Reporting, Including Preparation of Annual Reports and Five-Year Evaluations and Updates

As part of GSP implementation starting in 2022, the GSA must prepare and submit to the Department of Water Resources (DWR) annual reports and five-year assessments. Annual reports will be submitted to DWR by April 1st of each year and an initial five-year GSP assessment and update will be due to DWR by April 2027. Requirements for each of these reports are explained below.

Annual Reporting

Per Water Code Sections 10727.2, 10728, and 10733.2, SGMA regulations require the GSAs to submit an annual report on the implementation of the GSP to DWR. Development of the annual report will begin at the beginning of each water year, October 1, to assess the previous water year. The report will be submitted to DWR on April 1st of the following calendar year. A template for annual reporting is provided as Appendix 5-B. The annual reports will be completed in a format consistent with Section 356.2 of the SGMA regulations and will include three key sections: general information, Basin conditions and plan implementation progress.

General Information

General information will include a map of the Basin and an executive summary that includes a description of the sustainability goal, ongoing PMAs in the subbasin, jointly funded PMAs and their progress, as well as an updated implementation schedule.

Basin Conditions

This section will describe the current groundwater conditions and monitoring results, used to evaluate how groundwater conditions have changed in the Basin during the previous year. SGMA regulations require the following key components to be included in this section:

- Groundwater elevation data from monitoring wells, including (1) groundwater elevation contour maps for the principal aquifer in the Basin depicting seasonal high and low groundwater conditions, and (2) hydrographs of historical-to-current-reporting-year data showing groundwater elevations and water year type.
- Groundwater extractions during the preceding water year summarized by water use sector, including a map showing the general location and volume of groundwater extractions, as well as the method of measurement (direct or estimate) and accuracy of measurements. Metering of groundwater extraction is only included as a voluntary action and this information will be collected as the PMA is implemented, also based on availability of funding.
- Surface water supply for managed groundwater recharge or in-lieu use, including the annual volume and sources for the preceding water year.
- Total water uses by water use sector and water source type, including the method of measurement (direct or estimate) and accuracy of measurements.
- Maps of changes in groundwater storage for the principal aquifer and a graph depicting historical-to–current-reporting-year water year type, groundwater use, annual change in groundwater in storage, and the cumulative change in groundwater storage for the Basin. This information may change over time to incorporate potentially revised GSA priorities and to reflect new Basin conditions and applicable SGMA requirements.

Plan Implementation Progress

The progress made toward achieving interim milestones, as well as implementation of PMAs, will be explained in this section, along with a summary of plan implementation progress and sustainability progress.

Periodic Evaluations Every Five Years

Per Water Code Sections 10727.2, 10728, 10728.2, 10733.2, and 10733.8, SGMA regulations require the GSA to provide a written assessment of GSP implementation and progress towards meeting the sustainability goal at least every five years. A similar evaluation must also be submitted whenever the GSP is amended. The five-year assessment reports will be completed in a format consistent with Section 356.4 of the SGMA regulations and include the following elements:

Sustainability Evaluation

The overall Basin sustainability and current groundwater conditions for each applicable sustainability indicator will be described, including progress toward achieving interim milestones and measurable objectives (MO), and an evaluation of groundwater elevations at each of the representative monitoring points (RMPs) in relation to minimum thresholds (MT).

Plan Implementation Progress

This section will describe the current implementation status of PMAs, along with the effect on groundwater conditions resulting from their implementation, if applicable.

Reconsideration of GSP Elements

Elements of the GSP may require revision due to one or more of the following: collection of additional monitoring data during GSP implementation; implementation of PMAs; significant changes in groundwater uses or supplies and/or land uses. Such new information may require revision to the following GSP elements: Basin setting, water budgets, monitoring network, sustainable management criteria (SMCs), or PMAs.

Monitoring Network Description

This section will provide an assessment of the monitoring network's function, an analysis of data collected to date, a discussion of data gaps and the needs to address them, and identification of areas within the Basin that are not monitored in a manner commensurate with the requirements of Sections 352.4 and 354.34(c) of the SGMA regulations.

Consideration of New Information for Basin Setting and SMC

New information made available after GSP adoption will be described and evaluated. If new information would warrant a change to the GSP, including a re-evaluation of the Basin setting and SMC, then corresponding revised descriptions will be included in the five-year evaluation report.

Regulations or Ordinances

If DWR adopts new regulations that impacts GSP implementation, the update will also identify and address those requirements that may require updates to the GSP.

Legal or Enforcement Actions

Any enforcement or legal actions taken by the GSA or their member agencies to contribute to attainment of the sustainability goal for the Basin will be summarized.

Plan Amendments

Each five-year assessment report will include a description of amendments to the GSP, including adopted amendments, amendments that are underway during development of the report, and recommended amendments for future adoption.

Coordination

A summary of coordination that has occurred between Basin, with different agencies in the Basin, or with agencies with jurisdiction over land use and well construction will be incorporated in the five-year assessment report. The five-year assessments will also include any other information deemed appropriate by the GSA to support DWR in its periodic review of GSP implementation, as required by Water Code Section 10733.

5.1.2 Implementation

Monitoring Networks Summary

The SMC monitoring networks were developed leveraging current and ongoing monitoring to assess minimum thresholds (MT). A summary of the existing monitoring networks and planned expansion is presented in Table 5.1.

Groundwater Level and Storage

The current RMPs for the groundwater level and storage monitoring network currently includes 13 wells which are already part of the existing CASGEM network. The groundwater levels monitoring network combined with the current DWR CASGEM network serves as basis for assessing all SMCs with the exception of water quality. All 13 wells that have been selected for the groundwater level monitoring network are wells included in the CASGEM network and monitored by DWR twice per year. The current minimum monitoring frequency of twice each year (spring and fall) is used for all wells in the CASGEM network. Criteria for new wells is established in Chapter 3 and priorities listed in Appendix 3-A. Wells added to the monitoring network may be included among the RMPs in the five-years GSP update. If funding is secured, continuous sensors can be installed with telemetry to increase the frequency of monitoring and remove the need for monitoring site visits. Groundwater storage uses the levels monitoring network as a proxy and has no additional requirements.

Groundwater Quality

The seven existing wells selected for the water quality monitoring network are part of the Groundwater Ambient Monitoring and Assessment Program (GAMA) system. They are regularly monitored as municipal wells, but the frequency varies. The program seeks to augment the GAMA wells with additional wells for additional coverage (see Appendix 3-A). Results will be complemented with the ongoing monitoring undertaken by public health for the municipal wells mentioned above and included in the GAMA program. The monitoring plan will be augmented as needed if constituents will exceed the criteria or if specific increasing trends in constituent concentrations are observed.

Subsidence

DWR will periodically provide InSAR data that will be analyzed and assessed by the GSA for any occurrence or worsening subsidence trends.

Implementation of the monitoring Program Activities Described in Chapter 3

This category covers the functions associated with monitoring activities, including logistics and coordination with third party entities performing monitoring in the GSP Monitoring Network and any related monitoring data management. The GSP Monitoring Networks for groundwater level and groundwater quality, including the agencies performing that monitoring, are detailed in Chapter 3. A summary of existing and proposed

monitoring for the assessment of SMCs is presented in Table 5.1. The existing data in the first column of Table 5.1 are the representative monitoring points (RMPs) identified in Chapter 3 and will need to be monitored at the frequency specified and reported as part of the annual reports submitted by the GSA.

To address data gaps (extended data gap section is presented in Appendix 3-A) that are identified during GSP implementation, improvements to or expansion of the GSP Monitoring Network may be necessary. In that event, additional monitoring wells, monitoring well instrumentation; sampling and in-situ measurements; sample analysis; and associated data management and analysis may be required in the future. Costs for those facilities and activities are not addressed in this section.

Monitoring and data-related activities include:

- Groundwater Elevation Monitoring.
- Groundwater Quality Monitoring.
- Streamflow Monitoring.
- Monitoring data management (including data management system [DMS] maintenance), data validation (QA/QC), data entry and security, and data sharing.

Table 5.1: Monitoring and Planned Expansion for Sustainable Management Criteria in Butte Valley.

SMC	Wells (Existing)	Wells (New)	Measurement (Existing)	Measurement (New)	Other, Based on Future Funding Availability
Groundwater Levels	13 CASGEM wells	At least 2 wells (a) Additional wells dependent on funding	Measured at least 2x/year	(b)	See Appendix 3-A (Data Gap Appendix)
Storage	Groundwater Levels as Proxy				
Water Quality	7 wells	Dependent on funding	Once every two years, unless otherwise specified (see Chapter 3)(c) * Arsenic in 2 wells nearDorris * Nitrate as Nitrogen * Specific Conductivity	Once every 2 or 3 years (c)	See Appendix 3-A (Data Gap Appendix)
Subsidence	InSAR Data (d)	-	InSAR Data (d)	-	

a
Two additional wells (CASGEM and municipal well) to be added in 2025 – requires additional historical data.

b
Telemetry may be employed to increase data collection frequency and minimize field visits.

c
Minimum measurements for water quality will be once per year for the first two years of implementation. If there are no issues in water quality, measurements will be taken once every three years. Measurement may be more frequent if necessary to achieve monitoring objectives, or if the well is sampled at a greater measurement frequency as part of another monitoring program. Coordinate with existing GAMA water quality monitoring to obtain data.

d
InSAR data analyzed as it becomes available from DWR, but no more frequently than once every two years.

Technical Support, Including BVIHM Model Updates, SMC tracking, Other Data Analysis and Technical Support

Model updates – Management activities and ongoing performance evaluation of the SMC are informed by the Butte Valley Integrated Hydrogeologic Model (BVIHM) model output, which will require periodic updates and refinements as more data become available. Model updates and refinements help maintain, and potentially improve, the model functionality and its capabilities in providing more representative simulation results. These activities include incorporation of new model tools and features, data input and model parameter updates, calibration updates as additional data from the monitoring network and stream gauges is obtained, use of BVIHM to update water budgets, assess water usage, and assess the status of Basin-wide storage volumes, and related work to support ongoing simulations of PMAs, including recharge projects. Model updates may occur as frequent as annually and re-calibration is proposed to be completed every five to ten years.

SMC tracking – synthesis of data to analyze and track the status of compliance with SMC at the representative monitoring points (RMP) wells in the Monitoring Network. This information will comprise an essential element of the annual reports and five-year updates. A template for SMC tracking based on the annual report requirements from DWR is available in Appendix 5-B

Data analysis – Additional data analysis and associated technical support, outside of the GSA's resource capabilities, will be needed for annual reporting and five-year GSP update and outreach activities. The GSA will also have an ongoing need for technical support for the Basin management, such as vulnerability assessments for climate change, hydrologic technical support, assessment of managed aquifer recharge opportunities, economic and funding mechanisms assessments, and studies to address data gaps. It is anticipated that the GSA may also require various planning and programmatic support assistance for ongoing GSP- and SGMA-related requirements.

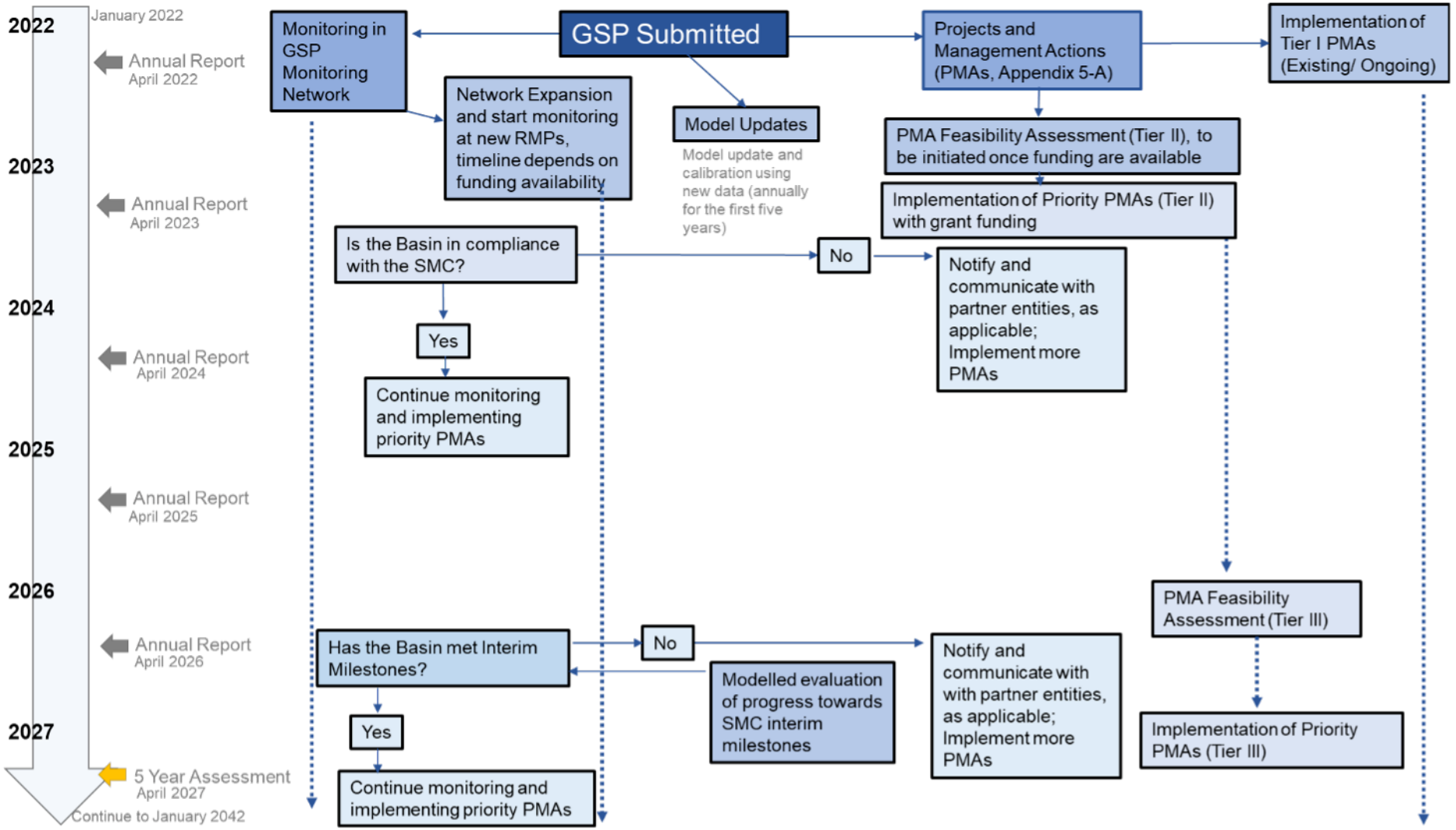

Figure 5.1: GSP implementation process for the first 5-years implementation. The road map is expected to be similar for the following 5-Year cycles

Results of the monitoring program activities inform GSA actions and next steps. The flowchart shown in Figure 5.1 illustrates the process and decision points for the first five years of GSP implementation. This process will be refined, as necessary, throughout the first five years of GSP implementation and will be updated in parallel with the five-year evaluations. Further detail on the prioritization and implementation timeline of PMAs can be found in the discussion of PMAs below, and in Appendix 5-A.

Projects and Management Actions Described in Chapter 4

Chapter 4 of this GSP identifies three different tiers of PMAs in the Basin, as follows:

1. Tier I: Existing PMAs that are currently being implemented and are anticipated to continue to be implemented.
2. Tier II: PMAs planned for near-term initiation and implementation (2022 to 2027) by individual member agencies.
3. Tier III: Additional PMAs that may be implemented in the future, as necessary (initiation and/or implementation 2027 to 2042).

The PMAs listed in Chapter 4 reflect a collection of potential options that may be employed to support the sustainability goals outlined in this plan. Although PMAs have been categorized into three tiers based on the anticipated timeframe for initiation and implementation, **these categorizations may change as additional monitoring data, information, and sources of funding are gained and as conditions change**. Tier I PMAs are anticipated to continue to be implemented throughout the GSP implementation period. A preliminary strategy for PMA prioritization and associated criteria, have been developed for PMAs. As a first step in Plan implementation, PMAs identified in the Tier II category will be ranked using criteria including the effectiveness, completeness, complexity, cost, uncertainty, and level of support for the project or management action. A full description of the criteria used in this evaluation and associated scoring system can be found in Appendix 5-A as well as a preliminary PMA assessment table. This preliminary prioritization step will be initiated immediately after submission of the GSP to provide the GSA with enough time to evaluate projects feasibility and include the selected projects into future funding requests. The GSA is expected to continue to refine this prioritization as more information on the feasibility, costs and anticipated benefits becomes available for these PMAs.

The management actions that will be undertaken by the GSA or in partnership with other entities active in the Basin, include:

- A variety of coordination activities, including:
  - Coordination with agencies with local land use authority.
  - Coordination with entities sponsoring major beneficial projects.
  - Coordination to support water use efficiency measures.
  - Coordination with Siskiyou County Environmental Health Division.

As a priority during the first months of GSP implementation, the Advisory Committee will meet and evaluate project management actions. Based on factors including ability to secure funding, effectiveness and feasibility of implementation, the Advisory Committee will recommend a prioritization scheme based on factors including ability to secure funding, effectiveness, and feasibility of implementation.

5.1.3 Outreach

Coordination Activities with Other Entities

The GSA will need to budget for ongoing coordination during GSP implementation. Coordination will be required with the following entities on the following topical areas:

- With agencies in the Basin with land use jurisdiction to identify and communicate regarding activities that may impact Basin sustainability.
- With water supply agencies, such as irrigation districts or municipal providers, to obtain updated information regarding water use efficiency programs, encourage such programs, and obtain information regarding the impacts of those programs on water demands.
- With entities sponsoring projects, such as recharge or efficiency improvements, in the Basin that will provide benefits to attainment of sustainability goals and objectives, including support for grant funding.
- With any other entities working in the Basin to support the sustainability goal and aspirational watershed goal, as applicable.

To achieve this coordination, the GSA will need to develop governance and communication processes to support these activities efficiently and effectively.

Outreach to Stakeholders

Activities under this element of the GSP implementation plan include continuation of education, outreach, and engagement with stakeholders, building off the framework and activities established in the Communication and Engagement Plan (C&E Plan), as described in Chapter 1. Such activities performed during GSP implementation include maintaining the Basin webpage on the County website and the online/social media presence, community meetings, workshops, and public events. These activities may also include electronic newsletters, informational surveys, coordination with entities conducting outreach to diverse communities in the Basin, and development of brochures and print materials. Decisions regarding the nature and extent of these outreach activities will be made by the GSA.

Continued Communication with Native American Indian Tribes

Once implementation begins, the GSA will initiate additional outreach with local Native American Indian Tribes, and in early 2022 look to establish regular coordination meetings to discuss aspects of implementing the GSP.

5.2 Estimate of GSP Implementation Costs

The implementation costs for the Butte Valley GSP will include funding for functions associated with the GSP implementation elements described above, including GSA management and administration, monitoring, technical support, data management, coordination, reporting, management actions, and outreach. GSP implementation costs will also cover the building of sufficient fiscal reserves to address other potential costs for the twenty-year implementation horizon.

Implementation of the GSP over the 20-year planning horizon is projected to cost between $120,000 and $210,000 per year. Table 5.2 summarizes the breakdown of these costs by implementation element. These costs are based on the best available estimates at the time of Plan development and may vary throughout the period of Plan implementation. Grant awards may offset some costs. If the GSA develops additional projects or management actions during the GSP implementation period, the cost estimates will be refined and reported to DWR through the annual reports or five-year periodic assessments.

Development of this GSP was funded largely through a Proposition 1 Groundwater Grant Program and Proposition 68 Grant. The GSA will pursue additional grant funding for GSP implementation as it is available. In the following analysis, it is assumed that the GSA will identify other sources of funding to cover GSP implementation costs.

Financial Reserves and Contingencies

To mitigate financial risks associated with expense overruns due to unanticipated expenditures and actual expenses exceeding estimated costs, the GSAs may carry a general reserve with no restrictions on the

types of expenses for which it can be used. Adoption of a financial reserves policy is authorized by SGMA Sections 10730(a) and 10730.2(a)(1). A reserve for operations usually targets a specific percentage of annual operating costs and may consider factors such as billing frequency and the recurrence of expenses to address cash flow constraints.

Total Implementation Costs Through 2042

The total annual cost is estimated at $165,000 to $260,000 based on the best available information at the time of Plan preparation and submittal. These costs include a grant writing component in addition to the costs of GSP implementation, discussed above and presented by major budget category in Table 5.2. The total annual cost was increased as part of the July 2024 GSP Revision to account for potential well mitigation costs expected over the GSP implementation period.

Table 5.2: Summary of Annual GSP Operation and Implementation Costs.

GSP Implementation Tasks	Recurring Annual Costs
GSA Management, Administration, Legal and Day-to-Day Operations	**$10,000-$25,000**
Administrative Staff Support /Accounting	TBD
GSA management and staff support	TBD
Legal support	TBD
Data management	TBD
Monitoring and Technical Support	
Technical Work: SVIHM maintenance	$40,000-$80,000
Monitoring, data analysis and management	$45,000-$60,000
GSP Reporting	
Annual Reports	$10,000-$15,000
5-Year GSP Assessments	$10,000
GSP Management Actions	
Management Action - Coordination activities	TBD
Ongoing Outreach Activities to Stakeholders	
Outreach & Education	$10,000-$20,000
Contingency	
Contingency (10%)	
TOTAL	**$120,000-$210,000**

5.3 Schedule for Implementation

The final GSP will be presented to the GSA Board for adoption in November or December 2021 and will be submitted to DWR no later than January 31, 2022. The preliminary schedule for agency administration, management, and coordination activities, GSP reporting, and community outreach and education are provided in Figure 5.2. While most activities are continuous during GSP implementation, annual reports will be submitted to DWR by April 1st of each year and periodic five-year assessment reports will be submitted to DWR by April 1st every five years after the initiation of Plan implementation in 2022 (i.e., assessment report submittal in 2027, 2032, 2037, and 2042).

	Start	2022-2042																				
		2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042
Data Management and Reporting																						
Milestones																						
GSP Submitted to DWR	January 2022	●																				
Groundwater Sustainability Goal Attained	January 2042																					●
Reporting																						
Annual Reporting	April 2022	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
5-Year Evaluations	April 2027						●					●					●					
Monitoring																						
Monitoring: Groundwater (all)	Continuous																					
Monitoring: Streamflow	Continuous																					
Monitoring: stream transects	Continuous																					
Groundwater Quality Monitoring Network Expansion	January 2022																					
Data Management	Continuous																					
Outreach and Education																						
Stakeholder Outreach and Education	Continuous																					
Projects and Management Actions																						
Tier I PMAs: ongoing	January 2022																					
Tier II PMAs feasibility study and prioritization upon funding availability	January 2022	●																				
Tier II PMAs: Implementation of highly prioritized PMAs (based on funding availability)	January 2023		●																			
Tier III PMAs Feasibility Study (based on funding availability)	January 2023			●																		

Figure 5.2: GSP implementation schedule.

5.4 Funding Sources and Mechanisms

SGMA authorizes GSAs to charge fees, such as pumping and permitting fees, to fund the costs of groundwater management and sustainability programs.

The GSA will pursue various funding opportunities from state and federal sources for GSP implementation. As the GSP implementation proceeds, the GSA will further evaluate funding mechanisms and fee criteria and may perform a cost-benefit analysis of fee collection to support consideration of potential refinements. A funding-options-analysis was conducted by SCI Consulting Group and the results of this analysis are presented as technical memorandum in Appendix 5-C. This technical memorandum summarizes the estimated costs for implementation, the recommended path to identify and prioritize funding during GSP implementation, and general funding recommendations. The recommended approach to funding is summarized in the "game plan," included on page 31 of Appendix 5-C, and shown below.

Game Plan:

1. Conduct community outreach regarding the Plan and its implementation.
2. Pursue use of existing revenue sources to fund implementation.
3. Pursue Grants and Loan Opportunities to fund implementation.
4. Implement Regulatory Fees to offset eligible implementation costs.
   If additional revenue is needed:
5. Conduct a survey and stakeholder outreach to better evaluate
   a. Community priorities and associated messaging.
   b. Optimal rate.
   c. Preference of non-balloted property-related fee versus special tax.
6. Use results of surveys, stakeholder input, and other analyses to develop a community outreach plan.
7. Implement community outreach.
8. Implement a property-related fee or special tax balloting:
   a. Include a cost escalator schedule or mechanism.
   b. Include the use of rate zones or other distinguishing factors.
   c. Do not include a rate expiration date (also known as a "Sunset Clause").
   d. Include a Discount Program to encourage better groundwater management by well owners.

Table 5.3 presents examples of potential financing options and the degree of certainty associated with each funding option. The "game plan" reflects an approach and order of priority given to seeking funding sources. The GSA is the lead in developing these funding sources, in partnership with other entities and agencies where appropriate. A working group will be convened in the first year of GSP implementation to identify and evaluate these funding sources.

Table 5.3: Potential Funding Sources for GSP Implementation.

Funding Source	Certainty
Feepayers (a)	High - User fees pay for operation and maintenance (O&M) of a utility's system. Depends upon rate structure adopted by the project proponent and the Proposition 218 rate approval process. Can be used for project implementation as well as project O&M.
General Funds or Capital Improvement Funds (of Project Proponents)	High - General or capital improvement funds are set aside by agencies to fund general operations and construction of facility improvements. Depends upon agency approval.
Special taxes, assessments, and user fees (within Project Proponent service area or area of project benefit)	High - Monthly user fees, special taxes, and assessments can be assessed by some agencies should new facilities directly benefit existing customers. Depends upon the rate structure adopted by the project proponent and the Proposition 218 rate approval process.
Bonds	Low - Revenue bonds can be issued to pay for capital costs of projects allowing for repayment of debt service over 20 to 30-year timeframe. Depends on the bond market and the existing debt of project proponents. Not anticipated in the Basin.
Integrated Regional Water Management (IRWM) implementation grants administered by the California Department of Water Resources (DWR)	Medium - Proposition 1, IRWM Implementation Grants.
Proposition 68 grant programs administered by various state agencies	Medium - Grant programs funded through Proposition 68, which was passed by California voters in June 2018, administered by various state agencies are expected to be applicable to fund GSP implementation activities. These grant programs are expected to be competitive, where $74 million has been set aside for Groundwater Sustainability statewide.
Disadvantaged Community (DAC) Involvement Program	Medium - DWR's DAC Involvement Program This program is not guaranteed to be funded in the future.

a Feepayers can be well-owners or property owners depending on the selected approach.

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Appendix 1-A Butte Valley Communication and Engagement Plan

Butte Valley Groundwater Basin
Stakeholder Communication and Engagement Plan




Butte Valley Groundwater Basin

Stakeholder Communication and Engagement Plan

Siskiyou County Groundwater Sustainability Agency.
2020. Butte Valley Groundwater Basin - Stakeholder Communication and Engagement Plan.
Siskiyou County, California. 17 pp.

Photo credits:
Main cover and irrigated field: Matt Parker; Dorris City Hall: Carol McKay; Birds: California Department of Fish and Wildlife, Butte Valley grasslands: US Forest Service.

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Overview of the Sustainable Groundwater Management Act

The purpose of the Sustainable Groundwater Management Act (SGMA), signed into law by former California Governor Jerry Brown in 2014, is to ensure local sustainable groundwater management in basins throughout the California, including in places like Butte Valley.

SGMA required eligible local agencies in over-drafted and medium/high priority basins to form Groundwater Sustainability Agencies (GSAs) by June 2017. Once formed, GSAs must prepare and submit Groundwater Sustainability Plans (GSPs) by January 2022 for evaluation by the Department of Water Resources (DWR), and then demonstrate sustainability within 20 years. Butte Valley is a medium priority basin and therefore must comply with SGMA.

SGMA defines six undesirable results for groundwater basins to avoid, includes a statutory framework and timelines for achieving sustainability, and identifies requirements GSAs must follow to engage the beneficial uses and users of groundwater within a basin. Moreover, regulations developed by DWR following the passage of SGMA specify needed documentation and evaluation of groundwater conditions within a basin, as well as the requirements for development and implementation of GSPs designed to achieve or maintain sustainability.[1]

In May, 2016, the California Water Commission unanimously adopted Final GSP Emergency Regulations to guide the GSP development process (California Water Code Section 10733.2). These regulations describe, among other things, the required contents of a GSP, including administrative information, an overview of the basin setting and water budget, sustainable management criteria, description of the groundwater monitoring network, and projects and management actions.

SGMA requires local GSAs to conduct broad stakeholder identification, communication and engagement during GSP development and implementation:

- "The groundwater sustainability agency shall encourage the active involvement of diverse social, cultural, and economic elements of the population within the groundwater basin prior to and during the development and implementation of the groundwater sustainability plan." (California Water Code Section 10727.8(a))
- "The groundwater sustainability agency shall consider the interests of all beneficial uses and users of groundwater." (California Water Code Section 10723.2)

To help guide the process of identifying and engaging local stakeholders, SGMA lists all the beneficial users of groundwater whose interests the GSA must consider:

- Agricultural users of water
- Domestic well owners
- Municipal well operators
- Public water systems
- Land use planning agencies
- Environmental users of groundwater
- Surface water users

[1] California Department of Water Resources. 2017. Draft – Best Management Practices for the Sustainable Management of Groundwater: Sustainable Management Criteria BMP.

- The federal government
- California Native American Tribes
- Disadvantaged communities (including those served by private domestic wells or small community water systems)
- Entities listed in Section 10927[2] that are monitoring and reporting groundwater elevations in all or part of a groundwater basin managed by the groundwater sustainability agency

DWR will evaluate and approve or disapprove GSPs within two years of submission. Once approved, GSPs will be re-evaluated by DWR for progress every five years. Local GSAs have 20 years to demonstrate full sustainability.

Plan Goals and Objectives

As a tool to assist the Siskiyou County GSA in meeting SGMA's stakeholder communication and engagement requirements, this plan will:

- Provide the GSA, Advisory Committee, community leaders and other beneficial users a roadmap to ensure broad understanding and consistent messaging of SGMA requirements
- Foster information sharing, communication and collaboration, and opportunities for stakeholders to have meaningful input on the GSA decision-making process
- Provide reasonable opportunities for interested stakeholders to receive and understand the technical groundwater information developed as part of the GSP process
- Ensure a collaborative GSP development and implementation process that is widely seen in the community as fair and respectful to the range of interested or affected stakeholders
- Assist the GSA in meeting all SGMA communication and engagement requirements

Specific objectives that will help the GSA achieve these overarching goals include the following:

- Educate stakeholders on:
  - Important SGMA requirements, events and milestones
  - The role, authorities and responsibilities of the local GSA in Siskiyou County
  - The Advisory Committee's role and how the public can stay informed or involved
  - The benefits of having a technically robust and broadly supported GSP
  - Potential changes to groundwater monitoring and management under SGMA
  - How the interests of beneficial uses and users will be considered under SGMA
- Develop strategies and communication mechanisms for obtaining broad stakeholder input and feedback that informs GSP development
- Coordinate outreach and engagement activities that foster information sharing, raise awareness and encourage public engagement in SGMA
- Ensure the needs, interests and perspectives of all beneficial uses and users are identified, documented and considered by the District Board
- Support local beneficial users to identify, preempt or otherwise proactively address and resolve different perspectives or conflicts over groundwater use and management
- Track all input received by beneficial users during the GSP development process and document District Board (GSA Board) responses as input is considered
- Develop strategies and communication mechanisms for long-term GSP implementation

[2] Entities that may assume responsibility for monitoring and reporting groundwater elevations in all or a part of a basin or subbasin in accordance with this section are listed here.

SGMA Implementation in Siskiyou County

In Siskiyou County SGMA implementation began with the formation of a local GSA and continues through a collaborative process that provides regular opportunities for public input.

Groundwater Sustainability Agency Formation

The Groundwater Sustainability Agency (GSA) for the Butte Valley Groundwater Basin is the Siskiyou County Flood Control and Water Conservation District (District). The Siskiyou County Board of Supervisors sits as the District Board and holds their District meetings during the regularly scheduled County Board of Supervisors meetings. The District is the only eligible local agency with jurisdiction over the entirety of the Butte, Scott and Shasta Valley groundwater basins. Early in the SGMA implementation process, District staff conducted countywide stakeholder workshops and garnered support to serve as the GSA for all three of these groundwater basins in the county, each of which must comply with SGMA. In its capacity as the GSA, the District will solicit and consider feedback on SGMA related issues from the public, and serve as the final decision maker in the GSP development and implementation process. The Siskiyou County Board of Supervisors also serves as a member of the Tulelake GSA, along with Tulelake Irrigation District, Modoc County, and the City of Tulelake.

Technical Support

Preparation of a GSP is a complex process that requires considerable research, discussion and deliberation before adoption. The GSA secured a DWR Sustainable Groundwater Management Grant Program Proposition 1[3] grant to support this collaborative SGMA effort[4]. This grant enabled contracting of a technical consulting team, Larry Walker Associates, to draft the GSP, conduct scientific studies, and build a groundwater monitoring network in each basin to inform GSP development and implementation. The technical consulting team will work with GSA staff and Advisory Committee members to outreach, network, and discuss with stakeholders in the basin regarding available technical information, studies and data gathering that would be beneficial for GSP development and implementation. Interaction between stakeholders and the technical consulting team will be valuable for substantive and extensive input into the GSP.

Facilitation Support

The GSA also leverage funds from DWR's Facilitation Support Services Program to secure impartial facilitation services of the Sacramento State University Consensus and Collaboration Program (CCP). CCP initially conducted a countywide situation assessment in order to gain insight and understanding of the range of issues, perspectives and interests on groundwater planning held by different stakeholders across Siskiyou County. As the GSP is developed, CCP will continue to support the District's efforts to engage stakeholders, tribes and the wider public at advisory, public and, as needed, special meetings. Continuation of facilitation support post-GSP submittal to DWR is contingent on available funding and if the use of impartial facilitation services are still considered necessary or warranted by District Board and staff, Advisory Committees and other interested parties.

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[3] Proposition 1 (Prop 1) or the Water Quality, Supply, and Infrastructure Improvement Act of 2014 authorized $7.545 billion in general obligation bonds for water projects including surface and groundwater storage, ecosystem and watershed protection and restoration, and drinking water protection.

[4] At a later date, additional grant sources may be added (e.g. Proposition 68 funds).

GSA Decision-Making

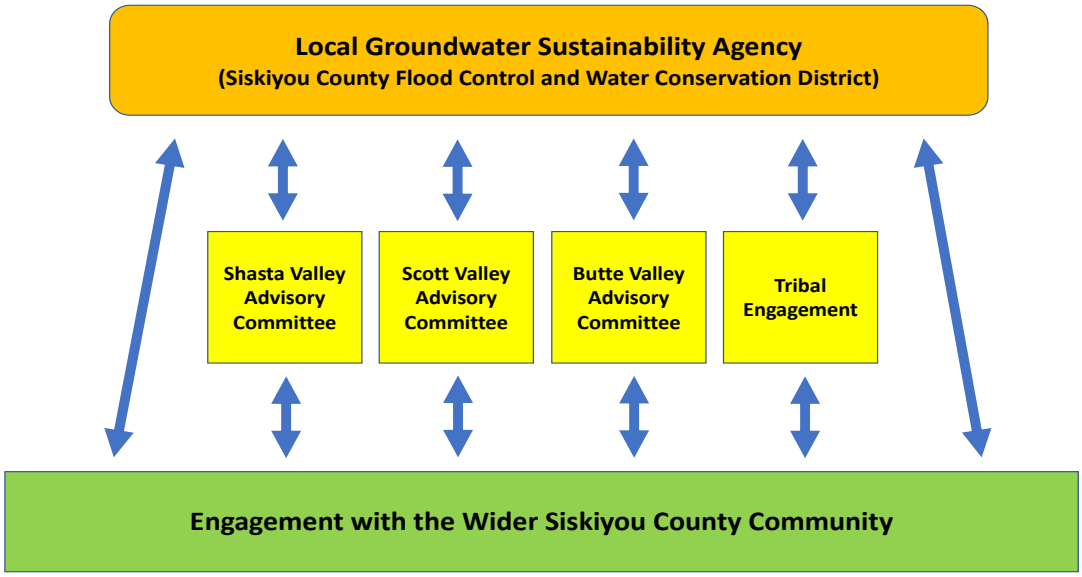
The District Board, in its capacity as the final decision-maker in the GSP process, will:

- Review and offer feedback on technical data, documentation, presentations, and other appropriate items as it pertains to SGMA and development of the GSP
- Review and make recommendations on appropriate studies, models, projects, and other technical needs that provide additional GSP-related information
- Identify and make recommendations on proposed groundwater management goals, objectives and strategies specific to the GSP
- Provide comments, recommendations, or suggestions on professional consultants, or technical experts, being considered to support local SGMA implementation
- Identify and review grant or funding opportunities that would provide financial support for GSP development and implementation
- Hear and offer feedback on GSP-related presentations by organizations, companies, consultants, or other necessary individuals or entities

GSA staff, with support from its technical and facilitation consultants, maintains a schedule that guides the collaborative GSP development and implementation process (see 'Phases of Groundwater Sustainability Development' below). The schedule is designed to integrate the social and technical elements of groundwater management planning, facilitate an open and transparent stakeholder engagement process, and provide a wide range of useful information that informs GSA decision-making.

The District Board will consider recommendations from a formally established Advisory Committee (described below) of diverse stakeholder interests when making SGMA decisions. If the District Board does not agree with committee recommendations or other input, it shall, as part of the process of tracking and responding to input received during the GSP development process, state the reasons for its decision.

Figure 1. Framework for Stakeholder Communication and Engagement



Stakeholder Advisory Committee

The District Board established the Butte Valley Groundwater Basin Advisory Committee (Advisory Committee) as a mechanism to secure local knowledge and insights as the GSP is developed. In its advisory role, the committee will review draft and final documents prepared by the SGMA technical team and provide the GSA with input and recommendations. Consensus building is a foundational principle of all committee discussions, and the group's membership is intended to reflect the diversity of beneficial groundwater users of Butte Valley (See Appendix I – Advisory Committee membership; see also Butte Valley Advisory Committee Charter).

Advisory Committee Goals

- Work collaboratively and transparently with other members to identify common goals, foster mutual understanding, and provide consensus recommendations to the District Board that help the District develop a locally informed and broadly supported GSP
- Develop a common understanding of all existing groundwater resources and groundwater/surface water interaction in the Butte Valley groundwater basin
- Solicit and incorporate community and stakeholder interests into committee discussions and emerging committee recommendations
- Consider and integrate science, as guided and with support from the District's qualified scientific consultants, when reviewing and commenting on GSP development and implementation
- Collaborate in good faith to achieve consensus recommendations; and to the extent consensus cannot be achieved, share with the District Board minority viewpoints as well
- Provide support to the GSA regarding implementation actions set forth in the GSP

Committee Member Roles

- Review and offer feedback on technical data, documentation, presentations, and other appropriate items as it pertains to SGMA and the development of the GSP
- Review and make recommendations on appropriate studies, models, projects, and other technical needs that will aid in developing additional information in relation to the GSP
- Identify and make recommendations on proposed groundwater management goals, objectives and strategies specific to the GSP
- Provide comments, recommendations, or suggestions on professional consultants, or technical experts, being considered by the District Board
- Identify and review grant or funding opportunities that would provide financial support for GSP development and implementation
- Hear and offer feedback on presentations by organizations, companies, consultants, or other necessary individuals or entities regarding the GSP

Tribal Engagement

To foster meaningful engagement with Native American Tribes, the GSA will maintain a government-to-government relationship with any tribe in Siskiyou County or the larger Klamath River watershed which expresses interest in SGMA. In addition, the GSA has appointed a tribal representative to the Advisory Committees for the Shasta Valley, Scott Valley and Butte Valley groundwater basins. Tribal representation on these committees is based on multiple factors, including cultural relationship to the area, ancestral territory and land held in trust or reservation

within a given basin. The GSA has begun developing communication protocols and coordination agreements with tribes who have voiced interest in SGMA. Individual tribes are recognized as sovereign tribal nations; no one tribe represents another. In Butte Valley, the Shasta Indian Nation is represented on the local SGMA Advisory Committee.

Community Involvement

To ensure broad public awareness and involvement as the GSP is developed, the GSA has tasked Advisory Committee members to act as liaisons to educate, inform and solicit input from the wider local community throughout the collaborative process. Key meetings and milestones during the process in which the general public is encouraged to attend and provide feedback on draft GSP content or other SGMA related issues include, but are not necessarily limited to:

- Bi-monthly Advisory Committee meetings when draft GSP sections are introduced, discussed or evaluated by members
- Advisory Committee engagement with constituents, with support as needed from GSA staff, during related meetings, events, and discussions by members,
- Stakeholder meetings led by GSA staff with participation from Advisory Committee members, Technical Consulting Team members and/or Facilitation Support Services
- Public comment periods when draft GSP sections are made available for review
- Regularly scheduled District Board meetings
- Special meetings that are scheduled, noticed in advance and open to the public

At key intervals during GSP development, the GSA will hold public meetings in order to share information, respond to questions or concerns about SGMA, and solicit input from the wider community. Interested parties can also reach out to District staff at any time to share and discuss specific elements of the GSP or SGMA in general.

Brown Act Compliance

All District Board and Advisory Committee meetings will operate in compliance with the Ralph M. Brown Act[5] (Brown Act). Each will be noticed and agendas posted in advance. Meetings are open to the public and allow public comment. The GSA will announce all meetings on its website and through regular communication channels, including a SGMA interested parties list.

Target Audiences

DWR created a stakeholder engagement chart to help GSAs identify and engage the range of beneficial groundwater users in a local basin that must comply with SGMA.[6] Table 1 below is a modified version which lists identified stakeholder groups in the Butte Valley community. Originally developed by GSA staff, the table has been reviewed and improved by the Butte Valley Advisory Committee. Interested parties may also assist the GSA in identifying all stakeholders who have an interest in or may be affected by SGMA. The table may be improved and updated at any time during the GSP development or implementation process. Listed groups represent a priority target audience for SGMA related communication and engagement.

[5] The Ralph M. Brown Act, located at California Government Code 54950 *et seq.*, is an act of the California State Legislature, authored by Assemblymember Ralph M. Brown and passed in 1953, that guarantees the public's right to attend and participate in meetings of local legislative bodies.

[6] *DWR Guidance Document for Groundwater Sustainability Plan: Stakeholder Communication and Engagement*.

Table 1. Butte Valley Stakeholder Groups

Interest Group	Engagement Purpose	Butte Valley Groups
General Public	Inform to improve public awareness of sustainable groundwater management	All beneficial users of groundwater
Land Use	Consult and involve to ensure land use policies are supporting GSPs	Siskiyou County Planning Commission
Private Users	Inform and involve to avoid negative impact to these users	Private Pumpers Domestic/Residential Users
Urban/Ag Users	Collaborate to ensure sustainable management of groundwater	Butte Valley Irrigation District; Siskiyou County Farm Bureau; Private agricultural pumpers; all local school districts; Siskiyou County Cattlemen's Association; Butte Valley/Lava Beds Resource Conservation District; Oregon/California RC&D
Industrial Users	Inform and involve to avoid negative impact to other users	None at this time
Environmental /Ecosystem	Inform and involve to sustain a vital ecosystem	North Groups Sierra Club/Sierra Club Water Chair; California Waterfowl; Ducks Unlimited; Rocky Mountain Elk Foundation; National Wild Turkey Federation; California Department of Fish and Wildlife
Economic Development	Inform and involve to support a stable economy	Siskiyou County Board of Supervisors; Siskiyou County Flood Control and Water Conservation District (acts as local GSA); Siskiyou Economic Development; Butte Valley Chamber of Commerce; Butte Valley Historical Association
Human Right to Water	Inform and involve to provide safe and secure groundwater supplies to disadvantages communities	City of Dorris; Macdoel; Mt. Hebron, local residents
NGOs/Local Associations/ Clubs	Inform, involve and collaborate to ensure basin sustainability	Siskiyou County Realtors Association; Siskiyou County Water Users; Dorris Lions Club; Local Granges
	Inform, involve and consult with tribal governments (See	Shasta Indian Nation

Native American Tribes	DWR Engagement with Tribal Governments Guidance Document[7])	Modoc Tribe of Oklahoma Karuk Tribe
State Land Management or Agencies	Inform, involve and collaborate to ensure basin sustainability	CDFW Butte Valley Wildlife Area; State Water Resources Control Board; North Coast Regional Water Quality Control Board; CALFIRE
Federal Lands/State Lands	Inform, involve and collaborate to ensure basin sustainability	US Forest Service/National Grasslands; Bureau of Land Management; US Geological Survey; National Marine Fisheries Service; USDA/NRCS; US Fish and Wildlife Service
Integrated Water Management	Inform, involve and collaborate to improve regional sustainability	North Coast Resource Partnership (DWR IRWM Region)

Phases of Groundwater Sustainability Plan Development

GSP development in the Butte Valley groundwater basin will occur in three major phases, with each phase offering significant opportunities for the public to provide input on draft material developed and presented by the GSA's technical consultants. Each phase will be linked to core elements of the GSP, including: 1) Introduction and Groundwater Basin Setting; 2) Sustainable Management Criteria; and 3) Project and Management Actions. Draft elements of the GSP will be developed and shared in a way that enables broad stakeholder input, fosters consensus building, and addresses the needs and interests of beneficial users throughout the basin.

The Advisory Committee will serve as the central forum where draft GSP sections will be presented and discussed. Committee members will regularly provide input and help the GSA and its technical team to refine and improve draft materials. Interested parties are also encouraged to attend and provide input at these meetings. GSP chapters with a broad level or even consensus support among committee members, including input from tribes and interested parties, will be presented to the District Board for consideration and approval. At this stage, the District Board may either approve draft GSP chapters or identify issues which require additional information from the technical consultants and more input from the Advisory Committee. A full draft of the GSP will be presented to all the aforementioned parties for final consideration prior to submittal of the document for evaluation by DWR.

At key stages during each phase of GSP development, draft materials that have been reviewed and refined by both the Advisory Committee and District Board will be made available on the county's website for public comment. Public workshops will also be held at this time with the purpose of sharing key messages associated with draft GSP material, soliciting input on draft material and communicating next steps in the GSP development process. A central goal of this

[7] *DWR Guidance Document for the Sustainable Management of Groundwater: Engagement with Tribal Governments.*

collaborative process is to achieve the highest level of agreement possible on the contents of the GSP by interested and affected parties. Viewed in this context, all three elements of stakeholder engagment represent important steps in the collaboration: Advisory Committee, tribal and interested party input; public comments, and District Board review and approval. Finally, SGMA requires the GSA to post a public notice of proposed adoption and hold a public hearing prior to formally adopting the GSP.

Figure 2: Iterative Process of GSP Development

A schedule has been developed which will guide the iterative process of developing and presenting draft sections of the GSP, and then securing input from committee members, the GSA Board and the public. The primary sections of the GSP—the basin setting, sustainable management criteria, and projects and management actions—will be developed and refined sequentially by phase. Following improvement of these sections through collaborative stakeholder engagement, the final sections, including the introduction to the GSP and view towards implementation, will be developed and shared for feedback. Finally, the full GSP will be assembled, then shared for final review by the committee, the GSA Board and the public. Primary actitivies and associated milestones by phase will include:

Phase 1: GSP Introduction and Basin Setting (September, 2019 – January, 2020)

Primary Activities

- 3-4 Advisory Committee meetings
- GSP draft section 2 (Basin Setting) introduced, reviewed and refined
- Basin setting, water budget and hydrologic model introduced, discussed and refined
- GSP draft chapter 2 prepared for Advisory Committee and GSA Board review
- Special meetings scheduled as needed to further discuss and improve draft materials

- 30-45 day public comment period on all draft materials developed under this phase

Key Milestones
Development and initial feedback secured on draft GSP section 2.0 (Plan Area and Basin Setting), including the following:

- 2.1 Description of the Plan Area (Reg. § 354.8)
- 2.11 Summary of Jurisditional Areas and Other Features (Reg. § 354.8 b)
    - 2.1.2 Water Resources Monitoring and Management Programs (Reg. § 354.8 c, d, e)
    - 2.1.3 Land Use Elements of Topic Categories of Applicable General Plans (Reg. § 354.8 f)
    - 2.1.4 Additional GSP Elements (Reg. § 354.8 g)
    - Notice and Communication (Reg. § 354.10)
- 2.2 Basin Setting
    - 2.2.1 Hydrogeologic Conceptual Model (Reg. § 354.14)
    - 2.2.2 Current and Historical Groundwater Conditions (Reg. § 354.16)
    - 2.2.3 Water Budget Information (Reg. § 354.18)
    - 2.2.4 Management Areas (as applicable) (Reg. § 354.20)

Phase 2: Sustainable Management Criteria (January – December 2020)

Primary Activities

- 7-8 Advisory Committee meetings; 2-3 GSA Board meetings and 1 public meeting
- GSP section 3 (Sustainable Management Criteria) introduced, discussed and refined
- Sustainability goal, measurable objectives and minimim thresholds, undesirable results and monitoring network introduced, discussed and refined
- Special meetings scheduled as needed to further discuss and improve draft materials
- 30-45 day public comment period on all draft materials developed under this phase
- Evaluate and, as needed, update stakeholder communication and engagement plan

Key Milestones
Development and initial feedback secured on draft GSP section 3.0 (Sustainable Management Criteria), including the following:

- 3.0 Sustainable Management Criteria (Reg. § 354.22)
    - 3.1 Sustainability Goal (Reg. § 354.24)
    - 3.2 Measurable Objectives (Reg. § 354.30)
    - 3.3 Minimum Thresholds (Reg. § 354.28)
    - 3.4 Undesirable Results (Reg. § 354.26)
    - 3.5 Monitoring Network (Reg. § 354.38)

Phase 3: Projects and Management Actions (September, 2020 – January, 2021)

Primary Activities

- Project and management actions, initially introduced and discussed during Sustainable Management Criteria (SMC) development, reviewed and refined

- 4 Advisory Committee meetings; 1-2 GSA Board meetings and 1 public meeting
- GSP draft section 4 (Projects and Management Actions) introduced, reviewed and refined
- Economical evaluation of the different management scenarios suggested
- Special meetings scheduled as needed to further discuss and improve draft materials
- 30-45 day public comment period on all draft materials developed under this phase

Key Milestones
Development and initial feedback secured on draft GSP section 4.0 (Projects and Management Actions to Achieve Sustainability Goal), including the following:

- 4.0 Projects and Management Actions
    - Project descriptions and discussion of possible project implementation
    - 4.1 Development of scenarios to be simulated with the groundwater model

Phase 4: Final Review, Implementation Steps Ahead and Local Plan Adoption (March, 2021 – December, 2021)

Primary Activities

- 3-6 Advisory Committee meetings, 2-4 GSA Board meetings, and 1-2 public meetings
- GSP draft section 5 (Plan Implementation) introduced, reviewed and refined
- Full GSP assembled, reviewed and refined/improved as needed, and made ready for public review
- Estimate of GSP implementation costs, schedule for implementation and annual reporting introduced, discussed and refined
- Special meetings scheduled as needed to further discuss and improve full draft GSP
- Evaluate and, as needed, update stakeholder communication and engagement plan
- 30-45 public comment period on all full draft GSP
- Public hearing held in advance of GSA Board adoption of GSP

Key Milestones

- Presentation, review and feedback on GSP introduction section and future implementation steps ahead:
    - Development and feedback secured on GSP introduction section
    - Development and feedback secured on draft GSP section 5.0 (Plan Implementation), including the following:
        - 5.1 Project descriptions and discussion of possible project implementation
- Presentation and, as needed, final refinements/improvements to full GSP
- GSA Board formally adopts GSP

Outreach Strategies, Forums and Tools

SGMA gives local GSAs wide discretion in how to conduct stakeholder communication and engagement. The Siskiyou County GSA will utilize the following outreach strategies, forums and tools to successfully meet all SGMA stakeholder engagement requirements:

Advisory Committee Meetings: The Butte Valley Groundwater Advisory Committee will gather for six regularly scheduled meetings each year in 2019 and 2020 along with potential

additional "Special Meetings" should such meetings be warranted, and on an as needed basis in 2021. The purpose of these meetings is for committee members to provide local insights, advice and recommendations during the GSP development process. The meetings also provide an important forum that enables interested parties to stay informed of SGMA activities and contribute to GSP development. Interested members of the public are encouraged to attend Advisory Committee meetings. GSA staff will keep a record of attendance, and track the various constituencies and interested parties which attend and contribute to GSP development.

Constituent Briefings: Advisory Committee members, and, as needed, GSA staff, will provide updates for, and solicit feedback from, their local constituent groups regarding ongoing SGMA activities. Briefings should inform key constituents about SGMA implementation, major milestones and achievements, and opportunities for voluntary participation in the groundwater monitoring program. Committee members will report back constituent input received at briefings to the full Advisory Committee for discussion and consideration.

Local Organizations: At times District Board members and staff, as well as Advisory Committee members, will share information and coordinate with established community organizations such as NGO's, irrigation districts, or localized interested parties by attending standing meetings and utilizing known communication channels. Additional coordination may occur through non-SGMA related forums, monthly information pieces in newsletters, or by disseminating information in any other manner that reaches the desired target audience.

Tribal Engagement: In addition to the role that tribal representatives will play on Advisory Committees, the GSA will, as noted, maintain a government-to-government relationship with any tribe in the Siskiyou County/Klamath River watershed region that expresses interest in participating in SGMA activities. The GSA will seek to foster trust building, provide the opportunity for tribes to have meaningful involvement, and create a forum by which sovereign tribes can communicate their respective needs and interests around SGMA. As noted earlier, the GSA has utilized DWR Facilitation Support Services to help develop and maintain positive relationships with interested tribes.

Public Meetings and Workshops: Public meetings and workshops will be held as needed at key milestones or as required by SGMA. These events can target specific geographic areas or be designed to welcome constituents from across the basin. At times, public meetings may be held in different locations across Siskiyou County. GSA staff, as well as the GSA's technical and facilitation consultants, will help plan and facilitate these events. Advisory Committee members and the District Board may play a support role.

District Board Meetings: GSA staff, with support from its technical and facilitation consultants, will provide regular updates to the District Board during the GSP development and implementation process. In turn, the District Board will provide guidance and direction to the overall SGMA implementation process. At times, Advisory Committee members, tribes or other interested parties may address the District Board regarding issues linked to SGMA. The District Board will provide a notice of intent and public hearing prior to formal adoption of the GSP.

Coordination with State and Federal Agencies: In order to ensure effective integration of distinct, yet oftentimes overlapping, water management and policy programs, the GSA will coordinate and share information, as needed, with state and federal agencies such as the California Department of Fish and Wildlife, Department of Water Resources, State Water Resources Control Board, US Fish and Wildlife Service and National Marine Fisheries Service.

Interested Parties List: GSA staff will maintain a interested parties email list that includes anyone interested in receiving information on SGMA in Siskiyou County during GSP development and implementation. Notification for public meetings and comment periods on draft GSP materials will be distributed through the interested parties list.

Integration of Relevant Studies/Materials: At times committee members or the public may be aware of useful studies, data or other information that can help inform the GSP development and implementation process. Committee members and others are encouraged to share relevant material with the local SGMA program coordinator, who in turn can bring these materials to the attention of the technical consultants and the Advisory Committee, and post documents for reference on the county's SGMA webpage.

Advisory Committee Meeting Announcements: Meeting agendas and handouts will be distributed to committee members and the interested parties list 72 hours prior to each meeting.

Social Media: Although not currently used, Facebook, Twitter, YouTube and other emerging social media technologies may be utilized to provide SGMA updates to interested parties.

Informational Materials: GSA staff, with support from both its consultants and Advisory Committee members, will jointly develop and utilize an array of informational materials to educate the public. These materials may include, but not necessarily be limited to, the following:

- Local SGMA brochures and key talking points
- Frequently asked questions about SGMA, the local GSA and the local GSP
- Existing and new educational materials
- Publicly available groundwater elevation or other related data
- Press releases, newspaper editorials and newsletter articles

Website: The GSA will regularly post and archive SGMA affiliated meeting materials on the county's established SGMA website (e.g. meeting agendas, presentations, summaries). The website will also serve as a repository for groundwater related reports, studies and other topical information discussed by the GSA or its Advisory Committees.

Media: Production of public service announcements, press releases or featured articles will expand awareness of SGMA and how interested parties can get involved. At important milestones advertisements or other announcements in local newspapers will provide information about public meetings, workshops and public comment periods on draft GSP materials.

Plan Evaluation and Adaptation

The Siskiyou County GSA will evaluate the effectiveness and efficacy of its stakeholder communication and engagement plan on, at minimum, an annual basis. Evaluations will likely

occur at or near key milestones, such as the completion of a major phase of work, as described above. Overarching questions that may guide the evaluation will include:

- Have all beneficial users been identified and effectively engaged?
- What has worked well and how can success be built on?
- What has not worked as planned and needs to change?
- What lessons learned will guide future stakeholder communication and engagement?

Appendix I – GSA Board, Staff and Advisory Committee Members

District Board of Directors

- Supervisor Brandon Criss, District 1
- Supervisor Ed Valenzuela, District 2
- Supervisor Michael Kobseff, District 3
- Supervisor Lisa Nixon, District 4
- Supervisor Ray Haupt, District 5

GSA Staff

- Elizabeth Nielson, Project Coordinator
- Matt Parker, Natural Resources Specialist

Advisory Committee Members

- Steve Albaugh, Private Pumper
- Don Bowen (Vice Chair), Residential
- Don Crawford, Private Pumper
- Patrick Graham, CDFW Butte Valley Wildlife Area
- Greg Herman, Private Pumper
- Steve Lutz, Butte Valley Irrigation District
- Carol Mckay, City of Dorris
- Richard Nelson (Chair), Private Pumper
- Jeff Volberg, Environmental/Conservation
- Howard Wynant, Shasta Indian Nation

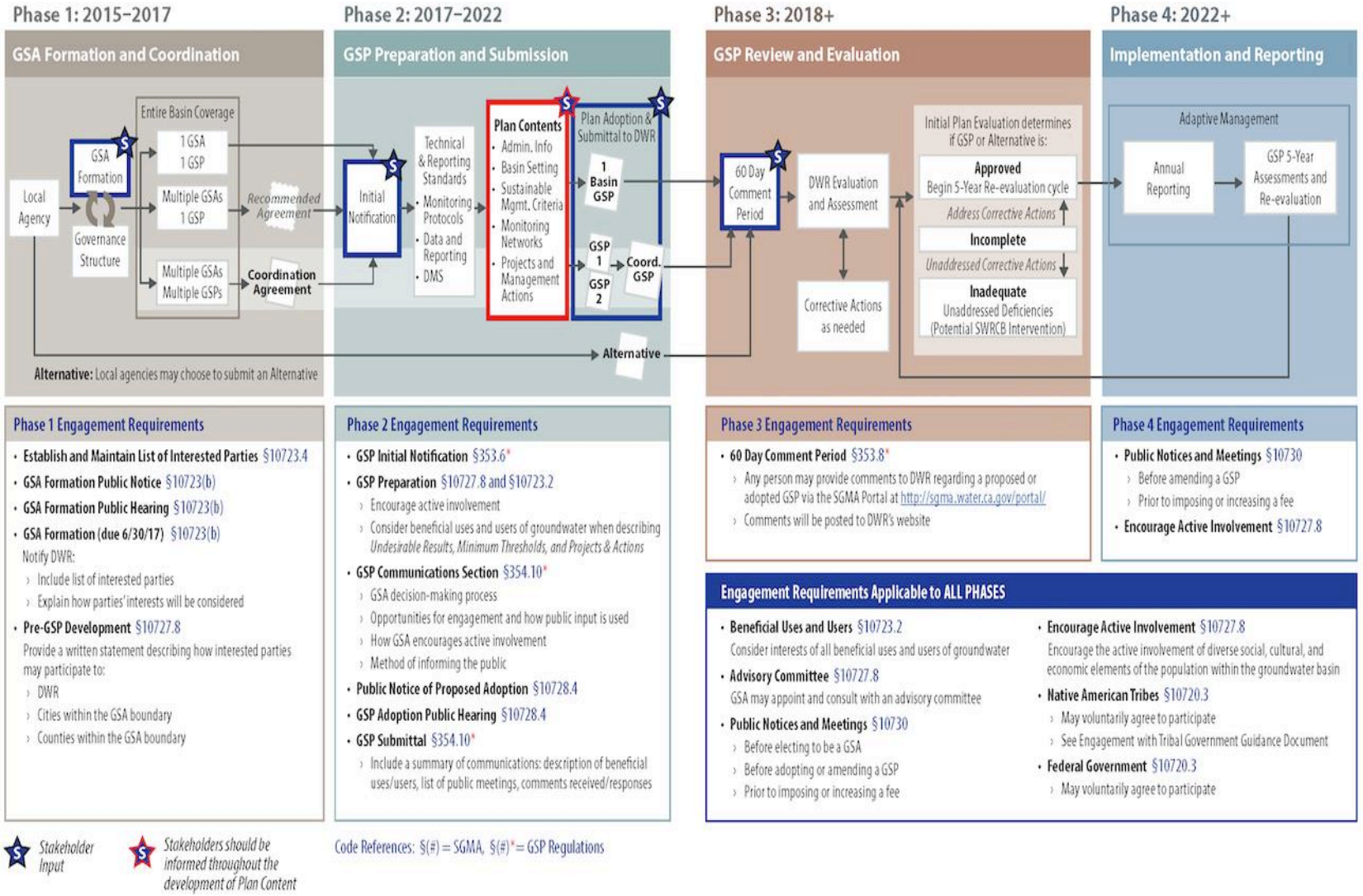
Appendix II – SGMA Educational Materials and References

DWR, and its many partners in academia and civil society, have developed a wide array of educational materials to assist GSAs, Advisory Committees and communities with SGMA implementation. Although not an exhaustive list, interested parties may educate themselves about SGMA with some of the following resources.

Table 2. SGMA Educational Resources

Educational Resource/Weblink	Publisher	Year
The 2014 Sustainable Groundwater Management Act: A Handbook to Understanding and Implementing the Law	Water Education Foundation	2015
Collaborating for Success: Stakeholder Engagement for Sustainable Groundwater Management Act Implementation	Community Water Center Clean Water Fund Union of Concerned Scientists	2015
Groundwater Sustainability Agency – Frequently Asked Questions	Department of Water Resources	2016
Groundwater Sustainability Plan Emergency Regulations (GSP Regulations)	Department of Water Resources	2016
Guidance Document for the Sustainable Management of Groundwater: Engagement With Tribal Governments	Department of Water Resources	2018
Guidance Document for Groundwater Sustainability Plan Stakeholder Communication and Engagement	Department of Water Resources	2018
TNC Groundwater Resource Hub	The Nature Conservancy	2018

Appendix III – SGMA Stakeholder Engagement Requirements



Source: Department of Water Resources (Updated June, 2017)

June 2020

Visit the Siskiyou County SGMA website for more information

OFFICIAL BUSINESS
Siskiyou County Administration
1312 Fairlane rd.
Yreka, California 96097

Appendix 1-B Record of Public Meetings

A list of official public meetings where the Butte Valley GSP was discussed is included below. Individual communication with agencies and other interested parties are not included in this list, though entities involved in targeted outreach or specific topic discussions are listed in Chapter 1.

Date	Meeting
4/5/18	Advisory Committee
7/19/18	Advisory Committee
12/12/18	Advisory Committee
1/24/19	Advisory Committee
4/25/19	Advisory Committee
5/30/19	Advisory Committee
9/4/19	Advisory Committee
11/7/19	Advisory Committee
1/30/20	Advisory Committee
3/5/20	Advisory Committee
4/16/20	Advisory Committee
5/28/20	Advisory Committee
9/3/20	Advisory Committee
10/15/20	Butte Valley SGMA Virtual Public Workshop
10/28/20	Advisory Committee
11/19/20	Advisory Committee
1/28/21	Advisory Committee
2/25/21	Advisory Committee
4/29/21	Advisory Committee
5/28/21	Advisory Committee
6/24/21	Advisory Committee
11/1/19	Chapter 2.1 Description and Plan Area Public Review Version
3/2/21	Chapter 3 Public Review Version (Water Quality and Subsidence)
4/23/21	Chapters 2, 3, 4 with appendices Public Review Version
6/15/21	Butte Valley Ad hoc Committee
9/15/21	Butte Valley GSP Open House and Public Comment Session

A record of all emails sent to the interested parties list is included below. These mostly represent meeting notices, informational notices, and other outreach materials.

2/2/18	Email
3/5/18	Email
3/16/18	Email
4/13/18	Email
4/17/18	Email
6/15/18	Email
7/3/18	Email
8/17/18	Email
10/16/18	Email
10/19/18	Email
1/7/19	Email
2/5/19	Email
3/22/19	Email
4/30/19	Email
5/7/19	Email
7/25/19	Email
11/8/19	Email
11/27/19	Email
12/11/19	Email
12/30/19	Email
1/14/20	Email
1/23/20	Email
1/27/20	Email
2/27/20	Email
4/9/20	Email
4/10/20	Email
5/5/20	Email
5/21/20	Email
6/19/20	Email
6/25/20	Email
8/31/20	Email
9/11/20	Email
9/21/20	Email
9/22/20	Email
10/6/20	Email
10/12/20	Email
10/15/20	Email
10/16/20	Email
10/22/20	Email

11/12/20	Email
11/17/20	Email
1/21/21	Email
2/18/21	Email
2/23/21	Email
2/25/21	Email
2/26/21	Email
3/2/21	Email
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6/3/21	Email
6/17/21	Email
6/18/21	Email
7/9/21	Email
7/15/21	Email
7/19/21	Email
8/6/21	Email
8/11/21	Email
8/13/21	Email
8/20/21	Email
8/27/21	Email
9/1/21	Email
9/13/21	Email
9/20/21	Email
10/1/21	Email
10/21/21	Email
10/22/21	Email
10/29/21	Email

Appendix 1-C Butte Valley Comment Response Summary

Butte Valley Groundwater Sustainability Plan Public Comment Summary

DRAFT

November 2021

Prepared for:

Siskiyou County Flood Control and Water Conservation District

Prepared by:

Stantec Consulting Services, Inc.

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November 2021

Table of Contents

LIST OF TABLES

ABBREVIATIONS

Advisory Committee	Butte Valley Groundwater Basin Advisory Committee
Board	County of Siskiyou Board of Supervisors
CIN	Comment Identification Number
County	County of Siskiyou
DAC	Disadvantaged Community
District	Siskiyou County Flood Control and Water Conservation District
DWR	California Department of Water Resources
GDE	Groundwater-Dependent Ecosystem
GL	Groundwater Level

GS	Groundwater Storage
GSA	Groundwater Sustainability Agency
GSP	Groundwater Sustainability Plan
ISW	Interconnected Surface Waters
Matrix	Comment and Comment Response Matrix
MCR	Multiple Comment Response
SGMA	Sustainable Groundwater Management Act of 2014
SMC	Sustainable Management Criteria
WQ	Water Quality

ATTACHMENTS

Attachment A – Notice to Cities, Counties, and Tribes

Attachment B – Annotated Comment Letters Received on Draft Groundwater Sustainability Plan

Attachment C – Butte Valley Groundwater Sustainability Plan Comment and Comment Response Matrix

BUTTE VALLEY GROUNDWATER SUSTAINABILITY PLAN
PUBLIC COMMENT SUMMARY

November 2021

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BUTTE VALLEY GROUNDWATER SUSTAINABILITY PLAN
PUBLIC COMMENT SUMMARY

November 2021

1.0 INTRODUCTION

This Public Comment Summary (Summary) describes the process and tools used by the Siskiyou County Flood Control and Water Conservation District (District) Groundwater Sustainability Agency (GSA) to solicit, review, and respond to public and stakeholder comments on the Draft Butte Valley Groundwater Sustainability Plan (GSP) and notify cities and counties within the plan area of the District's intent to adopt the GSP. These public review and notification processes were developed pursuant to the Sustainable Groundwater Management Act of 2014 (SGMA) and the California Department of Water Resources' (DWR) Groundwater Sustainability Plan Emergency Regulations, developed in May 2016.

California Code of Regulations (CCR) Title 23 Section (§) 355.4 provides the basis for DWR's determination of a GSP's compliance with SGMA and whether a GSP is likely to achieve the sustainability goal for the basin. As part of this criteria, DWR will consider:

> *(10) Whether the Agency has adequately responded to comments that raise credible technical or policy issues with the Plan. (§ 355.4(b)(10))*

This document reviews the GSA's actions to notify the public and other interested parties of the availability of the Draft GSP and the GSA's approach to soliciting, reviewing, and responding to technical and policy comments submitted by the public and other interested parties.

1.1 DOCUMENT FORMAT

This Summary is comprised of the following four sections:

- Section 1 – Introduction: Section 1 provides an overview of the purpose and structure of the document, as well as the GSP evaluation criteria for addressing comments on the GSP.
- Section 2 – Commenting Process: Section 2 describes the public comment process for the Draft GSP and method by which the GSA notified cities, counties, and Tribes within the plan area of the proposed plan. The notification letters are included as **Attachment A** to this Summary.
- Section 3 – Submitted Comments: Section 3 provides an overview of comment letters received on the Draft GSP during the public comment period. The comment letters in their entirety are included as **Attachment B** to this Summary.
- Section 4 – Comment Management and Review: Section 4 describes how the GSA reviewed and responded to comment letters received during the public comment period, including the processes for identifying and categorizing individual comments and responding to comments that raised credible technical and policy issues. This section also describes the tool used to manage the comments and comment responses. A copy of the final tool is provided as **Attachment C** to this Summary.

2.0 COMMENTING PROCESS

The GSA solicited public comments from individuals, agencies, and organizations representing beneficial uses and users of groundwater described in Water Code § 10723.2 as well as any other interested members of the public. This section describes the Draft GSP notification and public comment process. In addition, it describes the method by which the GSA notified cities and counties of availability of the Draft GSP, pursuant to California Water Code § 10728.4.

2.1 DRAFT GSP RELEASE AND PUBLIC COMMENT PERIOD

The District authorized the release of the Draft GSP on August 10, 2021. The Plan was released for public review and comment on Wednesday August 11, 2021, marking the beginning of a 45-day public comment period which ended on Sunday September 26, 2021. The GSA notified interested parties and members of the public of the release of the Draft GSP and public comment period through posting on the Siskiyou County website and an email sent out through the interested parties list.

Additional technical appendices to the Draft GSP were released during the public review and comment period on September 13, 2021. These appendices, listed below, provided supplemental, technical information only.

- Appendix 2D: Butte Model Documentation
- Appendix 2E: ET and Applied Water Estimates
- Appendix 2F: Butte Valley Wildlife Area Water Budget

The Draft GSP was available for review on the County of Siskiyou website throughout the public comment period. In addition, hard copies of the documents were made available for review at the following public locations:

- Dorris City Hall, 307 S. Main St, Dorris, CA 96023
- Butte Valley Library, 800 W 3rd St, Dorris, CA 96023

Members of the public were provided three methods to submit comment on the Draft GSP:

1. Hard copies of comments could be sent by mail or hand delivered to the GSA mailing address: 1312 Fairlane Rd, Yreka CA 96097 with Attention to SGMA.
2. Electronic copies of comment could be submitted to the GSA email address at SGMA@co.siskiyou.ca.us.
3. Comment cards could be written and returned at the September 15 and 16 GSP Open Houses.

2.2 NOTICE TO CITIES, COUNTIES, AND TRIBES

SGMA (as chaptered in California Water Code § 10728.4) requires that:

> *A groundwater sustainability agency may adopt or amend a groundwater sustainability plan after a public hearing, held at least 90 days after providing notice to a city or county within the area of the proposed plan or amendment. The groundwater sustainability agency shall review and consider comments from any city or county that receives notice pursuant to this section and shall consult with a city or county that requests consultation within 30 days of receipt of the notice. Nothing in this section is intended to preclude an agency and a city or county from otherwise consulting or commenting regarding the adoption or amendment of a plan.*

Pursuant to these regulations, the GSA notified cities and counties within the GSP area of its intention to adopt the GSP at least 90 days before adoption of the Final GSP. This notification included a letter sent to the City of Dorris, the Siskiyou County Board of Supervisors, and the Siskiyou County Planning Department on August 13 and 16, 2021. As a courtesy, the GSA also provided notice to the Yurok, Shasta Indian Nation, and Karuk Tribes. In addition to the letter, cities and counties were notified about release of the Draft GSP via postings on the Siskiyou County website. The requests for consultation as well as an example of the notification letter are included in **Attachment A** to this Summary.

2.3 PUBLIC AND STAKEHOLDER INPUT ON DRAFT GSP CHAPTERS

The GSA solicited input on the Draft GSP from stakeholders and members of the public through public meetings and workshops. The Butte Valley Groundwater Basin Advisory Committee (Advisory Committee) is composed of eleven individuals representing beneficial users of groundwater in the basin. The Advisory Committee includes representation from agricultural groundwater users, residential groundwater users, water and irrigation agencies or districts, environmental/conservation organizations, and Tribal governments. The group provides information and recommendations to the GSA Board. The Advisory Committee was actively involved and provided input in development of the Draft GSP. Draft GSP chapters were brought to the Advisory Committee for their review at regular public meetings and during internal public comment periods. Advisory Committee members also provided input on key GSP topics.

Members of the public had the opportunity to provide comments on Draft GSP chapters during public GSA Board meetings, Advisory Committee meetings, public workshops, and Draft GSP chapter public comment periods. The technical team also solicited comments via emails and phone calls with Advisory Committee members and other key stakeholders in the basin.

Draft GSP chapters and meeting materials were included in Advisory Committee and District meeting packets and posted on the District website. Preliminary drafts of GSP Chapters 2, 3, and 4 were made available on the GSA website to the public, Advisory Committee, and GSA Board on April 23, 2021. Draft Chapters 3 and 4 were also presented and discussed at the Board meeting on July 8, 2021.

The GSA also held two public workshops on August 17 and September 16 to inform and solicit input from stakeholders and members of the public about the content of the Draft GSP. The workshops were noticed via emails to the GSA's Interested Parties Database and on the District's website.

3.0 SUBMITTED COMMENTS

The GSA received two comment letters on the Draft GSP during the public comment period. Both letters were submitted from organizations representing beneficial uses and users of groundwater in the region, including state and federal agencies, special districts, and organizations representing environmental, and domestic users of groundwater. **Table 1,** shown below, provides the list of comments that were received on the Draft GSP, organized alphabetically by name. Copies of the comment letters received are provided in **Attachment B** to this Summary.

Table 1. Submitted Comments

Commenter or Agency Name	Commenter Type	Date Comment was Received
California Department of Fish and Wildlife	State Agency	9/23/2021
NGO Consortium	Non-Governmental Organizations	9/23/2021

4.0 COMMENT REVIEW AND RESPONSE

This section describes the process and tools the GSA used to review and respond to comments on the Draft GSP. Following the close of the public comment period, the GSA reviewed each comment letter to identify individual comments on the Draft GSP. To organize and manage the review of issue-specific comments, staff created a database, or matrix, that allowed for the categorization, grouping, and response to comments. This comment management approach is described below.

4.1 COMMENT MANAGEMENT

This subsection describes the process the GSA used to categorize each of the comment letters received on the Draft GSP and identify issue-specific comments for review and response. Of the two letters received, a total of 67 issue-specific comments applicable to the Draft GSP were identified. Each comment was assigned an individual comment identification number and entered into the database referred to as the Butte Valley GSP Comment and Comment Response Matrix (Matrix), further described below. GSA staff then used the Matrix to group technical or policy issues raised on the GSP, identify potential changes to the GSP to address comments, and develop comment responses.

4.1.1 Comment and Comment Response Matrix

The Matrix is an Excel database developed and used by GSA staff and consultants to categorize and respond to comments submitted on the Draft GSP. **Table 2** describes the types of information included in the Matrix. A copy of the completed Matrix is provided in **Attachment C** to this Summary.

Table 2. Butte Valley Groundwater Sustainability Plan Comment and Comment Response Matrix Columns

Matrix Column	Column Description
Author	Name of agency or organization that signed or submitted the comment letter.
Comment Identification Number (CIN)	Unique identifier assigned to each comment received. A single comment letter may contain multiple individual comments, each with its own comment identification number.
Multiple Comment Response (MCR) number	Comments that were similar in scope were grouped together based on the GSP sections or content they discussed. Each group of comments were assigned an MCR number, identified here.
Group	Comment grouping to facilitate structured review by Advisory Committee and GSA staff.
Sub-Category	Topic within the Draft GSP that the comment identifies with, describes, or otherwise raises questions about.
Description	Short description of the main topic or issues raised in the comment.
Code/Regulation	The code or regulation cited in the comment, if referenced.
Location in GSP	The chapter, page, and line number in the Draft GSP cited in the comment, if referenced.
Comment	Copies of the comment text directly from the comment letter.
Response/Recommended Action	Response or recommended action to address the comment.
Response Location in GSP	Location in Draft GSP text changes were made in response to comment, if applicable.

Key:
GSA = Groundwater Sustainability Agency
GSP = Groundwater Sustainability Plan

4.1.2 Sub-Categories

To aid the comment management process, GSA staff and consultants assigned all comments a sub-category based on the primary topic or issue the comment raised. The sub-categories were used to review similar comments and assign the appropriate subject-matter expert to develop the comment response. **Table 3** provides a list of these sub-categories.

Table 3. Groundwater Sustainability Plan Comment Sub-Categories

Acronym	Sub-Category
AL	Pumping Allocations/ Metering/ De Minimus Extractors/ Water Marketing/ Extraction – Water Accounting Framework
BR	Broader Regulations (such as: Endangered Species Act, Public Trust Doctrine)
DC	Disadvantaged Communities
DW	Domestic Wells
GA	GSA Organization
GD	Groundwater Dependent Ecosystems/ Environmental Beneficial Users
GE	General
GL	Groundwater Levels
GS	Groundwater Storage
GP	County General Plan
HM	Hydrogeologic Modeling
IS	Interconnected Surface Waters
LS	Land Subsidence
MA	Management Areas
MN	Monitoring Network
MU	Municipal Land/ Water Use
OR	Groundwater Sustainability Plan Organization
PM	Projects and Management Actions
PO	Public Outreach
SB	Subbasin Characteristics
TR	Transparency
WB	Water Budget/ Water Accounting Framework
WI	Well Inventory
WR	Water Resources/ Water Rights
WQ	Water Quality

4.1.3 Comment Groups

After assigning sub-categories and writing brief descriptions of the comments, GSA staff and consultants conducted a detailed evaluation of the scope, relevance, and importance of each individual comment. Through this activity, staff and consultants conducted an initial grouping, or prioritization, of these comments based, in part, on their applicability to 23 CCR § 355.4(b)(10). These groupings are further described below.

- **"Group A":** Comments were assigned to Group A if they raised substantial technical, policy, or legal issues most likely to be subject to 23 CCR § 355.4(b)(10). Of the 67 comments received, 28 were assigned to Group A.
- **"Group B":** Comments were assigned to Group B if they required additional evaluation or significant changes to the GSP and considered valid technical or policy issues for focused review. This included comments that referred to content and themes included throughout the GSP and would require more consideration to address. Of the 67 comments received, 24 comments were assigned to Group B.
- **"Group C":** Comments were assigned to Group C if they primarily raised editorial issues or could be addressed without requiring further technical evaluations or significant changes to the GSP text. For example, if a comment indicated that a certain passage or section of the GSP could be improved through a closer editorial review, it was categorized as Group C. Of the 67 comments, 15 were assigned to Group C and directly addressed by the GSA and consultant staff.

4.2 REVIEW AND RESPONSE

This subsection describes the approach and process GSA and consultant staff used to review, respond to, and address comments received on the Draft GSP and approval of amendments to the Draft GSP. This review and response process included preparation of draft multiple comment responses and a meeting of the Butte Valley Advisory Committee. These meetings, and their focus, are as noted in the following subsections.

4.2.1 Multiple Comment Responses

Comments of a similar nature were assigned a "Multiple Comment Response" or MCR. An MCR is a single response that applies to multiple comments of a similar nature. Draft MCRs pertaining to Group A comments were shared with the Advisory Committee in advance of the Comment Response Workshop. Based on feedback from the Workshop, the MCRs were finalized and are included in **Attachment C** to this Summary.

4.2.2 Comment Response Workshop

On October 28, 2021, the Butte Valley Advisory Committee held a publicly noticed meeting to review and respond to comments GSA staff and consultants had identified as Group A comments. A draft of the Matrix was provided to the Advisory Committee on October 22 and posted on the District website. Copies of the annotated comment letters were also distributed to the Advisory Committee and posted on the website. Committee members were invited to amend the priority designations of Group B and C comments; however, none were revised to Group A status. The Group A comments fell into the following major topics:

- Public Trust Doctrine
- Endangered Species Act

- Monitoring Networks
- Water Budgets
- Groundwater Dependent Ecosystems

Through a facilitated session, the GSA staff, consultants, and the Advisory Committee reviewed and provided staff direction, as appropriate, to approve or amend each of the staff-developed responses. The Advisory Committee reached a consensus vote on a recommendation to the District to adopt the Final GSP at its December 7 meeting, based on the agreed upon revisions to the Draft GSP.

4.2.3 Public Hearing <PLACEHOLDER>

On December 7, 2021, the Siskiyou County Board of Supervisors held a publicly noticed public hearing for adoption of the GSP. **Table 4** provides a summary of comments provided during the public comment period of the public hearing. The table provides the commenter's name and affiliation, the comment provided, and direction provided to staff by the GSA Board (if any). This meeting was recorded and posted to the County's website. Members of the public will be able to further comment and provide feedback on the GSP during DWR's established comment period under California Water Code § 10733.4. The GSA will continue to track written comments provided to DWR.

Table 4. Public Comments Received during the Public Hearing to Adopt <PLACEHOLDER>

Commenter Name	Commenter Affiliation	Comment Provided	Direction Provided to Staff by GSA Board

Attachment A – Notice to Cities, Counties, and Tribes

COUNTY OF SISKIYOU

Flood Control and Water Conservation District

P.O. Box 750 ▫ 1312 Fairlane Rd
Yreka, California 96097
www.co.siskiyou.ca.us

(530) 842-8005
FAX (530) 842-8013
Toll Free: 1-888-854-2000, ext. 8005

August 10, 2021
Attn: [Recipient]

Subject: Notice of Upcoming Hearing for Adoption of Groundwater Sustainability Plans

Dear [Recipient],

This letter is intended to provide the [Recipient] with notice of the Siskiyou County Flood Control and Water Conservation Districts (District) proposed adoption of a Groundwater Sustainability Plan (GSP) pursuant to California Water Code (CWC) section 10728.4. As required by the Sustainable Groundwater Management Act (SGMA) of 2014 (CWC §10720 et seq.), the District, acting as the Groundwater Sustainability Agency, must provide notice to a city or county within the area of the proposed GSP at least 90-days prior to holding a public hearing to adopt the GSP (CWC §10728.4).

The District has scheduled a public hearing to consider adoption of the Butte Valley, Shasta Valley and Scott River Valley GSP on December 7, 2021, at a time to be determined, during a meeting of the District, located in the Siskiyou County Board Chambers, 311 Fourth St, Yreka, CA 96097.

In accordance with CWC §10728.4, your city is eligible to request consultation with the District in advance of the public hearing. If you wish to consult with the District regarding the adoption of its GSP, please provide notice within 30 days of receipt of this letter.

You may also submit comments on the GSP during the scheduled public comment period. All relevant material, including instructions for commenting, can be found in a downloadable pdf format on the District's website at the following link: https://www.co.siskiyou.ca.us/naturalresources/page/sustainable-groundwater-management-act-sgma

If you have any questions, contact Matt Parker, Natural Resources Specialist at (530) 842-8019, or mparker@co.siskiyou.ca.us. This letter was approved by the Siskiyou County Board of Supervisors on August 10, 2021 by the following vote:

AYES: Director Criss, Kobseff, Valenzuela, Ogren and Haupt
NOES: None
ABSENT: None
ABSTAIN: None

Sincerely,

Ray A. Haupt, Chair
Siskiyou County Flood Control and Water Conservation District

Attachment B – Annotated Comment Letters Received on Draft Groundwater Sustainability Plan

September 26, 2021

Siskiyou County Flood Control and Water Conservation District
1312 Fairlane Road
Yreka, CA 96097

Submitted via email: lauraf@lwa.com; katie.duncan@stantec.com; sgma@co.siskiyou.ca.us

Re: Public Comment Letter for Butte Valley Draft Groundwater Sustainability Plan

Dear Laura Foglia,

On behalf of the above-listed organizations, we appreciate the opportunity to comment on the Draft Groundwater Sustainability Plan (GSP) for the Butte Valley Basin being prepared under the Sustainable Groundwater Management Act (SGMA). Our organizations are deeply engaged in and committed to the successful implementation of SGMA because we understand that groundwater is critical for the resilience of California's water portfolio, particularly in light of changing climate. Under the requirements of SGMA, Groundwater Sustainability Agencies (GSAs) must consider the interests of all beneficial uses and users of groundwater, such as domestic well owners, environmental users, surface water users, federal government, California Native American tribes and disadvantaged communities (Water Code 10723.2).

As stakeholder representatives for beneficial users of groundwater, our GSP review focuses on how well disadvantaged communities, drinking water users, tribes, climate change, and the environment were addressed in the GSP. While we appreciate that some basins have consulted us directly via focus groups, workshops, and working groups, we are providing public comment letters to all GSAs as a means to engage in the development of 2022 GSPs across the state. Recognizing that GSPs are complicated and resource intensive to develop, the intention of this letter is to provide constructive stakeholder feedback that can improve the GSP prior to submission to the State.

Based on our review, we have significant concerns regarding the treatment of key beneficial users in the Draft GSP and consider the GSP to be **insufficient** under SGMA. We highlight the following findings:

1. Beneficial uses and users **are not sufficiently** considered in GSP development.
    a. Human Right to Water considerations **are not sufficiently** incorporated.
    b. Public trust resources **are not sufficiently** considered.
    c. Impacts of Minimum Thresholds, Measurable Objectives and Undesirable Results on beneficial uses and users **are not sufficiently** analyzed.
2. Climate change **is not sufficiently** considered.

3. Data gaps **are not sufficiently** identified and the GSP **does not have a plan** to eliminate them.
4. Projects and Management Actions **do not sufficiently consider** potential impacts or benefits to beneficial uses and users.

Our specific comments related to the deficiencies of the Butte Valley Draft GSP along with recommendations on how to reconcile them, are provided in detail in **Attachment A.**

Please refer to the enclosed list of attachments for additional technical recommendations:

Attachment A	GSP Specific Comments
Attachment B	SGMA Tools to address DAC, drinking water, and environmental beneficial uses and users
Attachment C	Freshwater species located in the basin
Attachment D	The Nature Conservancy's "Identifying GDEs under SGMA: Best Practices for using the NC Dataset"

Thank you for fully considering our comments as you finalize your GSP.

Best Regards,

Ngodoo Atume
Water Policy Analyst
Clean Water Action/Clean Water Fund

J. Pablo Ortiz-Partida, Ph.D.
Western States Climate and Water Scientist
Union of Concerned Scientists

Samantha Arthur
Working Lands Program Director
Audubon California

Danielle V. Dolan
Water Program Director
Local Government Commission

E.J. Remson
Senior Project Director, California Water Program
The Nature Conservancy

Melissa M. Rohde
Groundwater Scientist
The Nature Conservancy

Attachment A

Specific Comments on the Butte Valley Draft Groundwater Sustainability Plan

1. Consideration of Beneficial Uses and Users in GSP development

Consideration of beneficial uses and users in GSP development is contingent upon adequate identification and engagement of the appropriate stakeholders. The (A) identification, (B) engagement, and (C) consideration of disadvantaged communities, drinking water users, tribes, groundwater dependent ecosystems, streams, wetlands, and freshwater species are essential for ensuring the GSP integrates existing state policies on the Human Right to Water and the Public Trust Doctrine.

A. Identification of Key Beneficial Uses and Users

Disadvantaged Communities, Drinking Water Users, and Tribes

The identification of Disadvantaged Communities (DACs), drinking water users, and tribes is **insufficient**. We note the following deficiencies with the identification of these key beneficial users.

- The GSP states that there are three Severely Disadvantaged Communities (SDACs) in the basin, but these areas are not mapped. — NGO-001
- The GSP provides a map of domestic well density in Figure 1.5, but fails to provide depth of these wells (such as minimum well depth, average well depth, or depth range) within the basin. — NGO-002
- The GSP fails to identify the population dependent on groundwater as their source of drinking water in the basin. Specifics are not provided on how much each SDAC community relies on a particular water supply (e.g., what percentage is supplied by groundwater). — NGO-003

These missing elements are required for the GSA to fully understand the specific interests and water demands of these beneficial users, and to support the development of sustainable management criteria and projects and management actions that are protective of these users.

RECOMMENDATIONS

- Provide a map of the SDACs in the basin. The DWR DAC mapping tool[1] can be used for this purpose. — NGO-001 cont.
- The statement on p. 2-11 that there are no DACs in the basin is confusing, since SDACs are a subset of DACs. Please remove or clarify this sentence.
- Include a map showing domestic well locations and average well depth across the basin. — NGO-002 cont.

[1] The DWR DAC mapping tool is available online at: https://gis.water.ca.gov/app/dacs/

- Identify the sources of drinking water for SDAC members, including an estimate of how many people rely on groundwater (e.g., domestic wells, state small water systems, and public water systems). NGO-003 cont.
- Describe the occurrence of tribal lands in the basin. If tribes have interests in the basin or if groundwater management within Butte Valley Basin will have impacts on downstream tribes, describe them in detail. NGO-004

Interconnected Surface Waters

The identification of Interconnected Surface Waters (ISWs) is **insufficient**. There is no map presented in the ISW section (Section 2.2.2.6) of stream reaches in the basin. NGO-005 The GSP provides a vague assessment of groundwater levels in the vicinity of stream reaches, with no specific details provided. NGO-006 The analysis concludes with the statement (p. 89): "Until the associated data gaps are addressed, Butte Creek is tentatively assumed disconnected from the Basin groundwater aquifer due to nearby deep groundwater levels."

The GSP acknowledges large data gaps for the determination of ISWs. However, given the gaps in groundwater level data and streamflow data, the stream reaches should be considered potential ISWs until further data can be gathered. Because the potential ISWs have not been identified, they cannot be adequately managed in the GSP. Until a disconnection can be proven, all potential ISWs should be included in the GSP. NGO-007 This is necessary to assess whether surface water depletions caused by groundwater use are having an adverse impact on environmental beneficial users of surface water.

RECOMMENDATIONS

- Provide a map showing all the stream reaches in the basin, with reaches clearly labeled with stream name and interconnected or disconnected. NGO-005 cont. Consider any segments with data gaps as potential ISWs and clearly mark them as such on maps provided in the GSP. NGO-007 cont.
- Provide depth-to-groundwater contour maps using the best practices presented in Attachment D, to aid in the determination of ISWs. Specifically, ensure that the first step is contouring groundwater elevations, and then subtracting this layer from land surface elevations from a digital elevation model (DEM) to estimate depth-to-groundwater contours across the landscape. This will provide accurate contours of depth to groundwater along streams and other land surface depressions where GDEs are commonly found. NGO-008
- Use seasonal data over multiple water year types (we recommend 10 years from 2005 to 2015) to capture the variability in environmental conditions inherent in California's climate, when mapping ISWs. NGO-009
- Reconcile ISW data gaps with specific measures (shallow monitoring wells, stream gauges, and nested/clustered wells) along surface water features in the Monitoring Network section of the GSP. Data gaps are discussed in general terms in the ISW section (Section 2.2.2.6), but very little detail is provided. NGO-007 cont.

Groundwater Dependent Ecosystems

The identification of Groundwater Dependent Ecosystems (GDEs) is **insufficient**, due to lack of clarity around the monitoring well data (well location and screen depth) used to map groundwater elevations and depth to groundwater. The GSP references TNC Best Practices for using the NC Dataset (2019) as the approach used to map depth to groundwater, using the difference between land surface elevation and interpolated groundwater elevation above mean sea level. However, the GSP does not further describe the monitoring well data (well location and screen depth) used to create the depth-to-groundwater maps. NGO-010

The GSP took initial steps to identify and map GDEs using the Natural Communities Commonly Associated with Groundwater dataset (NC dataset) and other sources. However, we found that some mapped features in the NC dataset were improperly disregarded, as described below.

- NC dataset polygons were incorrectly removed in areas adjacent to irrigated fields due to the presence of surface water. However, this removal criteria is flawed since GDEs, in addition to groundwater, can rely on multiple water sources – including shallow groundwater receiving inputs from irrigation return flow from nearby irrigated fields – simultaneously and at different temporal/spatial scales. NC dataset polygons adjacent to irrigated land can still potentially be reliant on shallow groundwater aquifers, and therefore should not be removed solely based on their proximity to irrigated fields. NGO-011
- NC dataset polygons were incorrectly removed based on the amount of time that they access groundwater. As presented in the GSP, assumed GDEs have access to groundwater >50% of time and assumed non-GDEs have access to groundwater <50% of the time. However, NC dataset polygons should not be assumed to be disconnected if there is any connection to groundwater (regardless of temporal percentage). Many GDEs often simultaneously rely on multiple sources of water (i.e., both groundwater and surface water), or shift their reliance on different sources on an interannual or inter-seasonal basis. NGO-012

RECOMMENDATIONS

- On the depth-to-groundwater level maps presented in Appendix 2-C, include the location of groundwater monitoring wells used to produce the maps. Discuss screening depth of monitoring wells and ensure they are monitoring the shallow principal aquifer. NGO-010 cont.
- Use depth-to-groundwater data from multiple seasons and water year types to verify whether polygons in the NC Dataset are supported by groundwater, instead of the incorrect criteria mentioned above (presence of irrigation water or less than 50% time connected to groundwater). NGO-012 cont.
- Refer to Attachment B for more information on TNC's plant rooting depth database. Deeper thresholds are necessary for plants that have reported maximum root depths that exceed the averaged 30 feet threshold, such as valley oak (*Quercus lobata*). We recommend that the reported max rooting depth for these deeper-rooted plants be used. For example, a depth-to-groundwater threshold of 80 feet should be used instead of the 30 feet threshold, when verifying whether valley oak polygons from the NC Dataset are connected to groundwater. It is important to re-emphasize that actual rooting depth data are limited and will depend on the plant species and site-specific conditions such as soil and aquifer types, and availability to other water sources. NGO-013

- If insufficient data are available to describe groundwater conditions within or near polygons from the NC dataset, include those polygons as "Potential GDEs" in the GSP until data gaps are reconciled in the monitoring network.

NGO-014

Native Vegetation and Managed Wetlands

Native vegetation and managed wetlands are water use sectors that are required[2,3] to be included into the water budget. The integration of native vegetation and managed wetlands into the water budget is **insufficient**, due to the absence of Appendix 2-D (Water Budget). We could not determine if the water budget included the current, historical, and projected demands of native vegetation and managed wetlands. The inclusion of explicit water demands for native vegetation and managed wetlands is crucial, so that key environmental uses of groundwater are accounted for as water supply decisions are made using this budget and considered in project and management actions.

NGO-015

RECOMMENDATION

- Include Appendix 2-D (Water Budget) in the GSP. Quantify and present all water use sector demands in the historical, current, and projected water budgets with individual line items for each water use sector, including native vegetation and managed wetlands.

NGO-015 cont.

B. Engaging Stakeholders

Stakeholder Engagement during GSP development

Stakeholder engagement during GSP development is **insufficient**. SGMA's requirement for public notice and engagement of stakeholders[4] is not fully met by the description in the Stakeholder Communication and Engagement Plan included in the GSP (Appendix 1-A).

NGO-016

The GSP describes outreach to tribal and environmental stakeholders in the basin and states that members of these groups are on the Stakeholder Advisory Committee. However, we note the following deficiencies with other aspects of the stakeholder engagement process:

- The opportunities for public involvement and engagement are described in very general terms. They include attendance at public meetings, stakeholder email list, and updates to

NGO-017

[2] "'Water use sector' refers to categories of water demand based on the general land uses to which the water is applied, including urban, industrial, agricultural, managed wetlands, managed recharge, and native vegetation." [23 CCR §351(al)]

[3] "The water budget shall quantify the following, either through direct measurements or estimates based on data: (3) Outflows from the groundwater system by water use sector, including evapotranspiration, groundwater extraction, groundwater discharge to surface water sources, and subsurface groundwater outflow." [23 CCR §354.18]

[4] "A communication section of the Plan shall include a requirement that the GSP identify how it encourages the active involvement of diverse social, cultural, and economic elements of the population within the basin." [23 CCR §354.10(d)(3)]

the GSP website. There is no specific outreach described for members of the SDAC communities or domestic well owners.

- The Stakeholder Communication and Engagement Plan does not include a plan for continual opportunities for engagement through the *implementation* phase of the GSP for SDACs, domestic well owners, and environmental stakeholders.

NGO-017

NGO-018

RECOMMENDATION

- In the Stakeholder Communication and Engagement Plan, describe active and targeted outreach to engage SDAC members, domestic well owners, and environmental stakeholders throughout the GSP development and implementation phases. Refer to Attachment B for specific recommendations on how to actively engage stakeholders during all phases of the GSP process.

NGO-016 cont.

C. Considering Beneficial Uses and Users When Establishing Sustainable Management Criteria and Analyzing Impacts on Beneficial Uses and Users

The consideration of beneficial uses and users when establishing sustainable management criteria (SMC) is **insufficient**. The consideration of potential impacts on all beneficial users of groundwater in the basin are required when defining undesirable results[5] and establishing minimum thresholds.[6,7]

Disadvantaged Communities and Drinking Water Users

For chronic lowering of groundwater levels, the GSP does not sufficiently describe or analyze direct or indirect impacts on domestic drinking water wells, DACs, or tribes when defining undesirable results. The GSP does not sufficiently describe how the existing minimum threshold groundwater levels are consistent with avoiding undesirable results in the basin. The GSP states (p. 3-34): "The minimum threshold is expected to cause as much as 15% well outages." This is the only quantitative statement made however, and it is not supported by data or analysis.

NGO-019

For degraded water quality, minimum thresholds for the following three constituents of concern (COCs) are set at the maximum contaminant levels (MCLs): nitrate, specific conductivity and arsenic. However, the GSP does not set SMC for the other COCs in the basin (boron, benzene, and 1,2-dibromoethane). The GSP states on p. 3-37 that because 1,2-dibromoethane and benzene are already being monitored and managed by the Regional Board through the Leaking Underground Storage Tank (LUST) program, SMC are not needed. The GSP states that since boron is naturally occurring, SMC are not needed. However, SMC should be established for all COCs in the basin, in addition to coordinating with water quality regulatory programs. Naturally occurring COCs can be exacerbated as a result of groundwater use or groundwater management within the basin.

NGO-020

[5] "The description of undesirable results shall include [...] potential effects on the beneficial uses and users of groundwater, on land uses and property interests, and other potential effects that may occur or are occurring from undesirable results." [23 CCR §354.26(b)(3)]

[6] "The description of minimum thresholds shall include [...] how minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests." [23 CCR §354.28(b)(4)]

[7] "The description of minimum thresholds shall include [...] how state, federal, or local standards relate to the relevant sustainability indicator. If the minimum threshold differs from other regulatory standards, the agency shall explain the nature of and the basis for the difference." [23 CCR §354.28(b)(5)]

The GSP only includes a very general discussion of indirect impacts to drinking water users when defining undesirable results and evaluating the cumulative or indirect impacts of proposed minimum thresholds. The GSP does not, however, mention or discuss direct and indirect impacts on DACs or tribes when defining undesirable results for degraded water quality, nor does it evaluate the cumulative or indirect impacts of proposed minimum thresholds on DACs or tribes. NGO-021

RECOMMENDATIONS

Chronic Lowering of Groundwater Levels

- Describe direct and indirect impacts on drinking water users, DACs, and tribes when describing undesirable results and defining minimum thresholds for chronic lowering of groundwater levels. NGO-019 cont.

Degraded Water Quality

- Describe direct and indirect impacts on drinking water users, DACs and tribes when defining undesirable results for degraded water quality. For specific guidance on how to consider these users, refer to "Guide to Protecting Water Quality Under the Sustainable Groundwater Management Act."[8] NGO-021 cont.
- Evaluate the cumulative or indirect impacts of proposed minimum thresholds for degraded water quality on drinking water users, DACs, and tribes.
- Set minimum thresholds and measurable objectives for boron, benzene and 1,2-dibromoethane. Ensure they align with drinking water standards[9]. NGO-020 cont.

Groundwater Dependent Ecosystems and Interconnected Surface Waters

Sustainable management criteria provided in the GSP do not consider potential impacts to environmental beneficial users. The GSP neither describes nor analyzes direct or indirect impacts on environmental users of groundwater or surface water when defining undesirable results. This is problematic because without identifying potential impacts to GDEs and beneficial users of interconnected surface waters, minimum thresholds may compromise, or even destroy, environmental beneficial users. Since GDEs are present in the basin, they must be considered when developing SMC for the basin. NGO-021 cont.

The GSP states that the depletion of interconnected surface water sustainability indicator is not applicable in the Basin, but this has not been proven. Chapter 2 of the GSP disregards ISWs due to data gaps. However, they should be retained as potential ISWs and preliminary SMC for the depletion of interconnected surface water sustainability indicator should be established. NGO-022

[8] Guide to Protecting Water Quality under the Sustainable Groundwater Management Act https://d3n8a8pro7vhmx.cloudfront.net/communitywatercenter/pages/293/attachments/original/1559328858/Guide_to_Protecting_Drinking_Water_Quality_Under_the_Sustainable_Groundwater_Management_Act.pdf?1559328858.

[9] "Degraded Water Quality [...] collect sufficient spatial and temporal data from each applicable principal aquifer to determine groundwater quality trends for water quality indicators, as determined by the Agency, to address known water quality issues." [23 CCR §354.34(c)(4)]

RECOMMENDATIONS

- When defining undesirable results for chronic lowering of groundwater levels, provide specifics on what biological responses (e.g., extent of habitat, growth, recruitment rates) would best characterize a significant and unreasonable impact to GDEs. Undesirable results to environmental users occur when 'significant and unreasonable' effects on beneficial users are caused by one of the sustainability indicators (i.e., chronic lowering of groundwater levels, degraded water quality, or depletion of interconnected surface water). Thus, potential impacts on environmental beneficial uses and users need to be considered when defining undesirable results[10] in the basin. Defining undesirable results is the crucial first step before the minimum thresholds[11] can be determined.

NGO-023

- Establish preliminary SMC for the depletion of interconnected surface water sustainability indicator, that can be refined when data gaps are filled. When defining undesirable results for depletion of interconnected surface water, include a description of potential impacts on instream habitats within ISWs when defining minimum thresholds in the basin[12]. The GSP should confirm that minimum thresholds for ISWs avoid adverse impacts to environmental beneficial users of interconnected surface waters as these environmental users could be left unprotected by the GSP. These recommendations apply especially to environmental beneficial users that are already protected under pre-existing state or federal law[6,13].

NGO-022 cont.

2. Climate Change

The SGMA statute identifies climate change as a significant threat to groundwater resources and one that must be examined and incorporated in the GSPs. The GSP Regulations[14] require integration of climate change into the projected water budget to ensure that projects and management actions sufficiently account for the range of potential climate futures.

The integration of climate change into the projected water budget is **incomplete**. The GSP does incorporate climate change into the projected water budget using DWR change factors for 2030 and 2070. The GSP also considers multiple climate scenarios (e.g., the 2070 extremely wet and extremely dry climate scenarios) in the projected water budget. The GSP includes climate change into key inputs (e.g., precipitation, evaporation, and surface water flow) of the projected water budget. However, we are

NGO-024

NGO-024 cont.

[10] "The description of undesirable results shall include [...] potential effects on the beneficial uses and users of groundwater, on land uses and property interests, and other potential effects that may occur or are occurring from undesirable results". [23 CCR §354.26(b)(3)]

[11] The description of minimum thresholds shall include [...] how minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests." [23 CCR §354.28(b)(4)]

[12] "The minimum threshold for depletions of interconnected surface water shall be the rate or volume of surface water depletions caused by groundwater use that has adverse impacts on beneficial uses of the surface water and may lead to undesirable results." [23 CCR §354.28(c)(6)]

[13] Rohde MM, Seapy B, Rogers R, Castañeda X, editors. 2019. Critical Species LookBook: A compendium of California's threatened and endangered species for sustainable groundwater management. The Nature Conservancy, San Francisco, California. Available at: https://groundwaterresourcehub.org/public/uploads/pdfs/Critical_Species_LookBook_91819.pdf

[14] "Each Plan shall rely on the best available information and best available science to quantify the water budget for the basin in order to provide an understanding of historical and projected hydrology, water demand, water supply, land use, population, climate change, sea level rise, groundwater and surface water interaction, and subsurface groundwater flow." [23 CCR §354.18(e)]

concerned that the selected period is from 1991-2011 and therefore it does not include the drought from 2012-2016. We look forward to reading Appendix 2-D (Water Budget) in the next draft of the GSP to learn about how you are integrating drought risk in your future water budget.

NGO-024 cont.

The GSP does not calculate a sustainable yield based on the projected water budget with climate change incorporated, but instead states that the sustainable yield will vary over time as new project and management actions are added. The GSP states (p. 2-126): "The sustainable yield is not a number that is constant over time, as future conditions may decrease or increase the amount of groundwater that can be withdrawn without causing undesirable results" and continues: "For every implementation of a PMA resulting in the reduction in groundwater pumping, including some conservation easements, there is a commensurate downward adjustment in sustainable yield. The exact amount of that adjustment varies over time and will depend on the future portfolio of PMAs implemented (see chapters 3 and 4). Without the automatic adjustment of the sustainable yield to future agreed-upon reductions in groundwater pumping, other water users in the Basin may claim that the reduction in groundwater pumping, e.g., for in lieu recharge, makes groundwater available for pumping elsewhere or at other times, up to the (constant) limit of the sustainable yield. This must be avoided to successfully manage the basin." Keep in mind that sustainable yield is a legally required component of SGMA and necessary for informing what project and management actions are necessary in the basin. If sustainable yield is not calculated, then there is also increased uncertainty in virtually every subsequent calculation used to plan for projects, derive measurable objectives, and set minimum thresholds. Plans that do not explicitly calculate sustainable yield may underestimate future impacts on vulnerable beneficial users of groundwater such as ecosystems, DACs, domestic well owners, and tribes.

NGO-025

NGO-025 cont.

RECOMMENDATIONS

- Include Appendix 2-D (Water Budget) in the next draft of the GSP, so that the manner in which climate change is incorporated into the water budgets is fully explained. NGO-024 cont.
- Estimate sustainable yield based on the projected water budget with climate change incorporated, to inform the basis for development of projects and management actions. NGO-025 cont.
- Incorporate climate change scenarios into projects and management actions. NGO-026 cont.

3. Data Gaps

The consideration of beneficial users when establishing monitoring networks is **insufficient**, due to lack of specific plans to increase the Representative Monitoring Points (RMPs) in the monitoring network that represent water quality conditions and shallow groundwater elevations around DACs, domestic wells, GDEs, and ISWs. Beneficial users of groundwater may remain unprotected by the GSP without adequate monitoring and identification of data gaps in the shallow aquifer. The Plan therefore fails to meet SGMA's requirements for the monitoring network[15].

NGO-027

The GSP includes a data gap assessment (Appendix 3-A) that identifies and prioritizes data gaps in the monitoring networks. Thus while the GSP recognizes the importance of filling data gaps, it does not provide specific plans, well locations shown on a map, or a timeline to fill the data gaps. The GSP states (p. 3-6): "These additional monitoring or information requirements depend on future availability of funding

NGO-027 cont.

[15] "The monitoring network objectives shall be implemented to accomplish the following: [...] (2) Monitor impacts to the beneficial uses or users of groundwater." [23 CCR §354.34(b)(2)]

and are not yet considered among the GSP Representative Monitoring Points (RMPs). They will be considered as potential RMPs and may eventually become part of the GSP network at the 5-year GSP update." However, the additional RMPs should be included in the GSP now, instead of included in the 5-year GSP update. Without a map of proposed new monitoring well locations, a determination cannot be made regarding the adequacy of the monitoring network for sustainability indicators going forward into the GSP implementation phase. NGO-027 cont.

RECOMMENDATIONS

- Provide maps that overlay current and proposed monitoring well locations with the locations of DACs, domestic wells, GDEs, and ISWs to clearly identify potentially impacted areas. Increase the number of representative monitoring points (RMPs) across the basin as needed to adequately monitor all groundwater condition indicators. Prioritize proximity to GDEs and drinking water users when identifying new RMPs. NGO-028 NGO-029
- Provide specific plans to fill data gaps in the monitoring network. Evaluate how the gathered data will be used to identify and map GDEs and ISWs, and identify DACs and shallow domestic well users that are vulnerable to undesirable results. NGO-030
- Further describe the biological monitoring that will be used to assess the potential for significant and unreasonable impacts to GDEs or ISWs due to groundwater conditions in the basin. Section 4.4 mentions the use of satellite images to evaluate the status of GDEs, however no further details are provided in the GSP. NGO-031

4. Addressing Beneficial Users in Projects and Management Actions

The consideration of beneficial users when developing projects and management actions is **insufficient**, due to the failure to completely identify benefits or impacts of identified projects and management actions to beneficial users of groundwater such as DACs and drinking water users. NGO-032

We commend the GSA for including projects and management actions with explicit benefits to the environment (e.g., the Abandonment of Sam's Neck Flood Control Facility and Kegg Meadow Enhancement and Butte Creek Channel Restoration). The GSP discusses how these projects will benefit ecosystems, but does not discuss the manner in which DACs, drinking water users, and tribes may be benefitted or impacted by projects and management actions identified in the GSP. Therefore, potential project and management actions may not protect these beneficial users. Groundwater sustainability under SGMA is defined not just by sustainable yield, but by the avoidance of undesirable results for *all* beneficial users. NGO-032 cont.

RECOMMENDATIONS

- For DACs and domestic well owners, include further discussion of a drinking water well impact mitigation program to proactively monitor and protect drinking water wells through GSP implementation. The GSP describes a well replacement program in Section 4.3 (Tier II PMAs), but no details are provided. Refer to Attachment B for specific recommendations on how to implement a drinking water well mitigation program. NGO-033

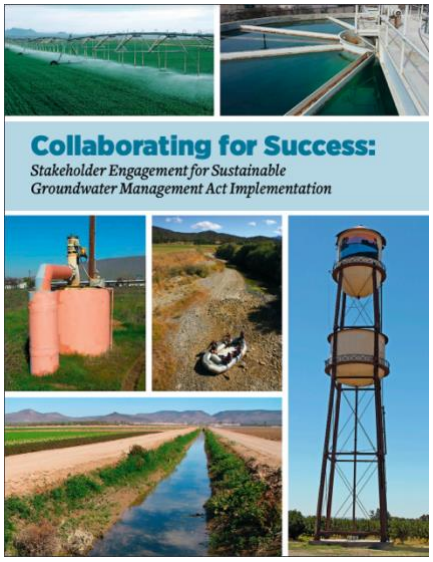
- For DACs, domestic well owners, and tribes, include a discussion of whether potential impacts to water quality from projects and management actions could occur and how the GSA plans to mitigate such impacts. NGO-034
- Recharge ponds, reservoirs, and facilities for managed stormwater recharge can be designed as multiple-benefit projects to include elements that act functionally as wetlands and provide a benefit for wildlife and aquatic species. For guidance on how to integrate multi-benefit recharge projects into your GSP, refer to the "Multi-Benefit Recharge Project Methodology Guidance Document"[16]. NGO-035
- Develop management actions that incorporate climate and water delivery uncertainties to address future water demand and prevent future undesirable results. NGO-036

[16] The Nature Conservancy. 2021. Multi-Benefit Recharge Project Methodology for Inclusion in Groundwater Sustainability Plans. Sacramento. Available at: https://groundwaterresourcehub.org/sgma-tools/multi-benefit-recharge-project-methodology-guidance/

Attachment B

SGMA Tools to address DAC, drinking water, and environmental beneficial uses and users

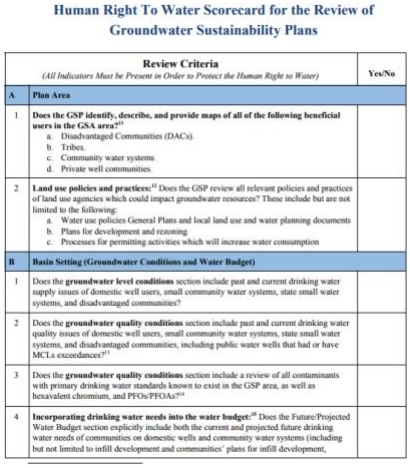
Stakeholder Engagement and Outreach



Clean Water Action, Community Water Center and Union of Concerned Scientists developed a guidance document called Collaborating for success: Stakeholder engagement for Sustainable Groundwater Management Act Implementation. It provides details on how to conduct targeted and broad outreach and engagement during Groundwater Sustainability Plan (GSP) development and implementation. Conducting a targeted outreach involves:

- Developing a robust Stakeholder Communication and Engagement plan that includes outreach at frequented locations (schools, farmers markets, religious settings, events) across the plan area to increase the involvement and participation of disadvantaged communities, drinking water users and the environmental stakeholders.
- Providing translation services during meetings and technical assistance to enable easy participation for non-English speaking stakeholders.
- GSP should adequately describe the process for requesting input from beneficial users and provide details on how input is incorporated into the GSP.

The Human Right to Water

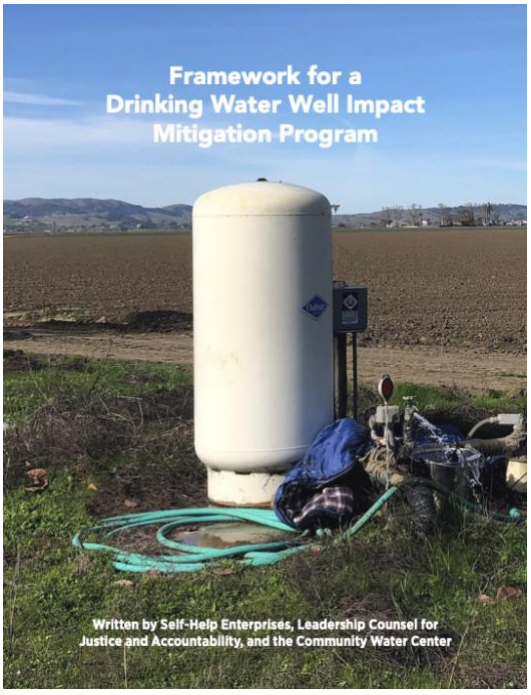


Human Right To Water Scorecard for the Review of Groundwater Sustainability Plans

	Review Criteria *(All Indicators Must be Present in Order to Protect the Human Right to Water)*	Yes/No
A	**Plan Area**	
1	**Does the GSP identify, describe, and provide maps of all of the following beneficial users in the GSA area?**[43] a. Disadvantaged Communities (DACs). b. Tribes. c. Community water systems. d. Private well communities.	
2	**Land use policies and practices:**[44] Does the GSP review all relevant policies and practices of land use agencies which could impact groundwater resources? These include but are not limited to the following: a. Water use policies General Plans and local land use and water planning documents b. Plans for development and rezoning c. Processes for permitting activities which will increase water consumption	
B	**Basin Setting (Groundwater Conditions and Water Budget)**	
1	Does the **groundwater level conditions** section include past and current drinking water supply issues of domestic well users, small community water systems, state small water systems, and disadvantaged communities?	
2	Does the **groundwater quality conditions** section include past and current drinking water quality issues of domestic well users, small community water systems, state small water systems, and disadvantaged communities, including public water wells that had or have MCLs exceedances?[45]	
3	Does the **groundwater quality conditions** section include a review of all contaminants with primary drinking water standards known to exist in the GSP area, as well as hexavalent chromium, and PFOs/PFOAs?[46]	
4	**Incorporating drinking water needs into the water budget:**[47] Does the Future/Projected Water Budget section explicitly include both the current and projected future drinking water needs of communities on domestic wells and community water systems (including but not limited to infill development and communities' plans for infill development,	

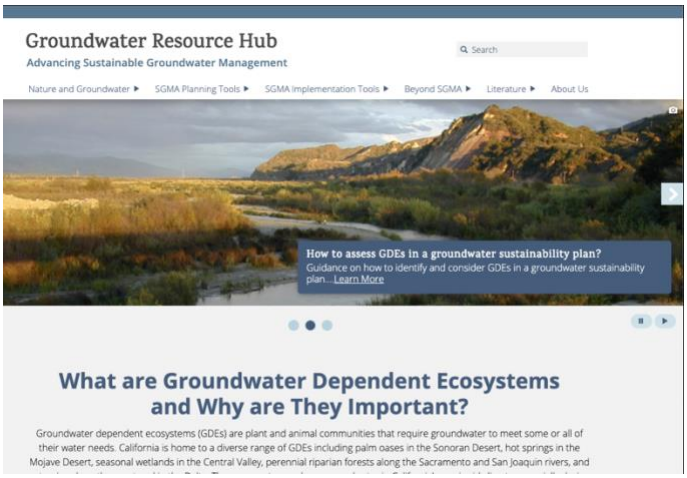
The Human Right to Water Scorecard was developed by Community Water Center, Leadership Counsel for Justice and Accountability and Self Help Enterprises to aid Groundwater Sustainability Agencies (GSAs) in prioritizing drinking water needs in SGMA. The scorecard identifies elements that must exist in GSPs to adequately protect the Human Right to Drinking water.

Drinking Water Well Impact Mitigation Framework



The Drinking Water Well Impact Mitigation Framework was developed by Community Water Center, Leadership Counsel for Justice and Accountability and Self Help Enterprises to aid GSAs in the development and implementation of their GSPs. The framework provides a clear roadmap for how a GSA can best structure its data gathering, monitoring network and management actions to proactively monitor and protect drinking water wells and mitigate impacts should they occur.

Groundwater Resource Hub



The Nature Conservancy has developed a suite of tools based on best available science to help GSAs, consultants, and stakeholders efficiently incorporate nature into GSPs. These tools and resources are available online at GroundwaterResourceHub.org. The Nature Conservancy's tools and resources are intended to reduce costs, shorten timelines, and increase benefits for both people and nature.

Rooting Depth Database

The Plant Rooting Depth Database provides information that can help assess whether groundwater-dependent vegetation are accessing groundwater. Actual rooting depths will depend on the plant species and site-specific conditions, such as soil type and

availability of other water sources. Site-specific knowledge of depth to groundwater combined with rooting depths will help provide an understanding of the potential groundwater levels are needed to sustain GDEs.

How to use the database

The maximum rooting depth information in the Plant Rooting Depth Database is useful when verifying whether vegetation in the Natural Communities Commonly Associated with Groundwater (NC Dataset) are connected to groundwater. A 30 ft depth-to-groundwater threshold, which is based on averaged global rooting depth data for phreatophytes[1], is relevant for most plants identified in the NC Dataset since most plants have a max rooting depth of less than 30 feet. However, it is important to note that deeper thresholds are necessary for other plants that have reported maximum root depths that exceed the averaged 30 feet threshold, such as valley oak (*Quercus lobata*), Euphrates poplar (*Populus euphratica*), salt cedar (*Tamarix spp.*), and shadescale (*Atriplex confertifolia*). The Nature Conservancy advises that the reported max rooting depth for these deeper-rooted plants be used. For example, a depth-to groundwater threshold of 80 feet should be used instead of the 30 ft threshold, when verifying whether valley oak polygons from the NC Dataset are connected to groundwater. It is important to re-emphasize that actual rooting depth data are limited and will depend on the plant species and site-specific conditions such as soil and aquifer types, and availability to other water sources.

The Plant Rooting Depth Database is an Excel workbook composed of four worksheets:

1. California phreatophyte rooting depth data (included in the NC Dataset)
2. Global phreatophyte rooting depth data
3. Metadata
4. References

How the database was compiled

The Plant Rooting Depth Database is a compilation of rooting depth information for the groundwater-dependent plant species identified in the NC Dataset. Rooting depth data were compiled from published scientific literature and expert opinion through a crowdsourcing campaign. As more information becomes available, the database of rooting depths will be updated. Please Contact Us if you have additional rooting depth data for California phreatophytes.

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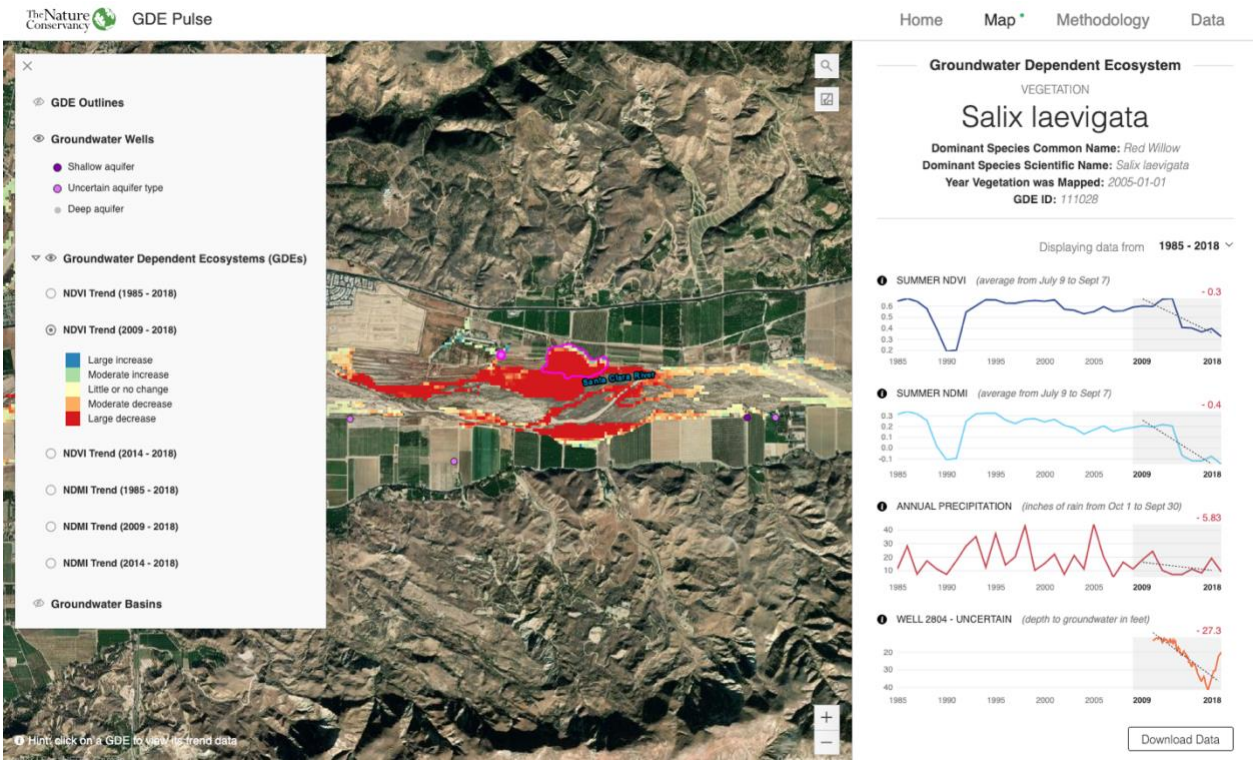
[1] Canadell, J., Jackson, R.B., Ehleringer, J.B. et al. 1996. Maximum rooting depth of vegetation types at the global scale. Oecologia 108, 583–595. https://doi.org/10.1007/BF00329030

GDE Pulse



GDE Pulse is a free online tool that allows Groundwater Sustainability Agencies to assess changes in groundwater dependent ecosystem (GDE) health using satellite, rainfall, and groundwater data. Remote sensing data from satellites has been used to monitor the health of vegetation all over the planet. GDE pulse has compiled 35 years of satellite imagery from NASA's Landsat mission for every polygon in the Natural Communities Commonly Associated with Groundwater Dataset. The following datasets are available for downloading:

Normalized Difference Vegetation Index (NDVI) is a satellite-derived index that represents the greenness of vegetation. Healthy green vegetation tends to have a higher NDVI, while dead leaves have a lower NDVI. We calculated the average NDVI during the driest part of the year (July - Sept) to estimate vegetation health when the plants are most likely dependent on groundwater.

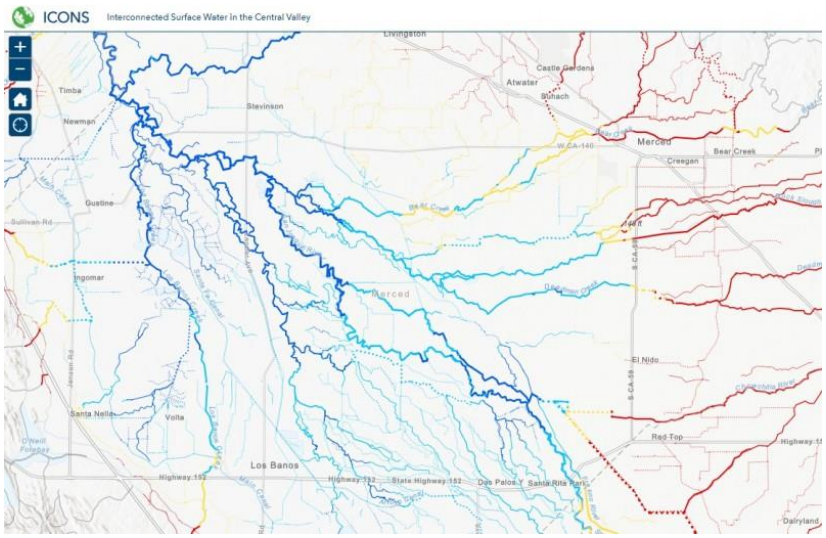
Normalized Difference Moisture Index (NDMI) is a satellite-derived index that represents water content in vegetation. NDMI is derived from the Near-Infrared (NIR) and Short-Wave Infrared (SWIR) channels. Vegetation with adequate access to water tends to have higher NDMI, while vegetation that is water stressed tends to have lower NDMI. We calculated the average NDVI during the driest part of the year (July–September) to estimate vegetation health when the plants are most likely dependent on groundwater.

Annual Precipitation is the total precipitation for the water year (October 1st – September 30th) from the PRISM dataset. The amount of local precipitation can affect vegetation with more precipitation generally leading to higher NDVI and NDMI.

Depth to Groundwater measurements provide an indication of the groundwater levels and changes over time for the surrounding area. We used groundwater well measurements from nearby (<1km) wells to estimate the depth to groundwater below the GDE based on the average elevation of the GDE (using a digital elevation model) minus the measured groundwater surface elevation.

ICONOS Mapper

Interconnected Surface Water in the Central Valley



ICONS maps the likely presence of interconnected surface water (ISW) in the Central Valley using depth to groundwater data. Using data from 2011-2018, the ISW dataset represents the likely connection between surface water and groundwater for rivers and streams in California's Central Valley. It includes information on the mean, maximum, and minimum depth to groundwater for each stream segment over the years with available data, as well as the likely presence of ISW based on the minimum depth to groundwater. The Nature Conservancy developed this database, with guidance and input from expert academics, consultants, and state agencies.

We developed this dataset using groundwater elevation data available online from the California Department of Water Resources (DWR). DWR only provides this data for the Central Valley. For GSAs outside of the valley, who have groundwater well measurements, we recommend following our methods to determine likely ISW in your region. The Nature Conservancy's ISW dataset should be used as a first step in reviewing ISW and should be supplemented with local or more recent groundwater depth data.

Attachment C

Freshwater Species Located in the Butte Valley Basin

To assist in identifying the beneficial users of surface water necessary to assess the undesirable result "depletion of interconnected surface waters", Attachment C provides a list of freshwater species located in the Butte Valley Basin. To produce the freshwater species list, we used ArcGIS to select features within the California Freshwater Species Database version 2.0.9 within the basin boundary. This database contains information on ~4,000 vertebrates, macroinvertebrates and vascular plants that depend on fresh water for at least one stage of their life cycle. The methods used to compile the California Freshwater Species Database can be found in Howard et al. 2015[1]. The spatial database contains locality observations and/or distribution information from ~400 data sources. The database is housed in the California Department of Fish and Wildlife's BIOS[2] as well as on The Nature Conservancy's science website[3].

Scientific Name	Common Name	Legal Protected Status		
		Federal	State	Other
BIRDS				
Actitis macularius	Spotted Sandpiper			
Aechmophorus clarkii	Clark's Grebe			
Aechmophorus occidentalis	Western Grebe			
Agelaius tricolor	Tricolored Blackbird	Bird of Conservation Concern	Special Concern	BSSC - First priority
Aix sponsa	Wood Duck			
Anas acuta	Northern Pintail			
Anas americana	American Wigeon			
Anas clypeata	Northern Shoveler			
Anas crecca	Green-winged Teal			
Anas cyanoptera	Cinnamon Teal			
Anas discors	Blue-winged Teal			
Anas platyrhynchos	Mallard			
Anas strepera	Gadwall			
Anser albifrons	Greater White-fronted Goose			
Ardea alba	Great Egret			
Ardea herodias	Great Blue Heron			
Aythya affinis	Lesser Scaup			
Aythya americana	Redhead		Special Concern	BSSC - Third priority
Aythya collaris	Ring-necked Duck			
Aythya valisineria	Canvasback		Special	

[1] Howard, J.K. et al. 2015. Patterns of Freshwater Species Richness, Endemism, and Vulnerability in California. PLoSONE, 11(7). Available at: https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0130710

[2] California Department of Fish and Wildlife BIOS: https://www.wildlife.ca.gov/data/BIOS

[3] Science for Conservation: https://www.scienceforconservation.org/products/california-freshwater-species-database

Botaurus lentiginosus	American Bittern			
Bucephala albeola	Bufflehead			
Bucephala clangula	Common Goldeneye			
Calidris mauri	Western Sandpiper			
Calidris minutilla	Least Sandpiper			
Chen caerulescens	Snow Goose			
Chen rossii	Ross's Goose			
Chroicocephalus philadelphia	Bonaparte's Gull			
Cistothorus palustris palustris	Marsh Wren			
Cygnus columbianus	Tundra Swan			
Egretta thula	Snowy Egret			
Fulica americana	American Coot			
Gallinago delicata	Wilson's Snipe			
Grus canadensis	Sandhill Crane			
Haliaeetus leucocephalus	Bald Eagle	Bird of Conservation Concern	Endangered	
Himantopus mexicanus	Black-necked Stilt			
Limnodromus scolopaceus	Long-billed Dowitcher			
Megaceryle alcyon	Belted Kingfisher			
Nycticorax nycticorax	Black-crowned Night-Heron			
Oxyura jamaicensis	Ruddy Duck			
Pelecanus erythrorhynchos	American White Pelican		Special Concern	BSSC - First priority
Phalacrocorax auritus	Double-crested Cormorant			
Phalaropus tricolor	Wilson's Phalarope			
Plegadis chihi	White-faced Ibis		Watch list	
Pluvialis squatarola	Black-bellied Plover			
Podiceps nigricollis	Eared Grebe			
Podilymbus podiceps	Pied-billed Grebe			
Porzana carolina	Sora			
Rallus limicola	Virginia Rail			
Recurvirostra americana	American Avocet			
Riparia riparia	Bank Swallow		Threatened	
Setophaga petechia	Yellow Warbler			BSSC - Second priority
Tachycineta bicolor	Tree Swallow			
Tringa melanoleuca	Greater Yellowlegs			
Tringa semipalmata	Willet			
Xanthocephalus xanthocephalus	Yellow-headed Blackbird		Special Concern	BSSC - Third priority

CRUSTACEANS				
Hyalella muerta	An Amphipod		Special	
Hyalella spp.	Hyalella spp.			
HERPS				
Actinemys marmorata marmorata	Western Pond Turtle		Special Concern	ARSSC
Anaxyrus boreas boreas	Boreal Toad			
Anaxyrus punctatus	Red-spotted Toad			
Pseudacris regilla	Northern Pacific Chorus Frog			
Rana pretiosa	Oregon Spotted Frog	Proposed Threatened	Special Concern	ARSSC
Spea intermontana	Great Basin Spadefoot			ARSSC
Thamnophis sirtalis sirtalis	Common Gartersnake			
INSECTS & OTHER INVERTS				
Ablabesmyia spp.	Ablabesmyia spp.			
Aeshna spp.	Aeshna spp.			
Antocha spp.	Antocha spp.			
Apedilum spp.	Apedilum spp.			
Argia spp.	Argia spp.			
Atractelmis wawona	Wawona Riffle Beetle		Special	
Callibaetis spp.	Callibaetis spp.			
Cenocorixa wileyae				Not on any status lists
Centroptilum spp.	Centroptilum spp.			
Chironomidae fam.	Chironomidae fam.			
Cleptelmis addenda				Not on any status lists
Clinotanypus spp.	Clinotanypus spp.			
Coenagrionidae fam.	Coenagrionidae fam.			
Corisella decolor				Not on any status lists
Corixidae fam.	Corixidae fam.			
Cricotopus spp.	Cricotopus spp.			
Cryptochironomus spp.	Cryptochironomus spp.			
Cryptotendipes spp.	Cryptotendipes spp.			
Eukiefferiella spp.	Eukiefferiella spp.			
Fallceon quilleri	A Mayfly			
Gumaga spp.	Gumaga spp.			
Haliplus spp.	Haliplus spp.			
Helicopsyche spp.	Helicopsyche spp.			
Hesperocorixa laevigata				Not on any status lists
Hydroptila arctia	A Caddisfly			

Hydroptila spp.	Hydroptila spp.			
Laccophilus maculosus				Not on any status lists
Liodessus obscurellus				Not on any status lists
Microtendipes spp.	Microtendipes spp.			
Mideopsis spp.	Mideopsis spp.			
Notonecta kirbyi				Not on any status lists
Oecetis spp.	Oecetis spp.			
Ophiogomphus spp.	Ophiogomphus spp.			
Optioservus spp.	Optioservus spp.			
Oxyethira spp.	Oxyethira spp.			
Parakiefferiella spp.	Parakiefferiella spp.			
Paralauterborniella spp.	Paralauterborniella spp.			
Paraleptophlebia spp.	Paraleptophlebia spp.			
Parametriocnemus spp.	Parametriocnemus spp.			
Pentaneura spp.	Pentaneura spp.			
Phaenopsectra spp.	Phaenopsectra spp.			
Procladius spp.	Procladius spp.			
Procloeon venosum	A Mayfly			
Psectrocladius spp.	Psectrocladius spp.			
Pseudochironomus spp.	Pseudochironomus spp.			
Radotanypus spp.	Radotanypus spp.			
Rheotanytarsus spp.	Rheotanytarsus spp.			
Sanfilippodytes spp.	Sanfilippodytes spp.			
Sialis spp.	Sialis spp.			
Simulium spp.	Simulium spp.			
Tanytarsus spp.	Tanytarsus spp.			
Tricorythodes spp.	Tricorythodes spp.			
Wormaldia spp.	Wormaldia spp.			
MAMMALS				
Castor canadensis	American Beaver			Not on any status lists
Lontra canadensis canadensis	North American River Otter			Not on any status lists
Neovison vison	American Mink			Not on any status lists
Ondatra zibethicus	Common Muskrat			Not on any status lists
Sorex palustris	American Water Shrew			Not on any status lists
MOLLUSKS				
Gyraulus spp.	Gyraulus spp.			
Lymnaea spp.	Lymnaea spp.			
Physa spp.	Physa spp.			

Pisidium spp.	Pisidium spp.			
PLANTS				
Potentilla newberryi	Newberry's Cinquefoil		Special	CRPR - 2B.3
Rorippa columbiae	Columbia Yellowcress		Special	CRPR - 1B.2
Alopecurus aequalis aequalis	Short-awn Foxtail			
Amphiscirpus nevadensis				Not on any status lists
Anemopsis californica	Yerba Mansa			
Aquilegia shockleyi	NA			Not on any status lists
Bistorta bistortoides				Not on any status lists
Bolboschoenus maritimus paludosus	NA			Not on any status lists
Carex alma	Sturdy Sedge			
Carex densa	Dense Sedge			
Carex nebrascensis	Nebraska Sedge			
Damasonium californicum				Not on any status lists
Downingia bacigalupii	Bacigalup's Downingia			
Downingia cuspidata	Toothed Calicoflower			
Downingia insignis	Parti-color Downingia			
Downingia pulcherrima				Not on any status lists
Downingia yina	NA			
Eleocharis acicularis acicularis	Least Spikerush			
Eleocharis bella	Delicate Spikerush			
Eleocharis coloradoensis				Not on any status lists
Eleocharis macrostachya	Creeping Spikerush			
Eleocharis montevidensis	Sand Spikerush			
Eleocharis parishii	Parish's Spikerush			
Eleocharis rostellata	Beaked Spikerush			
Epipactis gigantea	Giant Helleborine			
Fimbristylis thermalis	Hot Springs Fimbry		Special	CRPR - 2B.2
Iris missouriensis	Western Blue Iris			
Juncus xiphioides	Iris-leaf Rush			
Lobelia cardinalis cardinalis	NA			
Lythrum californicum	California Loosestrife			

Montia chamissoi	Chamisso's Miner's-lettuce			
Myosurus apetalus	Bristly Mousetail			
Myosurus minimus	NA			
Myosurus sessilis	Sessile Mousetail			
Myriophyllum aquaticum	NA			
Navarretia intertexta	Needleleaf Navarretia			
Navarretia leucocephala leucocephala	White-flower Navarretia			
Navarretia leucocephala minima	Least Navarretia			
Paspalum distichum	Joint Paspalum			
Phacelia distans	NA			
Phragmites australis australis	Common Reed			
Pluchea sericea	Arrow-weed			
Psilocarphus oregonus	Oregon Woolly-heads			
Puccinellia nuttalliana	Nuttall's Alkali Grass			
Rhododendron columbianum				Not on any status lists
Rumex salicifolius salicifolius	Willow Dock			
Salix exigua exigua	Narrowleaf Willow			
Salix exigua hindsiana				Not on any status lists
Salix gooddingii	Goodding's Willow			
Salix laevigata	Polished Willow			
Schoenoplectus americanus	Three-square Bulrush			
Schoenoplectus pungens longispicatus	Three-square Bulrush			
Scirpus microcarpus	Small-fruit Bulrush			
Senecio hydrophilus	Great Swamp Ragwort			
Sidalcea pedata	Pedate Checker-mallow	Endangered	Endangered	CRPR - 1B.1
Stachys albens	White-stem Hedge-nettle			
Stuckenia striata				Not on any status lists
Symphyotrichum frondosum	Alkali Aster			
Symphyotrichum lanceolatum lanceolatum	NA			
Typha domingensis	Southern Cattail			

Veronica anagallis-aquatica	NA			

Attachment D

The Nature Conservancy

July 2019

IDENTIFYING GDEs UNDER SGMA

Best Practices for using the NC Dataset

The Sustainable Groundwater Management Act (SGMA) requires that groundwater dependent ecosystems (GDEs) be identified in Groundwater Sustainability Plans (GSPs). As a starting point, the Department of Water Resources (DWR) is providing the Natural Communities Commonly Associated with Groundwater Dataset (NC Dataset) online[1] to help Groundwater Sustainability Agencies (GSAs), consultants, and stakeholders identify GDEs within individual groundwater basins. To apply information from the NC Dataset to local areas, GSAs should combine it with the best available science on local hydrology, geology, and groundwater levels to verify whether polygons in the NC dataset are likely supported by groundwater in an aquifer (Figure 1)[2]. This document highlights six best practices for using local groundwater data to confirm whether mapped features in the NC dataset are supported by groundwater.

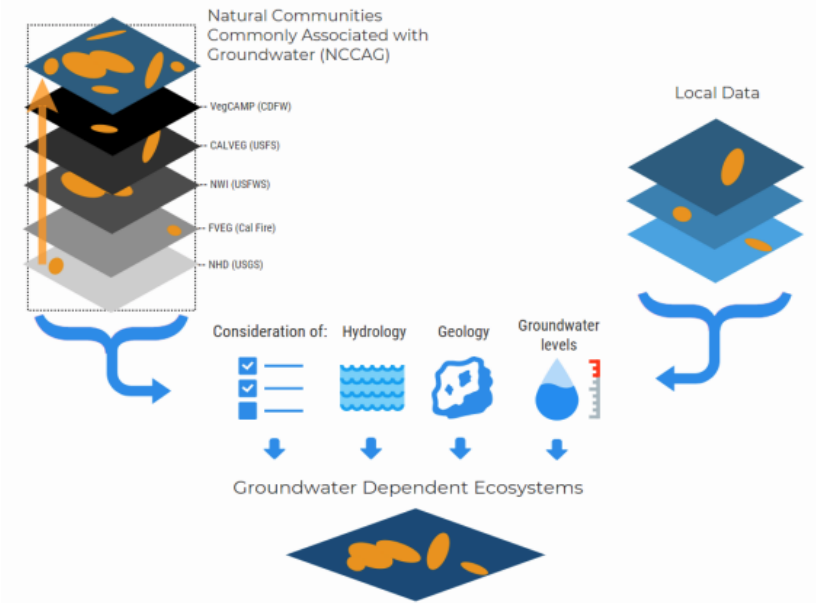


Figure 1. Considerations for GDE identification.
Source: DWR[2]

[1] NC Dataset Online Viewer: https://gis.water.ca.gov/app/NCDatasetViewer/
[2] California Department of Water Resources (DWR). 2018. Summary of the "Natural Communities Commonly Associated with Groundwater" Dataset and Online Web Viewer. Available at: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Data-and-Tools/Files/Statewide-Reports/Natural-Communities-Dataset-Summary-Document.pdf

The NC Dataset identifies vegetation and wetland features that are good indicators of a GDE. The dataset is comprised of 48 publicly available state and federal datasets that map vegetation, wetlands, springs, and seeps commonly associated with groundwater in California[3]. It was developed through a collaboration between DWR, the Department of Fish and Wildlife, and The Nature Conservancy (TNC). TNC has also provided detailed guidance on identifying GDEs from the NC dataset[4] on the Groundwater Resource Hub[5], a website dedicated to GDEs.

BEST PRACTICE #1. Establishing a Connection to Groundwater

Groundwater basins can be comprised of one continuous aquifer (Figure 2a) or multiple aquifers stacked on top of each other (Figure 2b). In unconfined aquifers (Figure 2a), using the depth-to-groundwater and the rooting depth of the vegetation is a reasonable method to infer groundwater dependence for GDEs. If groundwater is well below the rooting (and capillary) zone of the plants and any wetland features, the ecosystem is considered disconnected and groundwater management is not likely to affect the ecosystem (Figure 2d). However, it is important to consider local conditions (e.g., soil type, groundwater flow gradients, and aquifer parameters) and to review groundwater depth data from multiple seasons and water year types (wet and dry) because intermittent periods of high groundwater levels can replenish perched clay lenses that serve as the water source for GDEs (Figure 2c). Maintaining these natural groundwater fluctuations are important to sustaining GDE health.

Basins with a stacked series of aquifers (Figure 2b) may have varying levels of pumping across aquifers in the basin, depending on the production capacity or water quality associated with each aquifer. If pumping is concentrated in deeper aquifers, SGMA still requires GSAs to sustainably manage groundwater resources in shallow aquifers, such as perched aquifers, that support springs, surface water, domestic wells, and GDEs (Figure 2). This is because vertical groundwater gradients across aquifers may result in pumping from deeper aquifers to cause adverse impacts onto beneficial users reliant on shallow aquifers or interconnected surface water. The goal of SGMA is to sustainably manage groundwater resources for current and future social, economic, and environmental benefits. While groundwater pumping may not be currently occurring in a shallower aquifer, use of this water may become more appealing and economically viable in future years as pumping restrictions are placed on the deeper production aquifers in the basin to meet the sustainable yield and criteria. Thus, identifying GDEs in the basin should done irrespective to the amount of current pumping occurring in a particular aquifer, so that future impacts on GDEs due to new production can be avoided. A good rule of thumb to follow is: *if groundwater can be pumped from a well - it's an aquifer*.

[3] For more details on the mapping methods, refer to: Klausmeyer, K., J. Howard, T. Keeler-Wolf, K. Davis-Fadtke, R. Hull, A. Lyons. 2018. Mapping Indicators of Groundwater Dependent Ecosystems in California: Methods Report. San Francisco, California. Available at: https://groundwaterresourcehub.org/public/uploads/pdfs/iGDE_data_paper_20180423.pdf
[4] "Groundwater Dependent Ecosystems under the Sustainable Groundwater Management Act: Guidance for Preparing Groundwater Sustainability Plans" is available at: https://groundwaterresourcehub.org/gde-tools/gsp-guidance-document/
[5] The Groundwater Resource Hub: www.GroundwaterResourceHub.org

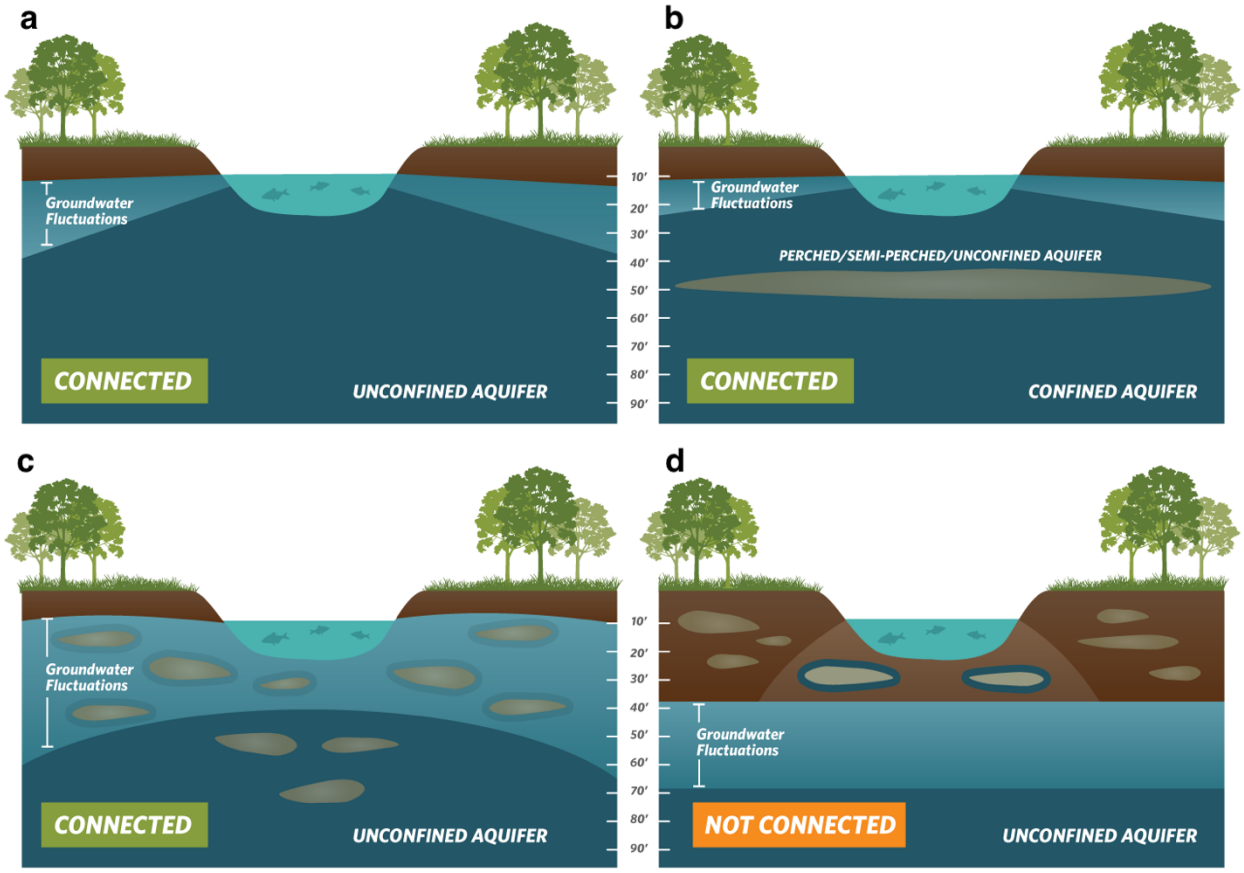


Figure 2. Confirming whether an ecosystem is connected to groundwater. Top: (a) Under the ecosystem is an unconfined aquifer with depth-to-groundwater fluctuating seasonally and interannually within 30 feet from land surface. **(b)** Depth-to-groundwater in the shallow aquifer is connected to overlying ecosystem. Pumping predominately occurs in the confined aquifer, but pumping is possible in the shallow aquifer. **Bottom: (c)** Depth-to-groundwater fluctuations are seasonally and interannually large, however, clay layers in the near surface prolong the ecosystem's connection to groundwater. **(d)** Groundwater is disconnected from surface water, and any water in the vadose (unsaturated) zone is due to direct recharge from precipitation and indirect recharge under the surface water feature. These areas are not connected to groundwater and typically support species that do not require access to groundwater to survive.

BEST PRACTICE #2. Characterize Seasonal and Interannual Groundwater Conditions

SGMA requires GSAs to describe current and historical groundwater conditions when identifying GDEs [23 CCR §354.16(g)]. Relying solely on the SGMA benchmark date (January 1, 2015) or any other single point in time to characterize groundwater conditions (e.g., depth-to-groundwater) is inadequate because managing groundwater conditions with data from one time point fails to capture the seasonal and interannual variability typical of California's climate. DWR's Best Management Practices document on water budgets[6] recommends using 10 years of water supply and water budget information to describe how historical conditions have impacted the operation of the basin within sustainable yield, implying that a baseline[7] could be determined based on data between 2005 and 2015. Using this or a similar time period, depending on data availability, is recommended for determining the depth-to-groundwater.

GDEs depend on groundwater levels being close enough to the land surface to interconnect with surface water systems or plant rooting networks. The most practical approach[8] for a GSA to assess whether polygons in the NC dataset are connected to groundwater is to rely on groundwater elevation data. As detailed in TNC's GDE guidance document[4], one of the key factors to consider when mapping GDEs is to contour depth-to-groundwater in the aquifer that is supporting the ecosystem (see Best Practice #5).

Groundwater levels fluctuate over time and space due to California's Mediterranean climate (dry summers and wet winters), climate change (flood and drought years), and subsurface heterogeneity in the subsurface (Figure 3). Many of California's GDEs have adapted to dealing with intermittent periods of water stress, however if these groundwater conditions are prolonged, adverse impacts to GDEs can result. While depth-to-groundwater levels within 30 feet[4] of the land surface are generally accepted as being a proxy for confirming that polygons in the NC dataset are supported by groundwater, it is highly advised that fluctuations in the groundwater regime be characterized to understand the seasonal and interannual groundwater variability in GDEs. Utilizing groundwater data from one point in time can misrepresent groundwater levels required by GDEs, and inadvertently result in adverse impacts to the GDEs. Time series data on groundwater elevations and depths are available on the SGMA Data Viewer[9]. However, if insufficient data are available to describe groundwater conditions within or near polygons from the NC dataset, include those polygons in the GSP until data gaps are reconciled in the monitoring network (see Best Practice #6).

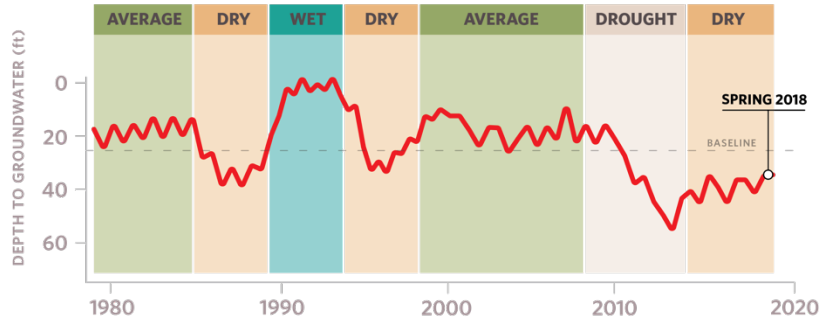


Figure 3. Example seasonality and interannual variability in depth-to-groundwater over time. Selecting one point in time, such as Spring 2018, to characterize groundwater conditions in GDEs fails to capture what groundwater conditions are necessary to maintain the ecosystem status into the future so adverse impacts are avoided.

[6] DWR. 2016. Water Budget Best Management Practice. Available at: https://water.ca.gov/LegacyFiles/groundwater/sgm/pdfs/BMP_Water_Budget_Final_2016-12-23.pdf

[7] Baseline is defined under the GSP regulations as "historic information used to project future conditions for hydrology, water demand, and availability of surface water and to evaluate potential sustainable management practices of a basin." [23 CCR §351(e)]

[8] Groundwater reliance can also be confirmed via stable isotope analysis and geophysical surveys. For more information see The GDE Assessment Toolbox (Appendix IV, GDE Guidance Document for GSPs[4]).

[9] SGMA Data Viewer: https://sgma.water.ca.gov/webgis/?appid=SGMADataViewer

BEST PRACTICE #3. Ecosystems Often Rely on Both Groundwater and Surface Water

GDEs are plants and animals that rely on groundwater for all or some of its water needs, and thus can be supported by multiple water sources. The presence of non-groundwater sources (e.g., surface water, soil moisture in the vadose zone, applied water, treated wastewater effluent, urban stormwater, irrigated return flow) within and around a GDE does not preclude the possibility that it is supported by groundwater, too. SGMA defines GDEs as "ecological communities and species that depend on groundwater emerging from aquifers or on groundwater occurring near the ground surface" [23 CCR §351(m)]. Hence, depth-to-groundwater data should be used to identify whether NC polygons are supported by groundwater and should be considered GDEs. In addition, SGMA requires that significant and undesirable adverse impacts to beneficial users of surface water be avoided. Beneficial users of surface water include environmental users such as plants or animals[10], which therefore must be considered when developing minimum thresholds for depletions of interconnected surface water.

GSAs are only responsible for impacts to GDEs resulting from groundwater conditions in the basin, so if adverse impacts to GDEs result from the diversion of applied water, treated wastewater, or irrigation return flow away from the GDE, then those impacts will be evaluated by other permitting requirements (e.g., CEQA) and may not be the responsibility of the GSA. However, if adverse impacts occur to the GDE due to changing groundwater conditions resulting from pumping or groundwater management activities, then the GSA would be responsible (Figure 4).

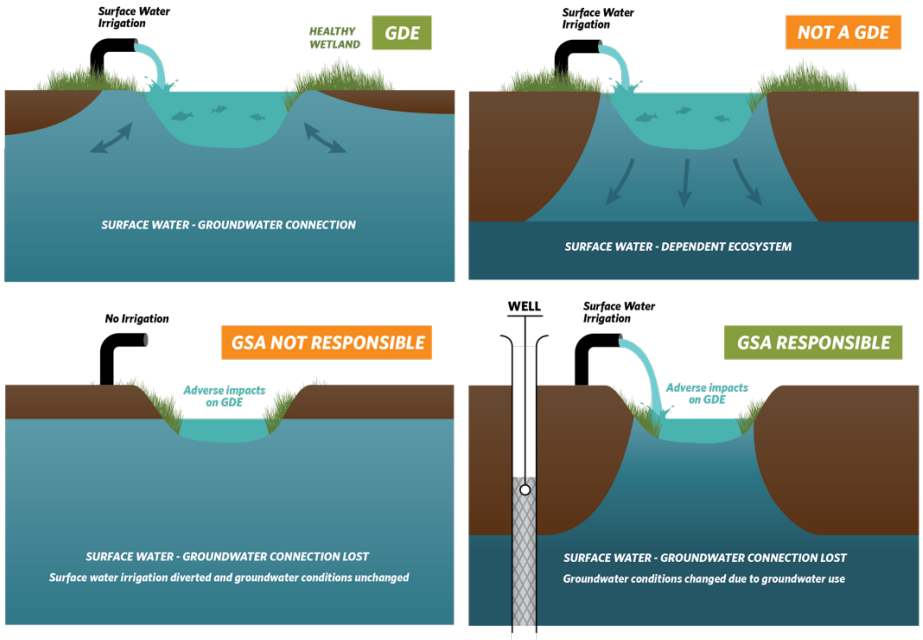


Figure 4. Ecosystems often depend on multiple sources of water. Top: (Left) Surface water and groundwater are interconnected, meaning that the GDE is supported by both groundwater and surface water. **(Right)** Ecosystems that are only reliant on non-groundwater sources are not groundwater-dependent. **Bottom: (Left)** An ecosystem that was once dependent on an interconnected surface water, but loses access to groundwater solely due to surface water diversions may not be the GSA's responsibility. **(Right)** Groundwater dependent ecosystems once dependent on an interconnected surface water system, but loses that access due to groundwater pumping is the GSA's responsibility.

[10] For a list of environmental beneficial users of surface water by basin, visit: https://groundwaterresourcehub.org/gde-tools/environmental-surface-water-beneficiaries/

BEST PRACTICE #4. Select Representative Groundwater Wells

Identifying GDEs in a basin requires that groundwater conditions are characterized to confirm whether polygons in the NC dataset are supported by the underlying aquifer. To do this, proximate groundwater wells should be identified to characterize groundwater conditions (Figure 5). When selecting representative wells, it is particularly important to consider the subsurface heterogeneity around NC polygons, especially near surface water features where groundwater and surface water interactions occur around heterogeneous stratigraphic units or aquitards formed by fluvial deposits. The following selection criteria can help ensure groundwater levels are representative of conditions within the GDE area:

- Choose wells that are within 5 kilometers (3.1 miles) of each NC Dataset polygons because they are more likely to reflect the local conditions relevant to the ecosystem. If there are no wells within 5km of the center of a NC dataset polygon, then there is insufficient information to remove the polygon based on groundwater depth. Instead, it should be retained as a potential GDE until there are sufficient data to determine whether or not the NC Dataset polygon is supported by groundwater.

- Choose wells that are screened within the surficial unconfined aquifer and capable of measuring the true water table.

- Avoid relying on wells that have insufficient information on the screened well depth interval for excluding GDEs because they could be providing data on the wrong aquifer. This type of well data should not be used to remove any NC polygons.

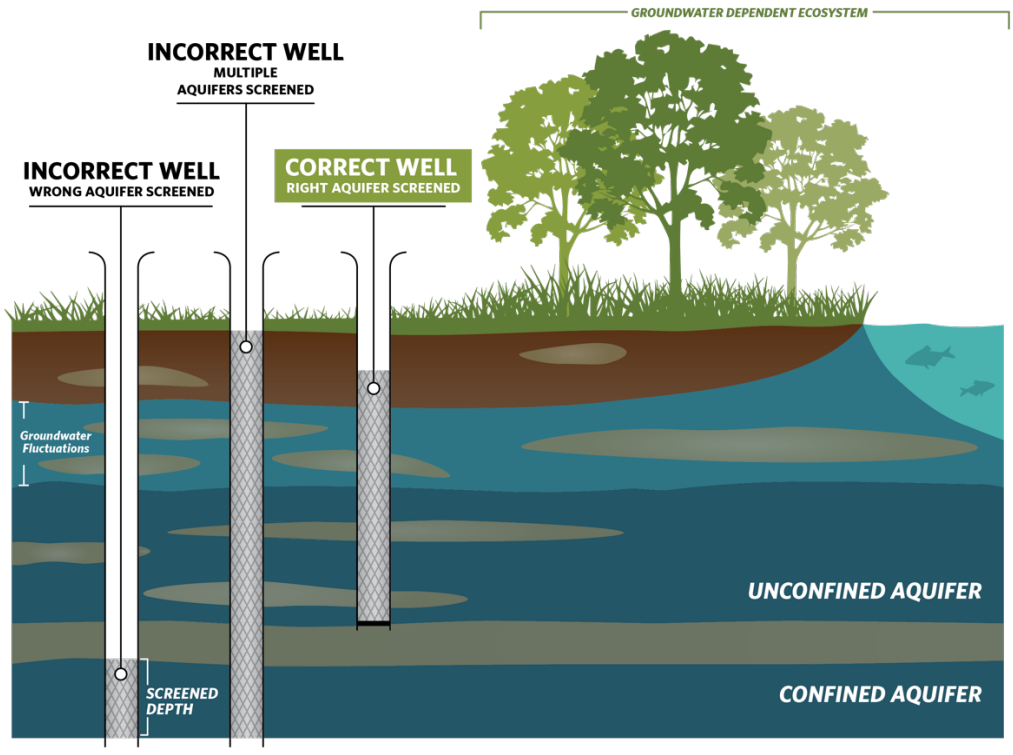


Figure 5. Selecting representative wells to characterize groundwater conditions near GDEs.

BEST PRACTICE #5. Contouring Groundwater Elevations

The common practice to contour depth-to-groundwater over a large area by interpolating measurements at monitoring wells is unsuitable for assessing whether an ecosystem is supported by groundwater. This practice causes errors when the land surface contains features like stream and wetland depressions because it assumes the land surface is constant across the landscape and depth-to-groundwater is constant below these low-lying areas (Figure 6a). A more accurate approach is to interpolate **groundwater elevations** at monitoring wells to get groundwater elevation contours across the landscape. This layer can then be subtracted from land surface elevations from a Digital Elevation Model (DEM)[11] to estimate depth-to-groundwater contours across the landscape (Figure b; Figure 7). This will provide a much more accurate contours of depth-to-groundwater along streams and other land surface depressions where GDEs are commonly found.

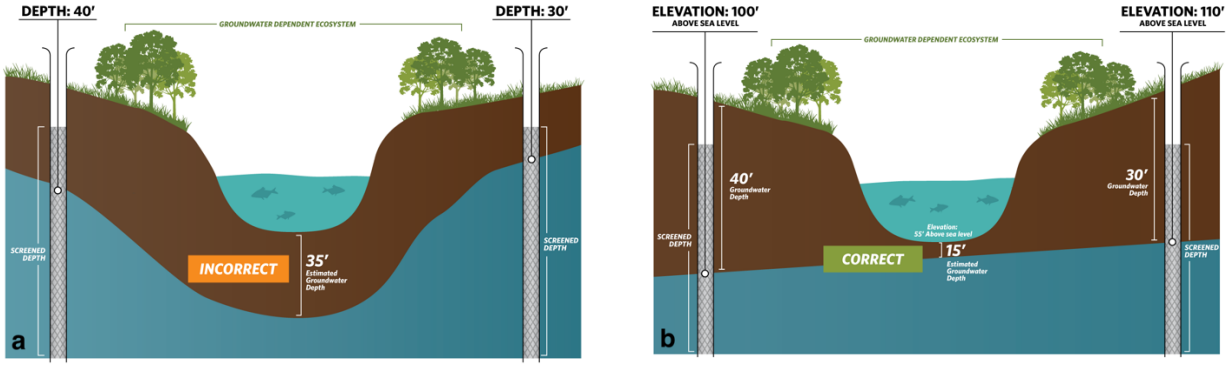


Figure 6. Contouring depth-to-groundwater around surface water features and GDEs. (a) Groundwater level interpolation using depth-to-groundwater data from monitoring wells. **(b)** Groundwater level interpolation using groundwater elevation data from monitoring wells and DEM data.

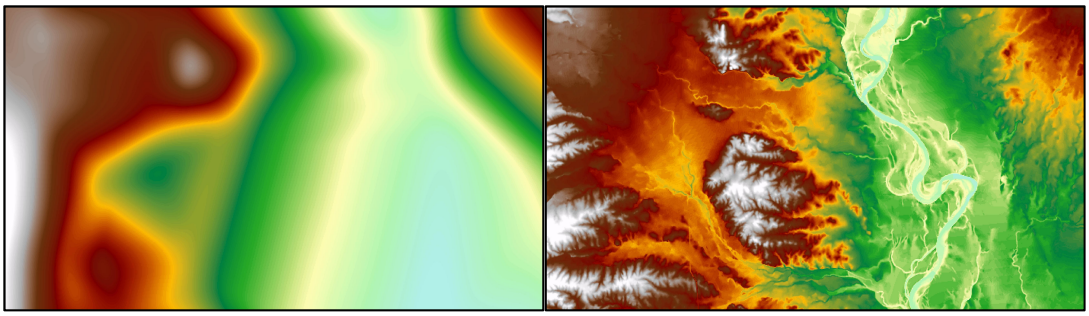


Figure 7. Depth-to-groundwater contours in Northern California. (Left) Contours were interpolated using depth-to-groundwater measurements determined at each well. **(Right)** Contours were determined by interpolating groundwater elevation measurements at each well and superimposing ground surface elevation from DEM spatial data to generate depth-to-groundwater contours. The image on the right shows a more accurate depth-to-groundwater estimate because it takes the local topography and elevation changes into account.

[11] USGS Digital Elevation Model data products are described at: https://www.usgs.gov/core-science-systems/ngp/3dep/about-3dep-products-services and can be downloaded at: https://iewer.nationalmap.gov/basic/

BEST PRACTICE #6. Best Available Science

Adaptive management is embedded within SGMA and provides a process to work toward sustainability over time by beginning with the best available information to make initial decisions, monitoring the results of those decisions, and using the data collected through monitoring programs to revise decisions in the future. In many situations, the hydrologic connection of NC dataset polygons will not initially be clearly understood if site-specific groundwater monitoring data are not available. If sufficient data are not available in time for the 2020/2022 plan, **The Nature Conservancy strongly advises that questionable polygons from the NC dataset be included in the GSP until data gaps are reconciled in the monitoring network.** Erring on the side of caution will help minimize inadvertent impacts to GDEs as a result of groundwater use and management actions during SGMA implementation.

KEY DEFINITIONS

Groundwater basin is an aquifer or stacked series of aquifers with reasonably well-defined boundaries in a lateral direction, based on features that significantly impede groundwater flow, and a definable bottom. *23 CCR §341(g)(1)*

Groundwater dependent ecosystem (GDE) are ecological communities or species that depend on groundwater emerging from aquifers or on groundwater occurring near the ground surface. *23 CCR §351(m)*

Interconnected surface water (ISW) surface water that is hydraulically connected at any point by a continuous saturated zone to the underlying aquifer and the overlying surface water is not completely depleted. *23 CCR §351(o)*

Principal aquifers are aquifers or aquifer systems that store, transmit, and yield significant or economic quantities of groundwater to wells, springs, or surface water systems. *23 CCR §351(aa)*

ABOUT US

The Nature Conservancy is a science-based nonprofit organization whose mission is *to conserve the lands and waters on which all life depends*. To support successful SGMA implementation that meets the future needs of people, the economy, and the environment, TNC has developed tools and resources (www.groundwaterresourcehub.org) intended to reduce costs, shorten timelines, and increase benefits for both people and nature.

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GAVIN NEWSOM, Governor
CHARLTON H. BONHAM, Director

September 23, 2021

Via Electronic Mail

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SUBJECT: CALIFORNIA DEPARTMENT OF FISH AND WILDLIFE COMMENTS ON THE BUTTE VALLEY BASIN DRAFT GROUNDWATER SUSTAINABLITY PLAN

Dear Matt Parker:

The California Department of Fish and Wildlife (Department) appreciates the opportunity to provide comments on the Draft Groundwater Sustainability Plan (GSP) for Butte Valley Basin (Basin) prepared by the Siskiyou County Flood Control and Water Conservation District, designated as the Groundwater Sustainability Agency (GSA).

Since the Basin is designated as medium priority under the Sustainable Groundwater Management Act (SGMA), the Basin must be managed under a GSP by January 31, 2022. Development and implementation of GSPs under SGMA represents a new era of California groundwater management. The Department has an interest in the sustainable management of groundwater, as many sensitive ecosystems and public trust resources depend on groundwater and interconnected surface waters (ISWs), including ecosystems on Department-owned and -managed lands within SGMA-regulated basins. In addition, it is important to note that the Department owns the Butte Valley Wildlife Area (BVWA), including Meiss Lake, which is within the Basin.

Background

The GSA appointed an Advisory Committee, composed of members of the Basin community, to work with a group of consultants to develop the Draft GSP. The Advisory Committee requested comments from any stakeholder as it developed the Draft GSP. The Department previously provided comments during Advisory Committee meetings, and on certain draft Chapters as they

were made available. During Committee meetings, the Department provided comments on issues including the following: use of the best available science and information to develop the model; the water budget; identification and consideration of beneficial users and groundwater-dependent ecosystems (GDEs); well information as it relates to Department-owned and -managed properties; and sustainable management criteria. The Draft GSP does not fully address all comments the Department provided during the Advisory Committee meetings or comments provided on the previous draft chapters. After its review of the Draft GSP, the Department also has additional comments that it had not raised previously. Therefore, the Department is commenting again at this point in time to ensure all of these comments are fully considered in the development of the Draft GSP.

Organization of Comments

The Department has organized its comments below into several key topic areas: (1) the Department's trustee agency role; (2) SGMA requirements relevant to beneficial users and GDEs; (3) SGMA hydrogeologic conceptual model requirements; (4) sustainable management criteria and water budget requirements; (5) monitoring network and well information; (6) data gaps and use of the best available science; and (7) Public Trust Doctrine and California Endangered Species Act (CESA) requirements. This letter highlights key comments and is not inclusive of all comments provided to the Advisory Committee during meetings and/or communication with County staff. The GSA reloaded Chapter 2 online on August 24, 2021. In addition, the model documentation and water budget information, including the Butte Valley Wildlife Area Water Budget, were not provided until September 13, 2021. Since the complete Draft GSP was not publicly available since the beginning of the public review period, limited time was available for review and comment of certain sections of the Draft GSP.

Department's Trustee Role

As the trustee agency for the State's fish and wildlife resources, the Department has jurisdiction over the conservation, protection, and management of fish, wildlife, native plants, and the habitat necessary for biologically sustainable populations of such species. (Fish & G. Code, §§ 711.7 & 1802.) The Basin supports populations of bald eagle (CESA endangered), greater sandhill crane (CESA threatened), Swainson's hawk (CESA threatened), tricolored blackbird (CESA threatened), western pond turtle (State species of special concern), pronghorn, and other fish and wildlife species that rely on habitats supported and supplemented by groundwater and surface water.

The Draft GSP raises significant concerns about potential impacts of groundwater pumping on GDEs, interconnected surface waters (ISWs), and species within the Department's jurisdiction. The Department urges the GSA to plan for and engage in responsible groundwater management that minimizes or avoids these impacts to the maximum extent feasible as required under applicable provisions of SGMA and the Public Trust Doctrine. CDFW-001

SGMA Requirements Relevant to Beneficial Users and GDEs

In addition to other requirements that will be discussed later in this letter, SGMA and its implementing regulations afford beneficial users and GDEs specific consideration, including the following as pertinent to GSPs:

Consideration of Beneficial Uses and Users

GSPs must consider the interests of all beneficial uses and users of groundwater, including environmental users of groundwater. (Water Code § 10723.2.) GSPs must also **identify and consider potential effects on all beneficial uses and users of groundwater**. (23 CCR §§ 354.10(a), 354.26(b)(3), 354.28(b)(4), 354.34(b)(2), and 354.34(f)(3).) The Draft GSP does not adequately identify all the environmental users in the Basin, their locations, the groundwater dependent habitat they depend on at certain life stages, and how the Draft GSP will meet their needs. CDFW-002 The Draft GSP identifies a handful of species that are either Endangered Species Act (ESA) or CESA listed species found on BVWA, and does not take into account other special status or locally significant fish and wildlife species and habitats that benefit from or are dependent on groundwater. CDFW-003 In Table 1.7 of Chapter 2, the Draft GSP identifies species prioritized for management in the first column, and other species that depend on the same ecosystems as the species prioritized for management in the second column. CDFW-004 The Draft GSP species prioritized for management were identified as "riparian vegetation", which is a vegetation type, not an ecosystem or species. Many species, including special-status species, that are known to depend on or may be vulnerable to groundwater fluctuations were not identified in this column. Species identified in the Basin that are not included in the Draft GSP include, but are not limited to, short-eared owl, Swainson's hawk, tri-colored blackbird, Tule white-fronted goose, Vaux's swift, Wawona Riffle Beetle, western pond turtle, and white-faced ibis. CDFW-005 The Draft GSP does not indicate where these species were found in the Basin and how these species could be supported by the identified riparian vegetation and impacted by groundwater.

Identification and Consideration of GDEs

GSPs must **consider impacts to GDEs**. (Water Code § 10727.4(l); *see also* 23 CCR § 354.16(g).) The Department is uncertain whether the Draft GSP accurately identifies all GDEs in the Basin. Specifically, the Draft GSP does not provide sufficient detail when describing the methods used for GDE classification and mapping in the Draft GSP and the rationale for the methods used. The Draft GSP mentions desktop methods of using existing mapping tools, root depth to groundwater modeling, and other tools for identifying GDEs. The Draft GSP appears not to include Advisory Committee input, field verification, or any quality assurance/quality control measures to validate the resulting classification and mapping. Without these means of verification, the Department cannot evaluate or comment on the accuracy of the GSP's GDE classification or mapping. However, the Department recommends that GDE mapping be informed by science-based vegetation classification or similar methods, such as the Department's *Survey of California Vegetation Classification and Mapping Standards.*[1] The Draft GSP's GDE classification and mapping should be revised if necessary after utilizing these methods. Classification and mapping methods should be thoroughly described so that GDE classification and mapping can be verified by stakeholders or repeated during future GSP updates and effectiveness monitoring.

CDFW-006

The Draft GSP mentions certain GDEs, but does not provide consideration of those GDEs or assess potential impacts to those GDEs from groundwater pumping. The Draft GSP also fails to identify or appropriately consider certain GDEs, including Meiss Lake within the BVWA. Historically, Meiss Lake was a natural wetland that spanned the Butte Valley Basin and received natural inputs from both groundwater and surface water. Due to unsustainable groundwater management practices, Meiss Lake has been reduced in size to about 4,000 acres, but it continues to support a wide variety of species and habitats. Currently, Meiss Lake receives natural inputs from surface water tributaries and is occasionally supported by pumped groundwater as needed in dry years to support groundwater-dependent species. Thus, Meiss Lake qualifies as a GDE that must be identified and appropriately considered in the draft GSP because it is a historic natural wetland that continues to rely on groundwater inputs to sustain its species and habitat. In defining GDEs entitled to consideration in a GSP, SGMA statutes and regulations do not require features to rely on groundwater from a particular source in order to qualify as GDEs. (23 CCR § 354.16(g); Water Code § 10727.4(l).)

CDFW-007

CDFW-008

[1] [1] https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=102342&inline

Alternatively, if the District were to nevertheless conclude that Meiss Lake is not a GDE, Meiss Lake must be considered a managed wetland, with its groundwater inputs appropriately accounted for in the Draft GSP's water budget. GSPs must account for groundwater extraction for all water use sectors including managed wetlands, managed recharge, and native vegetation. (23 CCR §§ 351(al) and 354.18(b)(3).)

CDFW-008 Cont'd.

Chapter 2 of the Draft GSP contains a description of the BVWA's water management practices depending on the water year type or impacts to Meiss Lake, the lowest point in the basin. Many of the streams, including Butte Creek, have been "sufficiently appropriated" during the irrigation season, meaning that allocated water likely exceeds available supplies, leaving little to enter Meiss Lake. The Draft GSP's water budget must consider and account for the fact that Meiss Lake may go dry in certain years and may require inputs of pumped groundwater for wetland habitat restoration and to support groundwater-dependent species. By failing to account for groundwater inputs to Meiss Lake, the GSP has not adequately analyzed the groundwater-surface water relationship in the Basin or developed a complete water budget.

The Draft GSP does not identify projects and management actions (PMAs) or sustainable management criteria to protect GDEs in the basin. The Department will make best efforts to support PMAs anticipated to address both immediate- and long-term fish and wildlife resource needs. Not recognizing the role of the GSA to ensure sustainable management and nearly all PMAs through an "integrative and collaborative approach" will make it difficult to achieve sustainability by 2042 as contemplated under SGMA. As explained more fully below, the Department recommends revisiting the Draft GSP to address data gaps, ensure compliance with applicable SGMA statutory requirements, and appropriately consider and address impacts to GDEs and all beneficial users.

CDFW-009

CDFW-010

Hydrogeologic Conceptual Model Requirements

SGMA regulations require each GSP to include a descriptive hydrogeologic conceptual model (HCM) 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. (23 CCR § 354.14.) The HCM must include a description of data gaps and uncertainty within the HCM. (*Id*. at § 354.14(b)(4)(5).)

While the Draft GSP includes an HCM, it is not clear that the HCM accurately characterizes the physical components and surface water-groundwater interactions in the Basin. For example, the HCM in the Draft GSP fails to identify a definable bottom of the basin as required by SGMA regulations. (23 CCR §354.14(b)(3).) As described in Chapter 2 of the Draft GSP, the HCM includes a description of the Western Cascades Subprovince geologic unit, which is the relatively older and less permeable volcanic bedrock that underlies Butte Valley. (p. 48.) Such description states that the Western Cascades unit "acts as a barrier to regional groundwater flow." As such, it is assumed that the Western Cascades unit surface is the bottom of the Basin. However, the description concludes that, "This formation has not been penetrated by Butte Valley wells (DOI 1980). The unknown depth to the Western Cascades Subprovince precludes its appearance in the cross-sections." No additional information was noted attempting to characterize the bottom of the Basin boundary.

CDFW-011

CDFW-012

Several statements in the Draft GSP contribute to the uncertainty regarding the accuracy of the HCM's characterizations of the physical components and surface water-groundwater interactions. For example, the Draft GSP states Butte Valley basin has experienced a decrease in groundwater levels on the order of approximately 30-feet during the study period of spring 1979 to spring 2015 due primarily to decreased precipitation, increased pumping, and a commensurate decrease in the subsurface hydraulic gradient. Similarly, the Draft GSP concludes that, "There is significant long-term trend indicating some groundwater depletion." Conversely, the Draft GSP finds that the basin is not in overdraft due to significantly higher volumes of lateral groundwater inflow compared to volumes of groundwater extraction and does not exceed the sustainable yield of the Basin. The Draft GSP asserts that the sustainable yield will be a constantly changing value based on future climate conditions, future groundwater pumping needs, and future management actions. The Draft GSP should adequately quantify sustainable yield as required by SGMA regulations to explain this fluctuation for the approach to be acceptable. (23 CCR § 354.18 (b)(7).) Once the GSA clarifies its understanding of these issues, the water budget should be adjusted accordingly and the Draft GSP should identify sustainable management criteria that prevent adverse impacts to beneficial users, such as dewatering of GDEs, and strive for long term groundwater sustainability with PMAs. The GSA should consider developing PMAs that promote more efficient water use through water conservation where feasible.

CDFW-011 Cont'd.

CDFW-013

CDFW-014

CDFW-015

CDFW-016

<u>Sustainable Management Criteria and Water Budget Requirements</u>

GSPs must **establish sustainable management criteria that avoid undesirable results** within 20 years of the applicable statutory deadline, including **depletions**

of ISW that have significant and unreasonable adverse impacts on beneficial uses of the surface water. (23 CCR § 354.22 et seq. and Water Code §§ 10721(x)(6) and 10727.2(b).) The Draft GSP concludes that sustainability will be achieved by 2042 and undesirable results will be avoided, but the underlying analysis and data do not fully support these conclusions. The goal of sustainability cannot be achieved by 2042 without an accurate water budget and clearly-defined sustainable management criteria, including minimum thresholds, that meet SGMA's requirements including the following:

CDFW-017

<u>Minimum Thresholds for ISW Depletions</u>
SGMA regulations require the GSP to include numeric minimum thresholds to define and avoid undesirable results, which must be explained and justified based on basin-specific information and other data or models as appropriate, with appropriate accounting for any uncertainty in the understanding of the basin setting. (23 CCR § 354.28(a)-(b).) The GSP must explain the relationship between the minimum thresholds and the relevant sustainability indicator, how the minimum thresholds will avoid causing undesirable results, how the minimum thresholds may affect the interests of beneficial uses and users of groundwater, and how each minimum threshold will be quantitatively measured consistent with SGMA monitoring network requirements. (*Id*.)

Specifically, SGMA regulations require minimum thresholds related to depletions of interconnected surface water to be "the rate or volume of surface water depletions caused by groundwater use that has adverse impacts on beneficial uses of the surface water and may lead to undesirable results." (23 CCR § 354.28(c)(6).) These minimum thresholds must be supported by the "location, quantity, and timing of depletions of interconnected surface water" and "a description of the groundwater and surface water model used to quantify surface water depletion." (*Id*. at § 354.28(c)(6).) If a numerical groundwater-surface water model is not used to quantify surface water depletion, the GSP must identify and describe an equally effective method, tool, or analytical model to be used for this purpose. The Draft GSP does not meet these requirements because it does not identify a sustainable management criteria for surface water depletions. As such, the Draft GSP does not set minimum thresholds for surface water depletions based on the rate or volume of surface water depletions caused by groundwater use, and it does not utilize a basin-wide groundwater-surface water model or equally effective method, tool, or model to quantify such depletions. The Department requests revisions to the Draft GSP to clarify how the sustainable management criteria were developed, how these criteria relate to the relevant sustainability indicators, and how the criteria may affect the interest of beneficial users.

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CDFW-019

Water Budget Requirements

Per SGMA regulations, each GSP "shall rely on the best available information and best available science to quantify the water budget for the basin in order to provide an understanding of historical and projected hydrology, water demand, water supply, land use, population, climate change, sea level rise, groundwater and surface water interaction, and subsurface groundwater flow." (23 CCR § 354.18(e).) The water budget is a product of the Butte Valley Integrated Hydrologic Model (BVIHM), which is derived from the larger USGS groundwater model of the Upper Klamath Basin (Gannett et al., 2012, USGS Scientific Investigations Report 2012-5062). A key simplification is utilized by the Draft GSP authors in developing the water budget in that the surface water hydrologic subsystem is removed from the BVIHM. The Department appreciates the justifications for this simplification being few streams contribute perennial flow to the basin surface due, in part, to infiltration into highly permeable volcanic soils outside of the basin boundary. However, some of the Water Budget's information contradicts the information presented within the HCM discussion. For example, during the HCM discussion in Chapter 2, the GSA acknowledges that streamflow losses, canal seepage and percolation from wetlands (that receive periodic surface flows) all contribute to groundwater recharge. Similarly, the HCM mentions spring-fed creeks that drain into Meiss Lake (currently part of the BVWA). Ultimately, the Department is hesitant to support elimination of all surface water inputs for modeling purposes. The Department is especially concerned with the canal seepage when an economic, environmental, or other benefit may result from a more efficient use of water. The GSA should conduct further analysis of potential surface water input sources to fully comply with applicable SGMA regulations. (*see, e.g.*, 23 CCR §354.18(b)(1).)

CDFW-020

Monitoring Network and Well Information

GSPs must describe monitoring networks that can identify adverse impacts to beneficial uses of ISWs. (23 CCR § 354.34(c)(6)(D).) The Draft GSP lacks basin-wide groundwater monitoring, which is necessary to assess potential surface water depletions and impacts to beneficial surface water users, including fish and wildlife species. The GSA should identify how the GSA will achieve a robust monitoring system to capture accurate information on these portions of the basin or use existing data to accurately model these portions and assess impacts. If the GSA intends to rely on basin-specific data, the Draft GSP should elaborate on the description of developing a monitoring network capable of collecting sufficient data to demonstrate short-term, seasonal, and long-term trends in groundwater and related surface water conditions as required by

CDFW-021

SGMA regulations. (23 CCR §354.34.) The Draft GSP should clearly identify the wells used for monitoring including individual well information. This includes the well ID, ground surface elevation, reference point elevations for water level measurements, well completion depth, perforation intervals, and hydrograph information. For the hydrograph information, the Draft GSP should provide information on the aquifer unit.

CDFW-021 Cont'd.

Data Gaps and Use of the Best Available Science

Per SGMA regulations, the Draft GSP must identify reasonable measures and schedules to eliminate data gaps. (23 CCR § 355.4(b)(2).) As noted above, the Draft GSP does not set forth sustainable management criteria for surface water depletions, nor does it utilize a basin-wide groundwater-surface water model or equally effective method, tool, or model to quantify such depletions. The Draft GSP also lacks basin-wide groundwater monitoring, which is necessary to assess potential surface water depletions and impacts to beneficial surface water users. The Department acknowledges data gaps may initially exist and may make development of certain criteria more challenging. However, the Draft GSP must set forth a reasonable pathway and timeline for addressing these data gaps and developing sustainable management criteria as required under SGMA, supplementing with models and other data if needed to address uncertainties in basin-specific data.

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CDFW-024

The Draft GSP also lacks quantitative criteria for interconnected surface water, which are needed to assess compliance with SGMA and avoid significant and unreasonable depletions of ISW. After conducting the necessary analysis and establishing appropriate criteria, the Draft GSP should be updated to consider and avoid any unreasonable adverse impacts to beneficial users anticipated to result from ISW depletions. The Draft GSP expanded its sustainability management criteria with additional monitoring points with "soft landing" triggers and "aspirational watershed goals". This characterization ignores SGMA, which clearly indicates the sustainability goal and sustainable management criteria must be developed to avoid undesirable results within the planning and implementation horizon. (23 CCR §§ 354.24, 354.26, and 354.28.)

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CDFW-026

In addition, SGMA requires the assumptions, criteria, findings, and objectives of a GSP to be reasonable and supported by the best available information and best available science. (23 CCR § 355.4(b)(1).) The Department is aware of available information not being utilized to the fullest for the development of each sustainable management criteria, the water budget and BVIHM in the Draft GSP. Specifically, the Draft GSP lacks consideration of current versus historic surface water extractions, agriculture ditch losses and gains, and new or

CDFW-027

improved wells in the basin. These deficiencies in the analysis suggest BVIHM may not be considering all relevant groundwater pumping and related impacts in the basin. Since SGMA requires sustainable management of the entire basin, the sustainable management criteria and water budget must take a basin-wide approach. The GSA must identify reasonable measures and schedules to address these data gaps and set or revise basin-wide sustainable management criteria as its understanding of the Basin improves.

CDFW-027 Cont'd.

Public Trust Doctrine and California Endangered Species Act

The Department urges the GSA to consider its duties under the Public Trust Doctrine while developing its Draft GSP. While the SGMA sustainability requirements must be met within the 20-year planning and implementation horizon, Public Trust Doctrine requirements apply independently of SGMA, are not preempted by SGMA, and are applicable at all times. Under the Public Trust Doctrine, the GSA has the responsibility to consider potential impacts of its groundwater planning decisions on navigable interconnected surface waters and their tributaries, and ISWs that support fisheries and ecological uses, including the level of groundwater contribution to those waters.[2] The GSA has "an affirmative duty to take the public trust into account in the planning and allocation of water resources, and to protect public trust uses whenever feasible." (*National Audubon Society v. Alpine County Superior Court* (1983) 33 Cal. 3d 419, 446.)

It is not clear that the GSA has undertaken the analysis and consideration required under the Public Trust Doctrine to support its proposed PMAs and management criteria. Under *Audubon* and *Environmental Law Foundation*, the GSA must conduct a robust analysis that considers the needs of public trust resources and impacts to those resources due to the proposed groundwater management practices, and that clearly explains why protection of public trust resources is infeasible due to inconsistency with the public interest. As explained above, the GSA has yet to resolve significant data gaps relevant to the surface water depletion rate, basin-wide groundwater levels, and the presence and needs of GDEs and beneficial users of interconnected surface waters. These issues must be addressed to ensure appropriate consideration of the needs of public trust resources as required under the Public Trust Doctrine.

CDFW-028

[2] *See, e.g., People v. Truckee Lumber Co.* (1897) 116 Cal. 397, *National Audubon Society v. Alpine County Superior Court* (1983) 33 Cal. 3d 419, and *Environmental Law Foundation v. State Water Resources Control Board* (2018) 26 Cal. App. 5th 844.

Based on an accurate understanding of public trust resource needs and impacts, the GSA will need to assess a range of potential protective measures to address impacts of groundwater extractions. These measures may need to go beyond the PMAs identified in the Draft GSP and may include pumping limits or alternative supply options to address existing, new, and expanded extractions. Given overallocation and ongoing drought, it is critical to plan for such eventualities in the Draft GSP. Before rejecting such measures, the GSA will need to engage in a balancing of competing interests that shows that protecting species and habitat though contingent pumping limits, use of supply alternatives, or equivalent protective measures would be infeasible.

CDFW-029

It is also unclear whether the GSA has appropriately considered potential impacts to *all* public trust resources in the basin, including those in Meiss Lake within the BVWA. Meiss Lake provides about 4,000 acres of aquatic wetland habitat that supports a variety of bird species, including migratory waterfowl, sandhill cranes, and other wetland-associated birds along the Pacific Flyway. (1996 Land Management Plan for BVWA.) Surveys since the Land Management Plan of 1996 have documented that in wet cycles, Meiss Lake contains thousands of nests of gull and tern species, including ring-billed gulls, California gulls, Caspian terns, and Forster's terns plus double crested cormorants and American white pelicans. (Novick 2011.) Species known to visit BVWA and use its habitat for nesting and/or foraging include the state endangered bald eagle, the state threatened greater sandhill crane, the state threatened Swainson's hawk, and the state threatened northern spotted owl. (*Id*.) Surveys of BVWA also document peak use of the wildlife area by hundreds of thousands of waterfowl, including nesting species (mallard, gadwall, cinnamon teal, Great Basin Canada goose, redhead, pintail and ruddy duck). (*Id*.) One of the key purposes for acquiring and maintaining the BVWA is to maintain and restore wetlands onsite, including Meiss Lake, to provide habitat and food for species. (1996 Land Management Plan for BVWA.) Failing to manage groundwater to ensure Meiss Lake receives adequate inputs to support these uses would undermine this goal.

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Many state policies and orders recognize the importance of wetlands, including the following:

- Executive Order W-59-93, California Wetlands Conservation Policy, commonly referred to as the "No Net Loss Policy" for wetlands, which aims to "[e]nsure no overall net loss and achieve a long-term net gain in the quantity, quality, and permanence of wetlands acreage and values in California in a manner that fosters creativity, stewardship and respect for private property";

- SWRCB Resolution No. 2019-0015 ("State Wetland Definition and Procedures for Discharges of Dredged or Fill Material to Waters of the State"), which affirms the SWRCB and Regional Water Boards' commitment to increasing the quantity, quality, and diversity of wetlands in California; and
- The Fish and Game Commission's Wetlands Resources policy, which recognizes that wetlands "provide significant and essential habitat for a wide variety of important resident and migratory fish and wildlife species" and that the quality and quantity of wetlands habitat in California has been significantly reduced. The Commission's policy is to ensure that proposed projects will result in no net loss of wetland or riparian habitat or acreage, and to seek to provide for the protection, preservation, restoration, enhancement, and expansion of wetland habitat in California.

Case law recognizes that these ecological uses of Meiss Lake are subject to the Public Trust Doctrine. In *Marks v. Whitney* (1971) 6 Cal. 3d 251, 259-260, the California Supreme Court recognized that the Public Trust Doctrine extends to preservation of wetlands "…in their natural state, so that they may serve as ecological units for scientific study, as open space, and as environments which provide food and habitat for birds and marine life…" More recently, the same court in *Audubon* recognized applicability of the Public Trust Doctrine to non-navigable tributaries to Mono Lake that supported a variety of bird species. (33 Cal. 3d 419, 436-437.) In *Environmental Law Foundation*, *supra*, 26 Cal. App. 5th 859-860, the Court applied the Public Trust Doctrine to groundwater extractions from tributaries that adversely impact public trust uses in interconnected surface waters, noting that the key factor is not the nature of the activity, but whether the activity results in harm to public trust resources. Consistent with this case law, the GSA must, if feasible, manage groundwater use to ensure Meiss Lake continues to receive groundwater inputs necessary to support its habitat and ecological uses.

CDFW-030 Cont'd.

Most critically, the GSA should consider the implications of its GSP development and implementation on species listed under the California Endangered Species Act (CESA). It is unclear whether the current Draft GSP will support all beneficial users, including CESA-listed bald eagle, greater sandhill crane, Swainson's hawk, and northern spotted owl, since its sustainable management criteria do not appear to account for the needs of these species and its PMAs are deferred to a future date. Actions may need to go beyond SGMA minimum requirements to meet Public Trust Doctrine requirements.

CDFW-031

The Department appreciates the opportunity to provide comments on the Draft GSP. For questions, please contact Region 1 SGMA Coordinator, Brad Henderson, at Brad.Henderson@wildlife.ca.gov . Additionally, you can contact the Klamath Watershed Coordinator, Janae Scruggs, at Janae.Scruggs@wildlife.ca.gov.

Sincerely,

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Attachment C – Butte Valley Groundwater Sustainability Plan Comment and Comment Response Matrix

Author	CIN	Group	Sub-Category	Description	Code/ Regulation	Location in GSP	Comment	Response / Recommended Action	Response Location in GSP
California Department of Fish and Wildlife	CDFW-01	A	BR	GDEs, Environmental Beneficial Users, Public Trust Doctrine			The Draft GSP raises significant concerns about potential impacts of groundwater pumping on GDEs, interconnected surface waters (ISWs), and species within the Department's jurisdiction. The Department urges the GSA to plan for and engage in responsible groundwater management that minimizes or avoids these impacts to the maximum extent feasible as required under applicable provisions of SGMA and the Public Trust Doctrine.	See MCR "GDE", "ISW", and "Public Trust Doctrine".	
California Department of Fish and Wildlife	CDFW-02	A	GD	Identification of Environmental Beneficial Users	23 CCR §§ 354.10(a), 354.26(b)(3), 354.28(b)(4), 354.34(b)(2), and 354.34(f)(3)		The Draft GSP does not adequately identify all the environmental users in the Basin, their locations, the groundwater dependent habitat they depend on at certain life stages, and how the Draft GSP will meet their needs.	See MCR "GDE".	
California Department of Fish and Wildlife	CDFW-03	A	BR	Identification of Environmental Beneficial Users, ESA	23 CCR §§ 354.10(a), 354.26(b)(3), 354.28(b)(4), 354.34(b)(2), and 354.34(f)(3)	Chapter 2, Table 1.7	The Draft GSP identifies a handful of species that are either Endangered Species Act (ESA) or CESA listed species found on BVWA, and does not take into account other special status or locally significant fish and wildlife species and habitats that benefit from or are dependent on groundwater.	See MCR "GDE".	
California Department of Fish and Wildlife	CDFW-04	C	GD	GDE- vegetation		Chapter 2, Table 1.7	The Draft GSP species prioritized for management were identified as "riparian vegetation", which is a vegetation type, not an ecosystem or species.	The language has been updated for clarity.	
California Department of Fish and Wildlife	CDFW-05	A	GD	Identification of Environmental Beneficial Users		Chapter 2, Table 1.7	Many species, including special-status species, that are known to depend on or may be vulnerable to groundwater fluctuations were not identified in this column. Species identified in the Basin that are not included in the Draft GSP include, but are not limited to, short-eared owl, Swainson's hawk, tri-colored blackbird, Tule white-fronted goose, Vaux's swift, Wawona Riffle Beetle, western pond turtle, and white-faced ibis. The Draft GSP does not indicate where these species were found in the Basin and how these species could be supported by the identified riparian vegetation and impacted by groundwater.	See MCR "GDE".	
California Department of Fish and Wildlife	CDFW-06	C	GD	GDE Classification Methodology	Water Code § 10727.4(l); 23 CCR § 354.16(g)		The Draft GSP does not provide sufficient detail when describing the methods used for GDE classification and mapping in the Draft GSP and the rationale for the methods used. The Draft GSP mentions desktop methods of using existing mapping tools, root depth to groundwater modeling, and other tools for identifying GDEs. The Draft GSP appears not to include Advisory Committee input, field verification, or any quality assurance/quality control measures to validate the resulting classification and mapping. Without these means of verification, the Department cannot evaluate or comment on the accuracy of the GSP's GDE classification or mapping. However, the Department recommends that GDE mapping be informed by science-based vegetation classification or similar methods, such as the Department's Survey of California Vegetation Classification and Mapping Standards.1 The Draft GSP's GDE classification and mapping should be revised if necessary after utilizing these methods. Classification and mapping methods should be thoroughly described so that GDE classification and mapping can be verified by stakeholders or repeated during future GSP updates and effectiveness monitoring.	See MCR "GDE".	
California Department of Fish and Wildlife	CDFW-07	A	GD	Consideration of Impacts to GDEs			The Draft GSP mentions certain GDEs, but does not provide consideration of those GDEs or assess potential impacts to those GDEs from groundwater pumping.	See MCR "GDE".	

California Department of Fish and Wildlife	CDFW-08	A	GD	Identification of GDEs, Inclusion in Water Budget- Meiss Lake	23 CCR § 354.16(g); Water Code § 10727.4(l); 23 CCR §§ 351(al) and 354.18(b)(3)	Chapter 2	The Draft GSP also fails to identify or appropriately consider certain GDEs, including Meiss Lake within the BVWA. Historically, Meiss Lake was a natural wetland that spanned the Butte Valley Basin and received natural inputs from both groundwater and surface water. Due to unsustainable groundwater management practices, Meiss Lake has been reduced in size to about 4,000 acres, but it continues to support a wide variety of species and habitats. Currently, Meiss Lake receives natural inputs from surface water tributaries and is occasionally supported by pumped groundwater as needed in dry years to support groundwater-dependent species. Thus, Meiss Lake qualifies as a GDE that must be identified and appropriately considered in the draft GSP because it is a historic natural wetland that continues to rely on groundwater inputs to sustain its species and habitat. In defining GDEs entitled to consideration in a GSP, SGMA statutes and regulations do not require features to rely on groundwater from a particular source in order to qualify as GDEs. Alternatively, if the District were to nevertheless conclude that Meiss Lake is not a GDE, Meiss Lake must be considered a managed wetland, with its groundwater inputs appropriately accounted for in the Draft GSP's water budget. GSPs must account for groundwater extraction for all water use sectors including managed wetlands, managed recharge, and native vegetation. Chapter 2 of the Draft GSP contains a description of the BVWA's water management practices depending on the water year type or impacts to Meiss Lake, the lowest point in the basin. Many of the streams, including Butte Creek, have been "sufficiently appropriated" during the irrigation season, meaning that allocated water likely exceeds available supplies, leaving little to enter Meiss Lake. The Draft GSP's water budget must consider and account for the fact that Meiss Lake may go dry in certain years and may require inputs of pumped groundwater for wetland habitat restoration and to support groundwater-dependent species. By failing to account for groundwater inputs to Meiss Lake, the GSP has not adequately analyzed the groundwater-surface water relationship in the Basin or developed a complete water budget.	CDFW's comment suggests that Meiss Lake is a groundwater dependent ecosystem. 23 CCR 351(o) provides that a groundwater dependent ecosystem refers to "ecological communities or species that depend on groundwater emerging from aquifers or on groundwater occurring near the ground surface." According to the data in the GSP, it does not appear that Meiss Lake depends on aquifers or groundwater occurring near the ground surface. While Meiss Lake may have depended on aquifers or groundwater occurring near the ground surface prior to an increase in groundwater pumping in the Butte Valley, any disconnection arose long before January 1, 2015. Therefore, even if such disconnection were classified as an "undesirable result", it is not something that the GSA must address. Also see MCR "GDE".	
California Department of Fish and Wildlife	CDFW-09	A	PM	Developing PMAs to Protect GDEs			The Draft GSP does not identify projects and management actions (PMAs) or sustainable management criteria to protect GDEs in the basin. The Department will make best efforts to support PMAs anticipated to address both immediate and long-term fish and wildlife resource needs. Not recognizing the role of the GSA to ensure sustainable management and nearly all PMAs through an "integrative and collaborative approach" will make it difficult to achieve sustainability by 2042 as contemplated under SGMA.	See MCR "GDE".	
California Department of Fish and Wildlife	CDFW-10	B	GE	Addressing Data Gaps, Consider Impacts to GDEs and Beneficial Users			The Department recommends revisiting the Draft GSP to address data gaps, ensure compliance with applicable SGMA statutory requirements, and appropriately consider and address impacts to GDEs and all beneficial users.	See MCR "GDE".	
California Department of Fish and Wildlife	CDFW-11	B	HM	Accuracy of the Hydrogeologic Model	23 CCR § 354.14.(b)(4)(5)		While the Draft GSP includes an HCM, it is not clear that the HCM accurately characterizes the physical components and surface water-groundwater interactions in the Basin. Several statements in the Draft GSP contribute to the uncertainty regarding the accuracy of the HCM's characterizations of the physical components and surface water-groundwater interactions.	See MCR "ISW".	
California Department of Fish and Wildlife	CDFW-12	B	HM	Accuracy of the Hydrogeologic Model	23 CCR §354.14(b)(3)	Chapter 2, page 48	The HCM in the Draft GSP fails to identify a definable bottom of the basin as required by SGMA regulations. As described in Chapter 2 of the Draft GSP, the HCM includes a description of the Western Cascades Subprovince geologic unit, which is the relatively older and less permeable volcanic bedrock that underlies Butte Valley. (p. 48.) Such description states that the Western Cascades unit "acts as a barrier to regional groundwater flow." As such, it is assumed that the Western Cascades unit surface is the bottom of the Basin. However, the description concludes that, "This formation has not been penetrated by Butte Valley wells (DOI 1980). The unknown depth to the Western Cascades Subprovince precludes its appearance in the cross-sections." No additional information was noted attempting to characterize the bottom of the Basin boundary. Several statements in the Draft GSP contribute to the uncertainty regarding the accuracy of the HCM's characterizations of the physical components and surface water-groundwater interactions.	The HCM is appropriate and properly reflects uncertainty about the depth of Western Cascades Subprovince. Due to the volcanic nature of Butte Valley many uncertainties surround Basin characterization such as the depth of the Western Cascades Subprovince. The Department of Water Resources is conducting airborne electromagnetic (AEM) surveys throughout California to assist implementing SGMA, which may improve some uncertainties in the HCM. At this time the GSP will focus on the critical data gaps listed in Appendix 3-A. Any future studies to improve the HCM will depend on partnerships with other agencies.	
California Department of Fish and Wildlife	CDFW-13	C	GL	Groundwater Depletion- Conflicting Information in GSP			The Draft GSP states Butte Valley basin has experienced a decrease in groundwater levels on the order of approximately 30-feet during the study period of spring 1979 to spring 2015 due primarily to decreased precipitation, increased pumping, and a commensurate decrease in the subsurface hydraulic gradient. Similarly, the Draft GSP concludes that, "There is significant long-term trend indicating some groundwater depletion." Conversely, the Draft GSP finds that the basin is not in overdraft due to significantly higher volumes of lateral groundwater inflow compared to volumes of groundwater extraction and does not exceed the sustainable yield of the Basin.	Model results suggest that the decline in groundwater levels is a reaction of the Butte Valley system to a decrease of recharge due to a long term decline of precipation and climate change. The GSA aims to balance groundwater pumping needs with the decline in recharge through the PMAs outlined in Chapter 4. A series of PMAs also address filling data gaps and updating the groundwater basin numerical model for better representation of the system dynamics. See MCR "General Data Gaps".	
California Department of Fish and Wildlife	CDFW-14	A	WB	Sustainable Yield calculation	23 CCR § 354.18 (b)(7)		The Draft GSP asserts that the sustainable yield will be a constantly changing value based on future climate conditions, future groundwater pumping needs, and future management actions. The Draft GSP should adequately quantify sustainable yield as required by SGMA regulations to explain this fluctuation for the approach to be acceptable.	See MCR "Sustainable Yield".	
California Department of Fish and Wildlife	CDFW-15	B	WB	Adjust Water Budget, Identify SMCs to protect GDEs			Once the GSA clarifies its understanding of these issues, the water budget should be adjusted accordingly and the Draft GSP should identify sustainable management criteria that prevent adverse impacts to beneficial users, such as dewatering of GDEs, and strive for long term groundwater sustainability with PMAs.	Based on current knowledge and data, the current GSP has chosen sustainable management criteria (SMC) that protects beneficial users. The SMCs will be revisited after additional data is collected at subsequent 5-year GSP updates. See MCR "PMA Selection Criteria".	Chapter 3
California Department of Fish and Wildlife	CDFW-16	C	PM	Water Conservation PMAs			The GSA should consider developing PMAs that promote more efficient water use through water conservation where feasible.	More efficient water use through water conservation is an innate characteristic of many PMAs such as Tier 2 - Irrigation Efficiency Improvements and Tier 2 - Dorris Water Meter Installation Project.	

California Department of Fish and Wildlife	CDFW-17	A	GE	Meeting SGMA Requirements	23 CCR § 354.22 et seq.; Water Code §§ 10721(x)(6) and 10727.2(b)		The Draft GSP concludes that sustainability will be achieved by 2042 and undesirable results will be avoided, but the underlying analysis and data do not fully support these conclusions. The goal of sustainability cannot be achieved by 2042 without an accurate water budget and clearly-defined sustainable management criteria, including minimum thresholds.	See MCR "General Data Gaps".	
California Department of Fish and Wildlife	CDFW-18	A	IS	ISW Depletion- Modeling and Minimum Threshold	23 CCR § 354.28(c)(6)		If a numerical groundwater-surface water model is not used to quantify surface water depletion, the GSP must identify and describe an equally effective method, tool, or analytical model to be used for this purpose. The Draft GSP does not meet these requirements because it does not identify a sustainable management criteria for surface water depletions. As such, the Draft GSP does not set minimum thresholds for surface water depletions based on the rate or volume of surface water depletions caused by groundwater use, and it does not utilize a basin-wide groundwater-surface water model or equally effective method, tool, or model to quantify such depletions.	See MCR "ISW".	Section 2.2.2.6 and Chapter 3
California Department of Fish and Wildlife	CDFW-19	A	IS	ISW Depletion- SMC Calculation			The Department requests revisions to the Draft GSP to clarify how the sustainable management criteria were developed, how these criteria relate to the relevant sustainability indicators, and how the criteria may affect the interest of beneficial users.	See MCR "ISW".	Section 2.2.2.6 and Chapter 3
California Department of Fish and Wildlife	CDFW-20	B	WB	Water Budget, Hydrogeologic Model	23 CCR § 354.18(e) and 354.18(b)(1)	Chapter 2	A key simplification is utilized by the Draft GSP authors in developing the water budget in that the surface water hydrologic subsystem is removed from the BVIHM. The Department appreciates the justifications for this simplification being few streams contribute perennial flow to the basin surface due, in part, to infiltration into highly permeable volcanic soils outside of the basin boundary. However, some of the Water Budget's information contradicts the information presented within the HCM discussion. For example, during the HCM discussion in Chapter 2, the GSA acknowledges that streamflow losses, canal seepage and percolation from wetlands (that receive periodic surface flows) all contribute to groundwater recharge. Similarly, the HCM mentions spring-fed creeks that drain into Meiss Lake (currently part of the BVWA). Ultimately, the Department is hesitant to support elimination of all surface water inputs for modeling purposes. The Department is especially concerned with the canal seepage when an economic, environmental, or other benefit may result from a more efficient use of water. The GSA should conduct further analysis of potential surface water input sources to fully comply with applicable SGMA regulations.	A PMA has been added in Chapter 4 to add the surface water hydrologic subsystem to the BVIHM. The PMA is dependent on first filling existing data gaps in Basin surface water. Additional text has been added to Chapter 5 outlining the implementation plan for the new PMA.	
California Department of Fish and Wildlife	CDFW-21	B	MN	Groundwater Monitoring Network	23 CCR §354.34		The Draft GSP lacks basinwide groundwater monitoring, which is necessary to assess potential surface water depletions and impacts to beneficial surface water users, including fish and wildlife species. The GSA should identify how the GSA will achieve a robust monitoring system to capture accurate information on these portions of the basin or use existing data to accurately model these portions and assess impacts. If the GSA intends to rely on basin-specific data, the Draft GSP should elaborate on the description of developing a monitoring network capable of collecting sufficient data to demonstrate short-term, seasonal, and long-term trends in groundwater and related surface water conditions as required by SGMA regulations. The Draft GSP should clearly identify the wells used for monitoring including individual well information. This includes the well ID, ground surface elevation, reference point elevations for water level measurements, well completion depth, perforation intervals, and hydrograph information. For the hydrograph information, the Draft GSP should provide information on the aquifer unit.	See MCR "General Data Gaps" and the PMA "Well Inventory Program".	
California Department of Fish and Wildlife	CDFW-22	A	IS	ISW Depletion- SMC	23 CCR § 355.4(b)(2)		The Draft GSP does not set forth sustainable management criteria for surface water depletions, nor does it utilize a basin-wide groundwater-surface water model or equally effective method, tool, or model to quantify such depletions.	See MCR "ISW".	Section 2.2.2.6, Chapter 3, Appendix 3-A
California Department of Fish and Wildlife	CDFW-23	A	MN	Monitoring Network- ISW Depletion and Environmental Beneficial Users	23 CCR § 355.4(b)(2)		The Draft GSP also lacks basin-wide groundwater monitoring, which is necessary to assess potential surface water depletions and impacts to beneficial surface water users.	See MCR "ISW".	Section 3.3 and Appendix 3-A.
California Department of Fish and Wildlife	CDFW-24	A	MN	Addressing Data Gaps	23 CCR § 355.4(b)(2)		The Draft GSP must set forth a reasonable pathway and timeline for addressing these data gaps and developing sustainable management criteria as required under SGMA, supplementing with models and other data if needed to address uncertainties in basin-specific data.	See MCR "General Data Gaps".	
California Department of Fish and Wildlife	CDFW-25	A	IS	ISW Depletion- SMCs, impact to Environmental Beneficial Users	23 CCR §§ 354.24, 354.26, and 354.28.		The Draft GSP also lacks quantitative criteria for interconnected surface water, which are needed to assess compliance with SGMA and avoid significant and unreasonable depletions of ISW. After conducting the necessary analysis and establishing appropriate criteria, the Draft GSP should be updated to consider and avoid any unreasonable adverse impacts to beneficial users anticipated to result from ISW depletions.	See MCR "ISW".	Section 2.2.2.6, Chapter 3, Appendix 3-A
California Department of Fish and Wildlife	CDFW-26	A	GE	Development of SMCs	23 CCR §§ 354.24, 354.26, and 354.28		The Draft GSP expanded its sustainability management criteria with additional monitoring points with "soft landing" triggers and "aspirational watershed goals". This characterization ignores SGMA, which clearly indicates the sustainability goal and sustainable management criteria must be developed to avoid undesirable results within the planning and implementation horizon.	The goal of the GSA remains to keep or return groundwater levels to the defined measurable objective. The defined triggers and "soft landing" triggers represent operational mechanisms to activate certain PMAs to address falling groundwater levels before they reach the minimum threshold and cause undesirable results. The system of PMAs to be activated at each trigger will be resolved during GSP implemention as needed and may operate anywhere from a local to Basin-wide scale. See MCR "PMA Selection Criteria".	

California Department of Fish and Wildlife	CDFW-27	B	GE	Development of SMCs, Hydrogeologic Model, and Water Budget	23 CCR § 355.4(b)(1)		The Department is aware of available information not being utilized to the fullest for the development of each sustainable management criteria, the water budget and BVIHM in the Draft GSP. Specifically, the Draft GSP lacks consideration of current versus historic surface water extractions, agriculture ditch losses and gains, and new or improved wells in the basin. These deficiencies in the analysis suggest BVIHM may not be considering all relevant groundwater pumping and related impacts in the basin.	The GSP used all available data in its development. While additional data may exist in the Basin, the GSA was not given access, which is at the discretion of private land owners and public agencies if they choose not to be collaborators. If CDFW is aware of additional information and data sources that are comfortable sharing with the GSA, it should forward the contact information to the GSA. Also see MCR "General Data Gaps".	
California Department of Fish and Wildlife	CDFW-28	A	BR	Public Trust Doctrine- GSP shortcomings	National Audubon Society v. Alpine County Superior Court (1983) 33 Cal. 3d 419, 446; People v. Truckee Lumber Co. (1897) 116 Cal. 397, 33 Cal. 3d 419, and Environmental Law Foundation v. State Water Resources Control Board (2018) 26 Cal. App. 5th 844		It is not clear that the GSA has undertaken the analysis and consideration required under the Public Trust Doctrine to support its proposed PMAs and management criteria. Under Audubon and Environmental Law Foundation, the GSA must conduct a robust analysis that considers the needs of public trust resources and impacts to those resources due to the proposed groundwater management practices, and that clearly explains why protection of public trust resources is infeasible due to inconsistency with the public interest. As explained above, the GSA has yet to resolve significant data gaps relevant to the surface water depletion rate, basin-wide groundwater levels, and the presence and needs of GDEs and beneficial users of interconnected surface waters. These issues must be addressed to ensure appropriate consideration of the needs of public trust resources as required under the Public Trust Doctrine.	See MCR "Public Trust".	
California Department of Fish and Wildlife	CDFW-29	A	PM	Consider Public Trust Doctrine when setting PMAs			Based on an accurate understanding of public trust resource needs and impacts, the GSA will need to assess a range of potential protective measures to address impacts of groundwater extractions. These measures may need to go beyond the PMAs identified in the Draft GSP and may include pumping limits or alternative supply options to address existing, new, and expanded extractions. Given overallocation and ongoing drought, it is critical to plan for such eventualities in the Draft GSP. Before rejecting such measures, the GSA will need to engage in a balancing of competing interests that shows that protecting species and habitat though contingent pumping limits, use of supply alternatives, or equivalent protective measures would be infeasible.	See MCR "Public Trust".	
California Department of Fish and Wildlife	CDFW-30	A	BR	Public Trust- Meiss Lake	Environmental Law Foundation, supra, 26 Cal. App. 5th 859-860		It is also unclear whether the GSA has appropriately considered potential impacts to all public trust resources in the basin, including those in Meiss Lake within the BVWA. One of the key purposes for acquiring and maintaining the BVWA is to maintain and restore wetlands onsite, including Meiss Lake, to provide habitat and food for species. (1996 Land Management Plan for BVWA.) Failing to manage groundwater to ensure Meiss Lake receives adequate inputs to support these uses would undermine this goal. In Environmental Law Foundation, supra, 26 Cal. App. 5th 859-860, the Court applied the Public Trust Doctrine to groundwater extractions from tributaries that adversely impact public trust uses in interconnected surface waters, noting that the key factor is not the nature of the activity, but whether the activity results in harm to public trust resources. Consistent with this case law, the GSA must, if feasible, manage groundwater use to ensure Meiss Lake continues to receive groundwater inputs necessary to support its habitat and ecological uses.	See MCR "Public Trust" and "GDE".	
California Department of Fish and Wildlife	CDFW-31	A	BR	Endangered Species Act	CESA		Tthe GSA should consider the implications of its GSP development and implementation on species listed under the California Endangered Species Act (CESA). It is unclear whether the current Draft GSP will support all beneficial users, including CESA-listed bald eagle, greater sandhill crane, Swainson's hawk, and northern spotted owl, since its sustainable management criteria do not appear to account for the needs of these species and its PMAs are deferred to a future date. Actions may need to go beyond SGMA minimum requirements to meet Public Trust Doctrine requirements.	See MCR "Public Trust" and "GDE".	Section 2.2.2.7
NGO Consortium	NGO-001	C	DC	Identification and Mapping of SDACs			The GSP states that there are three Severely Disadvantaged Communities (SDACs) in the basin, but these areas are not mapped. Provide a map of the SDACs in the basin. The DWR DAC mapping tool can be used for 1 this purpose. The statement on p. 2-11 that there are no DACs in the basin is confusing, since SDACs are a subset of DACs. Please remove or clarify this sentence.	One map showing DACs and SDACs has been added to Chapter 2. The statement on DACs and overall section has been edited for clarity.	Section 2.1.1.1

NGO Consortium	NGO-002	C	DW	Domestic Well Mapping			The GSP provides a map of domestic well density in Figure 1.5, but fails to provide depth of these wells (such as minimum well depth, average well depth, or depth range) within the basin. Include a map showing domestic well locations and average well depth across the basin.	The requested information is included in the well outtage analysis in Appendix 3-C.	Appendix 3-C
NGO Consortium	NGO-003	B	DC	Mapping of DAC groundwater users			The GSP fails to identify the population dependent on groundwater as their source of drinking water in the basin. Specifics are not provided on how much each SDAC community relies on a particular water supply (e.g., what percentage is supplied by groundwater). Identify the sources of drinking water for SDAC members, including an estimate of how many people rely on groundwater (e.g., domestic wells, state small water systems, and public water systems).	Added a sentence about SDAC dependence on groundwater as a source of drinking water. Details on water suppliers and SDAC population was already included in the section.	Section 2.1.1.1
NGO Consortium	NGO-004	C	DC	Identification and engagement of Tribes			Describe the occurrence of tribal lands in the basin. If tribes have interests in the basin or if groundwater management within Butte Valley Basin will have impacts on downstream tribes, describe them in detail.	Chapter 2 has been edited to clarify that no tribal lands exist within Butte Valley. Additionally, at this time we are not aware of any tribal interests.	Section 2.1.1.1
NGO Consortium	NGO-005	C	IS	Interconnected Surface Water- Mapping		2.2.2.6	There is no map presented in the ISW section (Section 2.2.2.6) of stream reaches in the basin. Provide a map showing all the stream reaches in the basin, with reaches clearly labeled with stream name and interconnected or disconnected. Consider any segments with data gaps as potential ISWs and clearly mark them as such on maps provided in the GSP.	A dedicated map showing stream reaches and other waterbodies in the Basin has been added to Section 2.2.2.6. An additional map of the Butte Valley Wildlife Area has been added, showing several stream reaches terminating in the Perimeter Canal of the managed wetlands. Comparison with groundwater elevation maps suggest that all surface water is disconnected, as discussed in the section. The need for additional data is discussed as a data gap.	Section 2.2.2.6
NGO Consortium	NGO-006	C	GL	Groundwater Levels			The GSP provides a vague assessment of groundwater levels in the vicinity of stream reaches, with no specific details provided.	The section has been updated to refer to Appendix 2-A for groundwater level maps.	Section 2.2.2.6
NGO Consortium	NGO-007	A	IS	Interconnected Surface Water determination- Data Gaps, Mapping		2.2.2.6	Given the gaps in groundwater level data and streamflow data, the stream reaches should be considered potential ISWs until further data can be gathered. Because the potential ISWs have not been identified, they cannot be adequately managed in the GSP. Until a disconnection can be proven, all potential ISWs should be included in the GSP. Reconcile ISW data gaps with specific measures (shallow monitoring wells, stream gauges, and nested/clustered wells) along surface water features in the Monitoring Network section of the GSP. Data gaps are discussed in general terms in the ISW section (Section 2.2.2.6), but very little detail is provided.	See MCR "ISW".	Section 2.2.2.6 and Appendix 3-A
NGO Consortium	NGO-008	B	IS	ISW determination- Groundwater Contour Maps			Provide depth-to-groundwater contour maps using the best practices presented in Attachment D, to aid in the determination of ISWs. Specifically, ensure that the first step is contouring groundwater elevations, and then subtracting this layer from land surface elevations from a digital elevation model (DEM) to estimate depth-to-groundwater contours across the landscape. This will provide accurate contours of depth to groundwater along streams and other land surface depressions where GDEs are commonly found.	The recommended approach in this comment cannot be done due to existing data gaps. See MCR "ISW" and "General Data Gaps".	Appendix 2-A
NGO Consortium	NGO-009	B	IS	ISW determination- seasonal data			Use seasonal data over multiple water year types (we recommend 10 years from 2005 to 2015) to capture the variability in environmental conditions inherent in California's climate, when mapping ISWs.	Seasonal groundwater level data is included in Appendix 2-A.	Appendix 2-A
NGO Consortium	NGO-010	A	GD	Identification of GDEs			The identification of Groundwater Dependent Ecosystems (GDEs) is insufficient, due to lack of clarity around the monitoring well data (well location and screen depth) used to map groundwater elevations and depth to groundwater. The GSP references TNC Best Practices for using the [Natural Communities Commonly Associated with Groundwater (NC)] NC Dataset (2019) as the approach used to map depth to groundwater, using the difference between land surface elevation and interpolated groundwater elevation above mean sea level. However, the GSP does not further describe the monitoring well data (well location and screen depth) used to create the depth-to-groundwater maps. On the depth-to-groundwater level maps presented in Appendix 2-C, include the location of groundwater monitoring wells used to produce the maps. Discuss screening depth of monitoring wells and ensure they are monitoring the shallow principal aquifer.	See MCR "GDE".	
NGO Consortium	NGO-011	B	GD	Indentification of GDEs			NC dataset polygons were incorrectly removed in areas adjacent to irrigated fields due to the presence of surface water. However, this removal criteria is flawed since GDEs, in addition to groundwater, can rely on multiple water sources – including shallow groundwater receiving inputs from irrigation return flow from nearby irrigated fields – simultaneously and at different temporal/spatial scales. NC dataset polygons adjacent to irrigated land can still potentially be reliant on shallow groundwater aquifers, and therefore should not be removed solely based on their proximity to irrigated fields.	See MCR "GDE".	
NGO Consortium	NGO-012	B	GD	Identification of GDEs			NC dataset polygons were incorrectly removed based on the amount of time that they access groundwater. As presented in the GSP, assumed GDEs have access to groundwater >50% of time and assumed non-GDEs have access to groundwater <50% of the time. However, NC dataset polygons should not be assumed to be disconnected if there is any connection to groundwater (regardless of temporal percentage). Many GDEs often simultaneously rely on multiple sources of water (i.e., both groundwater and surface water), or shift their reliance on different sources on an interannual or inter-seasonal basis. Use depth-to-groundwater data from multiple seasons and water year types to verify whether polygons in the NC Dataset are supported by groundwater, instead of the incorrect criteria mentioned above (presence of irrigation water or less than 50% time connected to groundwater).	See MCR "GDE".	

NGO Consortium	NGO-013	B	GD	GDEs- rooting depth			Refer to Attachment B for more information on TNC's plant rooting depth database. Deeper thresholds are necessary for plants that have reported maximum root depths that exceed the averaged 30 feet threshold, such as valley oak (Quercus lobata). We recommend that the reported max rooting depth for these deeper-rooted plants be used. For example, a depth-to-groundwater threshold of 80 feet should be used instead of the 30 feet threshold, when verifying whether valley oak polygons from the NC Dataset are connected to groundwater. It is important to re-emphasize that actual rooting depth data are limited and will depend on the plant species and site-specific conditions such as soil and aquifer types, and availability to other water sources.	See MCR "GDE".	
NGO Consortium	NGO-014	B	GD	Identification of GDEs			If insufficient data are available to describe groundwater conditions within or near polygons from the NC dataset, include those polygons as "Potential GDEs" in the GSP until data gaps are reconciled in the monitoring network.	See MCR "GDE".	
NGO Consortium	NGO-015	A	WB	Water Budget- Accounting for GDEs			The integration of native vegetation and managed wetlands into the water budget is **insufficient**, due to the absence of Appendix 2-D (Water Budget). We could not determine if the water budget included the current, historical, and projected demands of native vegetation and managed wetlands. Include Appendix 2-D (Water Budget) in the GSP. Quantify and present all water use sector demands in the historical, current, and projected water budgets with individual line items for each water use sector, including native vegetation and managed wetlands.	See MCR "Water Budget".	
NGO Consortium	NGO-016	B	PO	Targeted Stakeholder Outreach	23 CCR §354.10(d)(3)	Appendix 1-A	SGMA's requirement for public notice and engagement of stakeholders is not fully met by the description in the Stakeholder Communication and Engagement Plan included in the GSP (Appendix 1-A). In the Stakeholder Communication and Engagement Plan, describe active and targeted outreach to engage SDAC members, domestic well owners, and environmental stakeholders throughout the GSP development and implementation phases. Refer to Attachment B for specific recommendations on how to actively engage stakeholders during all phases of the GSP process.	Targeted outreach was not conducted to specific DACs but a large portion of the GSP area is classified as SDAC or DAC and thus outreach to the entire basin area was intended to cover those communities. See Chapter 1 for additional information.	
NGO Consortium	NGO-017	C	PO	Targeted Stakeholder Outreach	23 CCR §354.10(d)(3)	Appendix 1-A	The opportunities for public involvement and engagement are described in very general terms. They include attendance at public meetings, stakeholder email list, and updates to the GSP website. There is no specific outreach described for members of the SDAC communities or domestic well owners.	Noted. Specifc outreach activities are detailed in Appendix 1-B.	
NGO Consortium	NGO-018	B	PO	Sustained stakeholder engagement	23 CCR §354.10(d)(3)	Appendix 1-A	The Stakeholder Communication and Engagement Plan does not include a plan for continual opportunities for engagement through the implementation phase of the GSP for SDACs, domestic well owners, and environmental stakeholders.	Noted. Planned outreach during the implementation phase of the plan is described in Chapter 5.	
NGO Consortium	NGO-019	B	GL	Groundwater Level Minimum Threshold- Domestic Wells, DACs, Tribes			For chronic lowering of groundwater levels, the GSP does not sufficiently describe or analyze direct or indirect impacts on domestic drinking water wells, DACs, or tribes when defining undesirable results. The GSP does not sufficiently describe how the existing minimum threshold groundwater levels are consistent with avoiding undesirable results in the basin. The GSP states (p. 3-34): "The minimum threshold is expected to cause as much as 15% well outages." This is the only quantitative statement made however, and it is not supported by data or analysis. Describe direct and indirect impacts on drinking water users, DACs, and tribes when describing undesirable results and defining minimum thresholds for chronic lowering of groundwater levels.	Appendix 3-C includes an expanded well outtage analysis that reviews the impact of falling groundwater levels on groundwater wells within the groundwater basin, including domestic wells. The entire groundwater basin is a DAC or SDAC and there are no tribal lands. Chapter 3 has been updated to refer to the appendix for the data and discusses the results of the updated analysis.	
NGO Consortium	NGO-020	B	WQ	SMCs for Constiutents of Concern	23 CCR §354.34(c)(4)	pages 3-37	For degraded water quality, minimum thresholds for the following three constituents of concern (COCs) are set at the maximum contaminant levels (MCLs): nitrate, specific conductivity and arsenic. However, the GSP does not set SMC for the other COCs in the basin (boron, benzene, and 1,2-dibromoethane). The GSP states on p. 3-37 that because 1,2-dibromoethane and benzene are already being monitored and managed by the Regional Board through the Leaking Underground Storage Tank (LUST) program, SMC are not needed. The GSP states that since boron is naturally occurring, SMC are not needed. However, SMC should be established for all COCs in the basin, in addition to coordinating with water quality regulatory programs. Naturally occurring COCs can be exacerbated as a result of groundwater use or groundwater management within the basin. Set minimum thresholds and measurable objectives for boron, benzene and 1,2-ibromoethane. Ensure they align with drinking water standards.	The GSA only sets SMCs for three COCs but will continue to monitor other identified COCs for any increasing temporal and spatial trends. As shown in Appendix 2-B, 1,2-dibromoethane and benzene contamination is highly localized and decreasing down to drinking level standards through management by the Regional Board through the Leaking Underground Storage Tank (LUST) program. The GSA feels that SMCs are not needed at this time for 1,2-dibromoethane and benzene but will continue to monitor trends. Historical data of boron shows a decreasing or steady trend. The GSA feels that an SMC is not needed for boron, but will continue to monitor boron for any future issues.	Chapter 3

NGO Consortium	NGO-021	B	WQ	Degraded Water Quality Minimum Threshold- Impact on Water Users			The GSP only includes a very general discussion of indirect impacts to drinking water users when defining undesirable results and evaluating the cumulative or indirect impacts of proposed minimum thresholds. The GSP does not, however, mention or discuss direct and indirect impacts on DACs or tribes when defining undesirable results for degraded water quality, nor does it evaluate the cumulative or indirect impacts of proposed minimum thresholds on DACs or tribes. Describe direct and indirect impacts on drinking water users, DACs and tribes when defining undesirable results for degraded water quality. For specific guidance on how to consider these users, refer to “Guide to Protecting Water Quality Under the Sustainable Groundwater Management Act.” Evaluate the cumulative or indirect impacts of proposed minimum thresholds for degraded water quality on drinking water users, DACs, and tribes. Sustainable management criteria provided in the GSP do not consider potential impacts to environmental beneficial users. The GSP neither describes nor analyzes direct or indirect impacts on environmental users of groundwater or surface water when defining undesirable results.	The discussion of indirect impacts to drinking water users is valid because there are no tribal lands or interests within the Butte Valley groundwater basin and the entire valley is considered a disadvantaged community (DAC). Chapter 3 already describes the impact on water users when defining undesirable results for degraded water quality. The cumulative and indirect impact of the proposed minimum thresholds will avoid the described undesirable results for degraded water quality. Due to the lack of data, as described in Chapter 2 and Appendix 3-A, the GSA cannot complete qualitative analysis of the impact on the proposed SMCs on surface waters and groundwater dependent ecosystems. The current discussion in the GSP is valid until the outlined data gaps are addressed in the 5-year GSP update.	Chapter 3
NGO Consortium	NGO-022	A	IS	SMCs for ISW Depletion	23 CCR §354.28(c)(6) 23 CCR §354.28(b)(4)		The GSP states that the depletion of interconnected surface water sustainability indicator is not applicable in the Basin, but this has not been proven. Chapter 2 of the GSP disregards ISWs due to data gaps. However, they should be retained as potential ISWs and preliminary SMC for the depletion of interconnected surface water sustainability indicator should be established. Establish preliminary SMC for the depletion of interconnected surface water sustainability indicator, that can be refined when data gaps are filled. When defining undesirable results for depletion of interconnected surface water, include a description of potential impacts on instream habitats within ISWs when defining minimum thresholds in the basin. The GSP should confirm that minimum thresholds for ISWs avoid adverse impacts to environmental beneficial users of interconnected surface waters as these environmental users could be left unprotected by the GSP. These recommendations apply especially to environmental beneficial users that are already protected under pre-existing state or federal law.	See MCR "ISW".	
NGO Consortium	NGO-023	C	GL	Chronic Lowering of Groundwater Level- undesirable result for GDEs			When defining undesirable results for chronic lowering of groundwater levels, provide specifics on what biological responses (e.g., extent of habitat, growth, recruitment rates) would best characterize a significant and unreasonable impact to GDEs.	Discussion regarding SMCs for protecting GDEs has been added to the new PMA "Groundwater Dependent Ecosystem Data Gaps" of Chapter 4. See MCR "GDE".	
NGO Consortium	NGO-024	B	WB	Water Budget- climate change, data source		Appendix 2-D	The integration of climate change into the projected water budget is incomplete. The GSP includes climate change into key inputs (e.g., precipitation, evaporation, and surface water flow) of the projected water budget. However, we are concerned that the selected period is from 1991-2011 and therefore it does not include the drought from 2012-2016. We look forward to reading Appendix 2-D (Water Budget) in the next draft of the GSP to learn about how you are integrating drought risk in your future water budget. Include Appendix 2-D (Water Budget) in the next draft of the GSP, so that the manner in which climate change is incorporated into the water budgets is fully explained.	The GSP follows DWR guidance. Future updates may be used to improve climate change predictions.	
NGO Consortium	NGO-025	A	WB	Sustainable Yield calculation			The GSP does not calculate a sustainable yield based on the projected water budget with climate change incorporated, but instead states that the sustainable yield will vary over time as new project and management actions are added. If sustainable yield is not calculated, then there is also increased uncertainty in virtually every subsequent calculation used to plan for projects, derive measurable objectives, and set minimum thresholds. Plans that do not explicitly calculate sustainable yield may underestimate future impacts on vulnerable beneficial users of groundwater such as ecosystems, DACs, domestic well owners, and tribes. Estimate sustainable yield based on the projected water budget with climate change incorporated, to inform the basis for development of projects and management actions.	See MCR "Sustainable Yield"	Chapter 2
NGO Consortium	NGO-026	C	PM	Incorporate Climate Change into PMAs			Incorporate climate change scenarios into projects and management actions.	The future climate models were prepared by DWR and used in accordance with DWR guidance.	
NGO Consortium	NGO-027	A	MN	Monitoring Network- Add Representative Monitoring Points			The consideration of beneficial users when establishing monitoring networks is insufficient, due to lack of specific plans to increase the Representative Monitoring Points (RMPs) in the monitoring network that represent water quality conditions and shallow groundwater elevations around DACs, domestic wells, GDEs, and ISWs. While the GSP recognizes the importance of filling data gaps, it does not provide specific plans, well locations shown on a map, or a timeline to fill the data gaps. The additional RMPs should be included in the GSP now, instead of included in the 5-year GSP update. Without a map of proposed new monitoring well locations, a determination cannot be made regarding the adequacy of the monitoring network for sustainability indicators going forward into the GSP implementation phase.	Current GSP has been approved by the stakeholder committee and meets regulatory requirements. The current GSP has identified these data gaps (Appendix 3-A), PMAs to address these data gaps, and is consistent with regulations, communications by DWR, and DWR approved GSPs. In response to the public comment period, additional PMAs and language regarding data gap processes have been added to the GSP.	

NGO Consortium	NGO-028	B	MN	Monitoring Network-Mapping			Provide maps that overlay current and proposed monitoring well locations with the locations of DACs, domestic wells, GDEs, and ISWs to clearly identify potentially impacted areas.	A map of current monitoring locations, beneficial users, GDEs, and waterbodies has been added to Section 3.3. General tentative locations of proposed monitoring locations has been added to Appendix 3-A. Final locations of additional monitoring locations will depend on local well owner volunteers and funding availability.	
NGO Consortium	NGO-029	A	MN	Monitoring Networks-Add Representative Monitoring Points			Increase the number of representative monitoring points (RMPs) across the basin as needed to adequately monitor all groundwater condition indicators. Prioritize proximity to GDEs and drinking water users when identifying new RMPs.	Chapter 3 and Appendix 3-A outline existing data gaps and the need to expand the monitoring networks. An additional PMA clarifying this need has been added to Chapter 4. See MCR "GDE and "General Data Gaps".	
NGO Consortium	NGO-030	A	MN	Monitoring Network-Addressing Data Gaps			Provide specific plans to fill data gaps in the monitoring network. Evaluate how the gathered data will be used to identify and map GDEs and ISWs, and identify DACs and shallow domestic well users that are vulnerable to undesirable results.	See MCR "General Data Gaps". The entire Basin is considered DAC or SDAC so the current discussion in the GSP is valid. Vulnerable domestic well users are analyzed in a well outtage analysis included in Appendix 3-C.	
NGO Consortium	NGO-031	C	MN	Using Monitoring Networks to Assess Impact to Water Users		4.4	Further describe the biological monitoring that will be used to assess the potential for significant and unreasonable impacts to GDEs or ISWs due to groundwater conditions in the basin. Section 4.4 mentions the use of satellite images to evaluate the status of GDEs, however no further details are provided in the GSP.	Discussion regarding biological monitoring has been added to the new PMA "Groundwater Dependent Ecosystem Data Gaps" of Chapter 4. See MCR "GDE".	
NGO Consortium	NGO-032	B	PM	PMAs- DACs			The consideration of beneficial users when developing projects and management actions is insufficient, due to the failure to completely identify benefits or impacts of identified projects and management actions to beneficial users of groundwater such as DACs and drinking water users. [The GSP] does not discuss the manner in which DACs, drinking water users, and tribes may be benefitted or impacted by projects and management actions identified in the GSP. Therefore, potential project and management actions may not protect these beneficial users.	There is no tribal land in the Butte Valley groundwater basin and the entire valley is listed as a Disadvantaged Community (DAC) so the current discussion of projects and management actions in the GSP is sufficient.	Chapter 4
NGO Consortium	NGO-033	B	PM	Drinking Water Well Impact Mitigation Program for DACs and Domestic Well Ownders		4.3 Tier II PMAs	For DACs and domestic well owners, include further discussion of a drinking water well impact mitigation program to proactively monitor and protect drinking water wells through GSP implementation. The GSP describes a well replacement program in Section 4.3 (Tier II PMAs), but no details are provided. Refer to Attachment B for specific recommendations on how to implement a drinking water well mitigation program.	We already follow the Appendix B recommendations for a drinking water well impact mitigation program. The key elements include (Section 2 of Appendix B): - Drinking water well monitoring program (see RMP for water level); - Adaptive management trigger system (see water level SMC, where the MO is in the "green light" and the minimum threshold in the "yellow light" zone, for which potential corrective actions have been identified (see PMAs that address: - Undertake an analysis to pinpoint the cause; - Undertake water quality testing for selected domestic and public supply wells; - Provide immediate support to groundwater users experiencing impacts; - Reassess pumping allocation and pumping patterns; - Consider restricting or limiting groundwater extraction near the impacted area.); - drinking water well impact model (Appendix 3-C of GSP); - public outreach and education (see PMAs); - development of mitigation measures, - identifying eligibility and access.	
NGO Consortium	NGO-034	C	PM	PMA Impact on Water Quality			For DACs, domestic well owners, and tribes, include a discussion of whether potential impacts to water quality from projects and management actions could occur and how the GSA plans to mitigate such impacts.	There is no tribal land in the Butte Valley groundwater basin and the entire valley is listed as a Disadvantaged Community (DAC) so the current discussion of projects and management actions in the GSP is sufficient. For domestic well users, a well outtage analysis is included in Appendix 3-C, which will be used during GSP implementation. The PMA "Well Inventory Program" will also work towards creating a better database of domestic wells in the Basin, which will improve the ability of the GSA to protect those beneficial users.	
NGO Consortium	NGO-035	C	PM	Multi-benefit projects			Recharge ponds, reservoirs, and facilities for managed stormwater recharge can be designed as multiple-benefit projects to include elements that act functionally as wetlands and provide a benefit for wildlife and aquatic species. For guidance on how to integrate multi-benefit recharge projects into your GSP, refer to the “Multi-Benefit Recharge Project Methodology Guidance Document.”	The groundwater basin has no surface outflow. All stormwater is already recharged to groundwater.	Chapter 4
NGO Consortium	NGO-036	B	PM	Incorporate Uncertainty into PMAs			Develop management actions that incorporate climate and water delivery uncertainties to address future water demand and prevent future undesirable results.	The future climate models were prepared by DWR and used in accordance with DWR guidance.	

BUTTE VALLEY GROUNDWATER SUSTAINABILITY PLAN
PUBLIC COMMENT SUMMARY – MULTIPLE COMMENT RESPONSE

November 2021

Multiple Comment Response Directory Table

ID	Multiple Comment Response
GDE	Section 2.2.2.7 lists all the protected species in Butte Valley. The section provides Table 2.6, which is three pages of all freshwater species with any federal and state level status, from endangered to watch list. This list of observed species within the Butte Valley groundwater basin was collected from the Nature Conservancy and California Department of Fish and Wildlife (CDFW) Butte Valley Wildlife Area (BVWA) Management Plan, with the assistance of CDFW BVWA staff. Table 2.7 lists all these species again, but text has been modified for clarity on GSA management. Species maps generated by the CDFW Biogeographic Information and Observation System (BIOS) Viewer were shown to CDFW BVWA staff, who expressed displeasure on the accuracy of the maps and asked them to be removed from the GSP. Section 2.2.2.7 lists and discusses all the species in Butte Valley listed under the California Endangered Species Act (CESA). The section is clear that these species are considered environmental beneficial water users within the Basin and that the GSA will partner with relevant federal and state agencies to ensure that they are protected during implementation of the GSP. Describing potential impacts on GDEs requires a better understanding of the location and nature of GDEs in the Basin. Representative areas currently classed as 'Assumed not a GDE' will be reviewed in the field as part of future work and reanalyzed as data gaps are filled. Section 2.2.2.7 analyzes Meiss Lake and Butte Valley Wildlife Area (BVWA) as potential groundwater dependent ecosystems (GDE). However due to the lack of groundwater level data within BVWA, potential groundwater levels for the GDE analysis were contoured from wells outside BVWA with groundwater levels (see Appendix 2-A and 2-C) were deeper then the GDE rooting depths. Valley oak does not exist in Butte Valley and the associated rooting depth is not relevant to the local environment. The GSA acknowledges the data gaps in the GDE analysis in Section 2.2.2.7 and outlines how to address them in Appendix 3-A. Additional text has been added to Section 2.2.2.7 and Appendix 3-A for clarity and an additional management action "Groundwater Dependent Ecosystem Data Gaps" has been added to Chapter 4. The GSA looks forward to working with CDFW and other relevant agencies to fill these data gaps of local habitat and groundwater level data in Butte Valley in the next 5 years for the next GSP update.

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ID	Multiple Comment Response
ISW	Sustainable management criteria (SMCs) must be quantitative, which cannot be done at this time due to the lack of data on potential ISWs in the Basin. The GSP cannot quantify surface water depletion because there is not enough data at this time. Groundwater contour maps in the GSP are based on the best available groundwater level data, with large data gaps near potential ISWs. The potential ISWs are along the Basin edges while the available historical groundwater level data is within the center of the groundwater basin. The limited data that is available suggests that potential ISWs are disconnected from the groundwater aquifer (see Section 2.2.2.6). Current groundwater maps suggest that the water table is sufficiently deep below the potential ISWs to assume disconnection until further data is collected. SMCs for ISWs will be revisited during the next 5-year GSP update. The GSA acknowledges the data gaps in the ISW analysis in Section 2.2.2.6 and outlines how to address them in Appendix 3-A. Additional text has been added to Section 2.2.2.6 and Appendix 3-A for clarity and an additional management action "Interconnected Surface Water Data Gaps" has been added to Chapter 4. Details on specific measures to fill these data gaps depends heavily on awarded funding and will be developed for future funding proposals. The GSA looks forward to working with CDFW and other relevant agencies to fill these data gaps of ISWs in Butte Valley in the next 5 years for the next GSP update.
Water Budget	A PMA has been added in Chapter 4 to add the surface water hydrologic subsystem to the BVIHM. The PMA is dependent on first filling existing data gaps in Basin surface water. Additional text has been added to Chapter 5 outlining the implementation plan for the new PMA.
Public Trust	Assuming ELF/Audubon require a GSA, or special act district acting in this capacity, to consider the impacts of groundwater production on public trust resources in the Butte Valley in preparing its GSP, where there is not evidence that groundwater production is harming public trust resources due to the disconnection between groundwater and surface waters or GDEs, then any duty that may exist does not arise.

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ID	Multiple Comment Response
Sustainable Yield	The GSP is more conservative than a specific sustainable yield. Sustainable yield is a function of future climate and of project implementation. It may be less in the future than it is currently. The sustainable yield selected by the GSP is a formula that accounts for such changes. Prescribing a fixed sustainable yield is technically incorrect and practically insufficient to achieve long-term sustainability. The starting value of the sustainable yield is focused on the historic average of groundwater pumping which will translate into looking at the future averages of annual groundwater pumping rather than specific years. The undesirable results are prevented through the minimum threshold. The minimum threshold will be reached by implementation of PMAs that avoid all minimum thresholds and achieve the measurable objective. To the degree that those PMAs require a future reduction in groundwater pumping, that amount of pump reduction must be reflected in recomputed future sustainable yield. By providing a definition of sustainable yield that is not a fixed number, but accounts for future PMAs in a well-prescribed protocol, the sustainable yield is specific and implicitly adjusts to the implementation of PMAs. The GSP's definition of sustainable yield avoids the possibility that a new pumper will claim the amount of pumping that was retired through a PMA elsewhere in the basin. The approach is consistent with basin plans already approved by DWR (e.g., Oxnard, Mid-County Santa Cruz).
PMA Selection Criteria	Chapter 5 outlines how PMAs will be selected for prioritization during GSP implementation. Text has been added to Chapter 4.1 and Chapter 5 implementation schedule. After GSP adoption, the GSA will prioritize certain PMAs for feasibility reviews and preliminary engineering studies. Based on review and study results, PMAs may move forward to implementation.
5-year Update	At this time, the GSA has elected to use a voluntary program for groundwater extraction reporting. For the next five years, the GSA will conduct public outreach to encourage voluntary participation. This may be revisited in the 5-year update. Siskiyou County is currently considering a revised well drilling permit.
Data System	The GSA will follow DWR guidelines for data and model transparency. Per DWR's modeling BMP document, "final model files used for decision making in the GSP should be packaged for release to the Department". We anticipate that model files will be uploadable with the GSP in digital format. Similarly, we anticipate that DWR will collect annual report data in digital format.

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ID	Multiple Comment Response
General Data Gaps	The GSA acknowledges existing data gaps in Chapter 3 and Appendix 3-A, proposes PMAs in Chapter 4, and discusses an implementation plan in Chapter 5. General data gaps include water levels from domestic wells and groundwater extraction. Based on existing and available data, the GSP contains an accurate water budget, clearly defined sustainable management criteria, including minimum thresholds. The GSP will be updated as needed when data gaps are filled but will be dependent on outside sources of funding. The current data gap in groundwater extraction does not limit effective groundwater management as estimating groundwater extraction based on land use is sufficient to quantify basin groundwater budgets that determine groundwater sustainability for the basin. Future voluntary collection of groundwater extraction will serve for modeled groundwater pumping validation and verification of the success of PMAs.

Table Key:
BIOS = Biogeographic Information and Observation System
BMP = best management practice
BVIHM = Butte Valley Integrated Hydrologic Model
CDFW = California Department of Fish and Wildlife
CESA = California Endangered Species Act
DWR = Department of Water Resources
GDE = Groundwater Dependent Ecosystem
GSA = Groundwater Sustainability Agency
GSP = Groundwater Sustainability Plan
ISW = Interconnected Surface Water
PMA = Project and Management Action
PTD = Public Trust Doctrine
SGMA= Sustainable Groundwater Management ACt
SMC = Sustainable Management Criteria

Appendix 1-D DWR Element Guide

Article 5.			Plan Contents for Sample 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.	24:36				
(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.	282:287				
			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.	39				
(b)			The organization and management structure of the Agency, identifying persons with management authority for implementation of the Plan.	39				
(c)			The name and contact information, including the phone number, mailing address and electronic mail address, of the plan manager.	39				
(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.	39				
(e)			An estimate of the cost of implementing the Plan and a general description of how the Agency plans to meet those costs.	35:36, 39, 279:280	5.4			
			Note: Authority cited: Section 10733.2, Water Code.					
			Reference: Sections 10723.8, 10727.2, and 10733.2, Water Code.					
§ 354.8.			**Description of Plan Area**					

Article 5.			Plan Contents for Sample Basin	GSP Document References				
				Page Numbers of Plan	Or Section Numbers	Or Figure Numbers	Or Table Numbers	Notes
			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.	46	2.1.1	2.1		
	(2)		Adjudicated areas, other Agencies within the basin, and areas covered by an Alternative.	N/A		2.2		The Basin does not have adjudicated areas, other GSAs, or Alternatives.
	(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.	47, 49, 51	2.1.1.1			
	(4)		Existing land use designations and the identification of water use sector and water source type.	51:54		2.4, 2.5	2.1	
	(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.	54:56	2.1.1.2	2.6		
(b)			A written description of the Plan area, including a summary of the jurisdictional areas and other features depicted on the map.	46:56	2.1.1			
(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.	57:63	2.1.2			
(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.	57:63	2.1.2			
(e)			A description of conjunctive use programs in the basin.	57:63	2.1.2			
(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.	63:64	2.1.3			
	(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	63:64, 66				
	(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.	63:64, 66				

Article 5.			Plan Contents for Sample 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.	64:65				
	(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.	63:66				
(g)			A description of any of the additional Plan elements included in Water Code Section 10727.4 that the Agency determines to be appropriate.	64:66				
			Note: Authority cited: Section 10733.2, Water Code.					
			Reference: Sections 10720.3, 10727.2, 10727.4, 10733, and 10733.2, Water Code.					
§ 354.10.			**Notice and Communication**					
			Each Plan shall include a summary of information relating to notification and communication by the Agency with other agencies and interested parties including the following:					
(a)			A description of the beneficial uses and users of groundwater in the basin, including the land uses and property interests potentially affected by the use of groundwater in the basin, the types of parties representing those interests, and the nature of consultation with those parties.	40:42	1.4.3			
(b)			A list of public meetings at which the Plan was discussed or considered by the Agency.	310:311	Appendix 1-B			
(c)			Comments regarding the Plan received by the Agency and a summary of any responses by the Agency.	314:390	Appendix 1-C			
(d)			A communication section of the Plan that includes the following:					
	(1)		An explanation of the Agency's decision-making process.	40	1.4.2			
	(2)		Identification of opportunities for public engagement and a discussion of how public input and response will be used.	40:44	1.4.3			
	(3)		A description of how the Agency encourages the active involvement of diverse social, cultural, and economic elements of the population within the basin.	40:44	1.4.3			
	(4)		The method the Agency shall follow to inform the public about progress implementing the Plan, including the status of projects and actions.	40:44	1.4.3			
			Note: Authority cited: Section 10733.2, Water Code.					
			Reference: Sections 10723.2, 10727.8, 10728.4, and 10733.2, Water Code					
SubArticle 2.			**Basin Setting**					
§ 354.12.			**Introduction to Basin Setting**					

Article 5.			Plan Contents for Sample Basin	GSP Document References				
				Page Numbers of Plan	Or Section Numbers	Or Figure Numbers	Or Table Numbers	Notes
			This Subarticle describes the information about the physical setting and characteristics of the basin and current conditions of the basin that shall be part of each Plan, including the identification of data gaps and levels of uncertainty, which comprise the basin setting that serves as the basis for defining and assessing reasonable sustainable management criteria and projects and management actions. Information provided pursuant to this Subarticle shall be prepared by or under the direction of a professional geologist or professional engineer.					
			Note: Authority cited: Section 10733.2, Water Code.					
			Reference: Section 10733.2, Water Code.					
§ 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.	67:148	2.2.1, 2.2.2			
(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.	67:98	2.2.1			
	(2)		Lateral basin boundaries, including major geologic features that significantly affect groundwater flow.	67:98	2.2.1			
	(3)		The definable bottom of the basin.	110, 380				
	(4)		Principal aquifers and aquitards, including the following information:					
		(A)	Formation names, if defined.	75:89				
		(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.	86:89	2.2.1.6			
		(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.	75:89				
		(D)	General water quality of the principal aquifers, which may be based on information derived from existing technical studies or regulatory programs.	86:89, 114:123	2.2.1.6, 2.2.2.5			
		(E)	Identification of the primary use or uses of each aquifer, such as domestic, irrigation, or municipal water supply.	75:89				The Basin has only one aquifer.
	(5)		Identification of data gaps and uncertainty within the hydrogeologic conceptual model	580:592	Appendix 3-A			
(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.	79:81		2.14:2.16		
(d)			Physical characteristics of the basin shall be represented on one or more maps that depict the following:					

Article 5.			Plan Contents for Sample Basin	GSP Document References				
				Page Numbers of Plan	Or Section Numbers	Or Figure Numbers	Or Table Numbers	Notes
	(1)		Topographic information derived from the U.S. Geological Survey or another reliable source.	67:69		2.8		
	(2)		Surficial geology derived from a qualified map including the locations of cross-sections required by this Section.	76		2.13		
	(3)		Soil characteristics as described by the appropriate Natural Resources Conservation Service soil survey or other applicable studies.	89:94	2.2.1.8			
	(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.	89	2.2.1.7			
	(5)		Surface water bodies that are significant to the management of the basin.	94:98	2.2.1.9			
	(6)		The source and point of delivery for imported water supplies.	N/A				Water is not imported into the Basin.
			Note: Authority cited: Section 10733.2, Water Code.					
			Reference: Sections 10727.2, 10733, and 10733.2, Water Code.					
§ 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.	107:109, 421:433				
	(2)		Hydrographs depicting long-term groundwater elevations, historical highs and lows, and hydraulic gradients between principal aquifers.	110, 601:616	Appendix 3-C			
(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.	152:153				
(c)			Seawater intrusion conditions in the basin, including maps and cross-sections of the seawater intrusion front for each principal aquifer.	N/A				The Basin is not near the ocean.
(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.	114:123, 435:475	2.2.2.5, Appendix 2-B			
(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.	123:124, 127	2.2.2.7			
(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.	124:126, 128:129	2.2.2.8			

Article 5.			Plan Contents for Sample Basin	GSP Document References				
				Page Numbers of Plan	Or Section Numbers	Or Figure Numbers	Or Table Numbers	Notes
(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.	130:148	2.2.2.9			
			Note: Authority cited: Section 10733.2, Water Code.					
			Reference: Sections 10723.2, 10727.2, 10727.4, and 10733.2, Water Code.					
§ 354.18.			**Water Budget**					
(a)			Each Plan shall include a water budget for the basin that provides an accounting and assessment of the total annual volume of groundwater and surface water entering and leaving the basin, including historical, current and projected water budget conditions, and the change in the volume of water stored. Water budget information shall be reported in tabular and graphical form.	149:179, 507:579	2.2.3:2.2.5, Appendix 2-D			
(b)			The water budget shall quantify the following, either through direct measurements or estimates based on data:					
	(1)		Total surface water entering and leaving a basin by water source type.	149:179, 507:579	2.2.3, Appendix 2-D			
	(2)		Inflow to the groundwater system by water source type, including subsurface groundwater inflow and infiltration of precipitation, applied water, and surface water systems, such as lakes, streams, rivers, canals, springs and conveyance systems.	149:167, 507:579	2.2.3, Appendix 2-D			
	(3)		Outflows from the groundwater system by water use sector, including evapotranspiration, groundwater extraction, groundwater discharge to surface water sources, and subsurface groundwater outflow.	149:167, 507:579	2.2.3, Appendix 2-D			
	(4)		The change in the annual volume of groundwater in storage between seasonal high conditions.	149:167, 507:579	2.2.3, Appendix 2-D			
	(5)		If overdraft conditions occur, as defined in Bulletin 118, the water budget shall include a quantification of overdraft over a period of years during which water year and water supply conditions approximate average conditions.	149:167, 507:579	2.2.3, Appendix 2-D			
	(6)		The water year type associated with the annual supply, demand, and change in groundwater stored.	149:167, 507:579	2.2.3, Appendix 2-D			
	(7)		An estimate of sustainable yield for the basin.	149:179, 507:579	2.2.5, Appendix 2-D			
(c)			Each Plan shall quantify the current, historical, and projected water budget for the basin as follows:					
	(1)		Current water budget information shall quantify current inflows and outflows for the basin using the most recent hydrology, water supply, water demand, and land use information.	149:167, 507:579	2.2.3, Appendix 2-D			

Article 5.			Plan Contents for Sample Basin	GSP Document References				
				Page Numbers of Plan	Or Section Numbers	Or Figure Numbers	Or Table Numbers	Notes
	(2)		Historical water budget information shall be used to evaluate availability or reliability of past surface water supply deliveries and aquifer response to water supply and demand trends relative to water year type. The historical water budget shall include the following:					
		(A)	A quantitative evaluation of the availability or reliability of historical surface water supply deliveries as a function of the historical planned versus actual annual surface water deliveries, by surface water source and water year type, and based on the most recent ten years of surface water supply information.	149:167, 507:579	2.2.3, Appendix 2-D			
		(B)	A quantitative assessment of the historical water budget, starting with the most recently available information and extending back a minimum of 10 years, or as is sufficient to calibrate and reduce the uncertainty of the tools and methods used to estimate and project future water budget information and future aquifer response to proposed sustainable groundwater management practices over the planning and implementation horizon.	149:167, 507:579	2.2.3, Appendix 2-D			
		(C)	A description of how historical conditions concerning hydrology, water demand, and surface water supply availability or reliability have impacted the ability of the Agency to operate the basin within sustainable yield. Basin hydrology may be characterized and evaluated using water year type.	149:167, 507:579	2.2.3, Appendix 2-D			
	(3)		Projected water budgets shall be used to estimate future baseline conditions of supply, demand, and aquifer response to Plan implementation, and to identify the uncertainties of these projected water budget components. The projected water budget shall utilize the following methodologies and assumptions to estimate future baseline conditions concerning hydrology, water demand and surface water supply availability or reliability over the planning and implementation horizon:					
		(A)	Projected hydrology shall utilize 50 years of historical precipitation, evapotranspiration, and streamflow information as the baseline condition for estimating future hydrology. The projected hydrology information shall also be applied as the baseline condition used to evaluate future scenarios of hydrologic uncertainty associated with projections of climate change and sea level rise.	167:169, 507:579	2.2.4, Appendix 2-D			
		(B)	Projected water demand shall utilize the most recent land use, evapotranspiration, and crop coefficient information as the baseline condition for estimating future water demand. The projected water demand information shall also be applied as the baseline condition used to evaluate future scenarios of water demand uncertainty associated with projected changes in local land use planning, population growth, and climate.	167:169, 507:579	2.2.4, Appendix 2-D			

Article 5.			Plan Contents for Sample Basin	GSP Document References				
				Page Numbers of Plan	Or Section Numbers	Or Figure Numbers	Or Table Numbers	Notes
		(C)	Projected surface water supply shall utilize the most recent water supply information as the baseline condition for estimating future surface water supply. The projected surface water supply shall also be applied as the baseline condition used to evaluate future scenarios of surface water supply availability and reliability as a function of the historical surface water supply identified in Section 354.18(c)(2)(A), and the projected changes in local land use planning, population growth, and climate.	167:169, 507:579	2.2.4, Appendix 2-D			
(d)			The Agency shall utilize the following information provided, as available, by the Department pursuant to Section 353.2, or other data of comparable quality, to develop the water budget:					
	(1)		Historical water budget information for mean annual temperature, mean annual precipitation, water year type, and land use.	149:167, 507:579	2.2.3, Appendix 2-D			
	(2)		Current water budget information for temperature, water year type, evapotranspiration, and land use.	149:167, 507:579	2.2.3, Appendix 2-D			
	(3)		Projected water budget information for population, population growth, climate change, and sea level rise.	167:169, 507:579	2.2.4, Appendix 2-D			
(e)			Each Plan shall rely on the best available information and best available science to quantify the water budget for the basin in order to provide an understanding of historical and projected hydrology, water demand, water supply, land use, population, climate change, sea level rise, groundwater and surface water interaction, and subsurface groundwater flow. If a numerical groundwater and surface water model is not used to quantify and evaluate the projected water budget conditions and the potential impacts to beneficial uses and users of groundwater, the Plan shall identify and describe an equally effective method, tool, or analytical model to evaluate projected water budget conditions.	149:179, 507:579	2.2.3:2.2.5, Appendix 2-D			
(f)			The Department shall provide the California Central Valley Groundwater-Surface Water Simulation Model (C2VSIM) and the Integrated Water Flow Model (IWFM) for use by Agencies in developing the water budget. Each Agency may choose to use a different groundwater and surface water model, pursuant to Section 352.4.	149:179, 507:579	2.2.3:2.2.5, Appendix 2-D			
			Note: Authority cited: Section 10733.2, Water Code.					
			Reference: Sections 10721, 10723.2, 10727.2, 10727.6, 10729, and 10733.2, Water Code.					
§ 354.20.			**Management Areas**					
(a)			Each Agency may define one or more management areas within a basin if the Agency has determined that creation of management areas will facilitate implementation of the Plan. Management areas may define different minimum thresholds and be operated to different measurable objectives than the basin at large, provided that undesirable results are defined consistently throughout the basin.	N/A				The Basin does not use management areas.

Article 5.			Plan Contents for Sample Basin	GSP Document References				
				Page Numbers of Plan	Or Section Numbers	Or Figure Numbers	Or Table Numbers	Notes
(b)			A basin that includes one or more management areas shall describe the following in the Plan:					
	(1)		The reason for the creation of each management area.	N/A				The Basin does not use management areas.
	(2)		The minimum thresholds and measurable objectives established for each management area, and an explanation of the rationale for selecting those values, if different from the basin at large.	N/A				The Basin does not use management areas.
	(3)		The level of monitoring and analysis appropriate for each management area.	N/A				The Basin does not use management areas.
	(4)		An explanation of how the management area can operate under different minimum thresholds and measurable objectives without causing undesirable results outside the management area, if applicable.	N/A				The Basin does not use management areas.
(c)			If a Plan includes one or more management areas, the Plan shall include descriptions, maps, and other information required by this Subarticle sufficient to describe conditions in those areas.	N/A				The Basin does not use management areas.
			Note: Authority cited: Section 10733.2, Water Code.					
			Reference: Sections 10733.2 and 10733.4, Water Code.					
SubArticle 3.			**Sustainable Management Criteria**					
§ 354.22.			**Introduction to Sustainable Management Criteria**					
			This Subarticle describes criteria by which an Agency defines conditions in its Plan that constitute sustainable groundwater management for the basin, including the process by which the Agency shall characterize undesirable results, and establish minimum thresholds and measurable objectives for each applicable sustainability indicator.					
			Note: Authority cited: Section 10733.2, Water Code.					
			Reference: Section 10733.2, Water Code.					
§ 354.24.			**Sustainability Goal**					
			Each Agency shall establish in its Plan a sustainability goal for the basin that culminates in the absence of undesirable results within 20 years of the applicable statutory deadline. The Plan shall include a description of the sustainability goal, including information from the basin setting used to establish the sustainability goal, a discussion of the measures that will be implemented to ensure that the basin will be operated within its sustainable yield, and an explanation of how the sustainability goal is likely to be achieved within 20 years of Plan implementation and is likely to be maintained through the planning and implementation horizon.	182	3.2			
			Note: Authority cited: Section 10733.2, Water Code.					
			Reference: Sections 10721, 10727, 10727.2, 10733.2, and 10733.8, Water Code.					
§ 354.26.			**Undesirable Results**					
(a)			Each Agency shall describe in its Plan the processes and criteria relied upon to define undesirable results applicable to the basin. Undesirable results occur when significant and unreasonable effects for any of the sustainability indicators are caused by groundwater conditions occurring throughout the basin.	200:228, 601:653	3.4, Appendix 3-C			
(b)			The description of undesirable results shall include the following:					

Article 5.			Plan Contents for Sample Basin	GSP Document References				
				Page Numbers of Plan	Or Section Numbers	Or Figure Numbers	Or Table Numbers	Notes
	(1)		The cause of groundwater conditions occurring throughout the basin that would lead to or has led to undesirable results based on information described in the basin setting, and other data or models as appropriate.	200:203, 215:216, 217:219, 225:226, 227:228	3.4.1.1, 3.4.2, 3.4.3.1, 3.4.4.1, 3.4.5.2			
	(2)		The criteria used to define when and where the effects of the groundwater conditions cause undesirable results for each applicable sustainability indicator. The criteria shall be based on a quantitative description of the combination of minimum threshold exceedances that cause significant and unreasonable effects in the basin.	200:203, 215:216, 217:219, 225:226, 227:228	3.4.1.1, 3.4.2, 3.4.3.1, 3.4.4.1, 3.4.5.2			
	(3)		Potential effects on the beneficial uses and users of groundwater, on land uses and property interests, and other potential effects that may occur or are occurring from undesirable results.	204:205, 215:216, 223:224, 227, 228				
(c)			The Agency may need to evaluate multiple minimum thresholds to determine whether an undesirable result is occurring in the basin. The determination that undesirable results are occurring may depend upon measurements from multiple monitoring sites, rather than a single monitoring site.	200:228, 601:653	3.4, Appendix 3-C			
(d)			An Agency that is able to demonstrate that undesirable results related to one or more sustainability indicators are not present and are not likely to occur in a basin shall not be required to establish criteria for undesirable results related to those sustainability indicators.	200:228, 601:653	3.4, Appendix 3-C			Seawater intrusion is not applicable to the Basin.
			Note: Authority cited: Section 10733.2, Water Code.					
			Reference: Sections 10721, 10723.2, 10727.2, 10733.2, and 10733.8, Water Code.					
§ 354.28.			**Minimum Thresholds**					
(a)			Each Agency in its Plan shall establish minimum thresholds that quantify groundwater conditions for each applicable sustainability indicator at each monitoring site or representative monitoring site established pursuant to Section 354.36. The numeric value used to define minimum thresholds shall represent a point in the basin that, if exceeded, may cause undesirable results as described in Section 354.26.	200:228, 601:653	3.4, Appendix 3-C			
(b)			The description of minimum thresholds shall include the following:					
	(1)		The information and criteria relied upon to establish and justify the minimum thresholds for each sustainability indicator. The justification for the minimum threshold shall be supported by information provided in the basin setting, and other data or models as appropriate, and qualified by uncertainty in the understanding of the basin setting.	205:206, 214:215, 215:216, 216:217, 219:220, 225:228, 601:653				

Article 5.			Plan Contents for Sample Basin	GSP Document References				
				Page Numbers of Plan	Or Section Numbers	Or Figure Numbers	Or Table Numbers	Notes
	(2)		The relationship between the minimum thresholds for each sustainability indicator, including an explanation of how the Agency has determined that basin conditions at each minimum threshold will avoid undesirable results for each of the sustainability indicators.	214:216, 224:225, 227:228				
	(3)		How minimum thresholds have been selected to avoid causing undesirable results in adjacent basins or affecting the ability of adjacent basins to achieve sustainability goals.	N/A				The minimum thresholds will not affect adjacent basins.
	(4)		How minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests.	213:216, 223:224, 227:228				
	(5)		How state, federal, or local standards relate to the relevant sustainability indicator. If the minimum threshold differs from other regulatory standards, the Agency shall explain the nature of and basis for the difference.	200, 215:216, 225:227				
	(6)		How each minimum threshold will be quantitatively measured, consistent with the monitoring network requirements described in Subarticle 4.	182:200	3.3			
(c)			Minimum thresholds for each sustainability indicator shall be defined as follows:					
	(1)		Chronic Lowering of Groundwater Levels. The minimum threshold for chronic lowering of groundwater levels shall be the groundwater elevation indicating a depletion of supply at a given location that may lead to undesirable results. Minimum thresholds for chronic lowering of groundwater levels shall be supported by the following:					
		(A)	The rate of groundwater elevation decline based on historical trends, water year type, and projected water use in the basin.	205:206, 601:653	Appendix 3-C			
		(B)	Potential effects on other sustainability indicators.	214				
	(2)		Reduction of Groundwater Storage. The minimum threshold for reduction of groundwater storage shall be a total volume of groundwater that can be withdrawn from the basin without causing conditions that may lead to undesirable results. Minimum thresholds for reduction of groundwater storage shall be supported by the sustainable yield of the basin, calculated based on historical trends, water year type, and projected water use in the basin.	215:216				
	(3)		Seawater Intrusion. The minimum threshold for seawater intrusion shall be defined by a chloride concentration isocontour for each principal aquifer where seawater intrusion may lead to undesirable results. Minimum thresholds for seawater intrusion shall be supported by the following:					
		(A)	Maps and cross-sections of the chloride concentration isocontour that defines the minimum threshold and measurable objective for each principal aquifer.	N/A				Seawater intrusion is not present in the Basin.
		(B)	A description of how the seawater intrusion minimum threshold considers the effects of current and projected sea levels.	N/A				Seawater intrusion is not present in the Basin.

Article 5.			Plan Contents for Sample Basin	GSP Document References				
				Page Numbers of Plan	Or Section Numbers	Or Figure Numbers	Or Table Numbers	Notes
	(4)		Degraded Water Quality. The minimum threshold for degraded water quality shall be the degradation of water quality, including the migration of contaminant plumes that impair water supplies or other indicator of water quality as determined by the Agency that may lead to undesirable results. The minimum threshold shall be based on the number of supply wells, a volume of water, or a location of an isocontour that exceeds concentrations of constituents determined by the Agency to be of concern for the basin. In setting minimum thresholds for degraded water quality, the Agency shall consider local, state, and federal water quality standards applicable to the basin.	216:225				
	(5)		Land Subsidence. The minimum threshold for land subsidence shall be the rate and extent of subsidence that substantially interferes with surface land uses and may lead to undesirable results. Minimum thresholds for land subsidence shall be supported by the following:					
		(A)	Identification of land uses and property interests that have been affected or are likely to be affected by land subsidence in the basin, including an explanation of how the Agency has determined and considered those uses and interests, and the Agency's rationale for establishing minimum thresholds in light of those effects.	225:227				
		(B)	Maps and graphs showing the extent and rate of land subsidence in the basin that defines the minimum threshold and measurable objectives.	127				
	(6)		Depletions of Interconnected Surface Water. The minimum threshold for depletions of interconnected surface water shall be the rate or volume of surface water depletions caused by groundwater use that has adverse impacts on beneficial uses of the surface water and may lead to undesirable results. The minimum threshold established for depletions of interconnected surface water shall be supported by the following:					
		(A)	The location, quantity, and timing of depletions of interconnected surface water.	124:125				
		(B)	A description of the groundwater and surface water model used to quantify surface water depletion. If a numerical groundwater and surface water model is not used to quantify surface water depletion, the Plan shall identify and describe an equally effective method, tool, or analytical model to accomplish the requirements of this Paragraph.	227:228				
(d)			An Agency may establish a representative minimum threshold for groundwater elevation to serve as the value for multiple sustainability indicators, where the Agency can demonstrate that the representative value is a reasonable proxy for multiple individual minimum thresholds as supported by adequate evidence.	227:228				
(e)			An Agency that has demonstrated that undesirable results related to one or more sustainability indicators are not present and are not likely to occur in a basin, as described in Section 354.26, shall not be required to establish minimum thresholds related to those sustainability indicators.	227:228				
			Note: Authority cited: Section 10733.2, Water Code.					

Article 5.			Plan Contents for Sample Basin	GSP Document References				
				Page Numbers of Plan	Or Section Numbers	Or Figure Numbers	Or Table Numbers	Notes
			Reference: Sections 10723.2, 10727.2, 10733, 10733.2, and 10733.8, Water Code.					
§ 354.30.			**Measurable Objectives**					
(a)			Each Agency shall establish measurable objectives, including interim milestones in increments of five years, to achieve the sustainability goal for the basin within 20 years of Plan implementation and to continue to sustainably manage the groundwater basin over the planning and implementation horizon.	200:228				
(b)			Measurable objectives shall be established for each sustainability indicator, based on quantitative values using the same metrics and monitoring sites as are used to define the minimum thresholds.	209:216, 220:225, 226:228				
(c)			Measurable objectives shall provide a reasonable margin of operational flexibility under adverse conditions which shall take into consideration components such as historical water budgets, seasonal and long-term trends, and periods of drought, and be commensurate with levels of uncertainty.	209:216, 220:225, 226:228				
(d)			An Agency may establish a representative measurable objective for groundwater elevation to serve as the value for multiple sustainability indicators where the Agency can demonstrate that the representative value is a reasonable proxy for multiple individual measurable objectives as supported by adequate evidence.	215:216, 226:228				
(e)			Each Plan shall describe a reasonable path to achieve the sustainability goal for the basin within 20 years of Plan implementation, including a description of interim milestones for each relevant sustainability indicator, using the same metric as the measurable objective, in increments of five years. The description shall explain how the Plan is likely to maintain sustainable groundwater management over the planning and implementation horizon.	209:216, 220:225, 226:228				
(f)			Each Plan may include measurable objectives and interim milestones for additional Plan elements described in Water Code Section 10727.4 where the Agency determines such measures are appropriate for sustainable groundwater management in the basin.	209:216, 220:225, 226:228				
(g)			An Agency may establish measurable objectives that exceed the reasonable margin of operational flexibility for the purpose of improving overall conditions in the basin, but failure to achieve those objectives shall not be grounds for a finding of inadequacy of the Plan.	209:216, 220:225, 226:228				
			Note: Authority cited: Section 10733.2, Water Code.					
			Reference: Sections 10727.2, 10727.4, and 10733.2, Water Code.					
SubArticle 4.			**Monitoring Networks**					
§ 354.32.			**Introduction to Monitoring Networks**					
			This Subarticle describes the monitoring network that shall be developed for each basin, including monitoring objectives, monitoring protocols, and data reporting requirements. The monitoring network shall promote the collection of data of sufficient quality, frequency, and distribution to characterize groundwater and related surface water conditions in the basin and evaluate changing conditions that occur through implementation of the Plan.					

Article 5.			Plan Contents for Sample Basin	GSP Document References				
				Page Numbers of Plan	Or Section Numbers	Or Figure Numbers	Or Table Numbers	Notes
			Note: Authority cited: Section 10733.2, Water Code.					
			Reference: Section 10733.2, Water Code.					
§ 354.34.			**Monitoring Network**					
(a)			Each Agency shall develop a monitoring network capable of collecting sufficient data to demonstrate short-term, seasonal, and long-term trends in groundwater and related surface conditions, and yield representative information about groundwater conditions as necessary to evaluate Plan implementation.	182:200	3.3			
(b)			Each Plan shall include a description of the monitoring network objectives for the basin, including an explanation of how the network will be developed and implemented to monitor groundwater and related surface conditions, and the interconnection of surface water and groundwater, with sufficient temporal frequency and spatial density to evaluate the affects and effectiveness of Plan implementation. The monitoring network objectives shall be implemented to accomplish the following:					
	(1)		Demonstrate progress toward achieving measurable objectives described in the Plan.	182:200	3.3			
	(2)		Monitor impacts to the beneficial uses or users of groundwater.	182:200	3.3			
	(3)		Monitor changes in groundwater conditions relative to measurable objectives and minimum thresholds.	182:200	3.3			
	(4)		Quantify annual changes in water budget components.	182:200	3.3			
(c)			Each monitoring network shall be designed to accomplish the following for each sustainability indicator:					
	(1)		Chronic Lowering of Groundwater Levels. Demonstrate groundwater occurrence, flow directions, and hydraulic gradients between principal aquifers and surface water features by the following methods:					
		(A)	A sufficient density of monitoring wells to collect representative measurements through depth-discrete perforated intervals to characterize the groundwater table or potentiometric surface for each principal aquifer.	191:195	3.3.1			
		(B)	Static groundwater elevation measurements shall be collected at least two times per year, to represent seasonal low and seasonal high groundwater conditions.	191:195	3.3.1			
	(2)		Reduction of Groundwater Storage. Provide an estimate of the change in annual groundwater in storage.	194:196	3.3.2			
	(3)		Seawater Intrusion. Monitor seawater intrusion using chloride concentrations, or other measurements convertible to chloride concentrations, so that the current and projected rate and extent of seawater intrusion for each applicable principal aquifer may be calculated.	N/A				The Basin does not have seawater intrusion.
	(4)		Degraded Water Quality. Collect sufficient spatial and temporal data from each applicable principal aquifer to determine groundwater quality trends for water quality indicators, as determined by the Agency, to address known water quality issues.	196:199	3.3.3			

Article 5.			Plan Contents for Sample Basin	GSP Document References				
				Page Numbers of Plan	Or Section Numbers	Or Figure Numbers	Or Table Numbers	Notes
	(5)		Land Subsidence. Identify the rate and extent of land subsidence, which may be measured by extensometers, surveying, remote sensing technology, or other appropriate method.	199:200	3.3.4			
	(6)		Depletions of Interconnected Surface Water. Monitor surface water and groundwater, where interconnected surface water conditions exist, to characterize the spatial and temporal exchanges between surface water and groundwater, and to calibrate and apply the tools and methods necessary to calculate depletions of surface water caused by groundwater extractions. The monitoring network shall be able to characterize the following:					
		(A)	Flow conditions including surface water discharge, surface water head, and baseflow contribution.	200	3.3.5			
		(B)	Identifying the approximate date and location where ephemeral or intermittent flowing streams and rivers cease to flow, if applicable.	200	3.3.5			
		(C)	Temporal change in conditions due to variations in stream discharge and regional groundwater extraction.	200	3.3.5			
		(D)	Other factors that may be necessary to identify adverse impacts on beneficial uses of the surface water.	200	3.3.5			
(d)			The monitoring network shall be designed to ensure adequate coverage of sustainability indicators. If management areas are established, the quantity and density of monitoring sites in those areas shall be sufficient to evaluate conditions of the basin setting and sustainable management criteria specific to that area.	200	3.3.5			
(e)			A Plan may utilize site information and monitoring data from existing sources as part of the monitoring network.	200	3.3.5			
(f)			The Agency shall determine the density of monitoring sites and frequency of measurements required to demonstrate short-term, seasonal, and long-term trends based upon the following factors:					
	(1)		Amount of current and projected groundwater use.	182:200	3.3			
	(2)		Aquifer characteristics, including confined or unconfined aquifer conditions, or other physical characteristics that affect groundwater flow.	182:200	3.3			
	(3)		Impacts to beneficial uses and users of groundwater and land uses and property interests affected by groundwater production, and adjacent basins that could affect the ability of that basin to meet the sustainability goal.	182:200	3.3			
	(4)		Whether the Agency has adequate long-term existing monitoring results or other technical information to demonstrate an understanding of aquifer response.	182:200	3.3			
(g)			Each Plan shall describe the following information about the monitoring network:					
	(1)		Scientific rationale for the monitoring site selection process.	189:191				
	(2)		Consistency with data and reporting standards described in Section 352.4. If a site is not consistent with those standards, the Plan shall explain the necessity of the site to the monitoring network, and how any variation from the standards will not affect the usefulness of the results obtained.	189:191				

Article 5.			Plan Contents for Sample Basin	GSP Document References				
				Page Numbers of Plan	Or Section Numbers	Or Figure Numbers	Or Table Numbers	Notes
	(3)		For each sustainability indicator, the quantitative values for the minimum threshold, measurable objective, and interim milestones that will be measured at each monitoring site or representative monitoring sites established pursuant to Section 354.36.	200:228				
(h)			The location and type of each monitoring site within the basin displayed on a map, and reported in tabular format, including information regarding the monitoring site type, frequency of measurement, and the purposes for which the monitoring site is being used.	182:200				
(i)			The monitoring protocols developed by each Agency shall include a description of technical standards, data collection methods, and other procedures or protocols pursuant to Water Code Section 10727.2(f) for monitoring sites or other data collection facilities to ensure that the monitoring network utilizes comparable data and methodologies.	593:600	Appendix 3-B			
(j)			An Agency that has demonstrated that undesirable results related to one or more sustainability indicators are not present and are not likely to occur in a basin, as described in Section 354.26, shall not be required to establish a monitoring network related to those sustainability indicators.	200:228				
			Note: Authority cited: Section 10733.2, Water Code.					
			Reference: Sections 10723.2, 10727.2, 10727.4, 10728, 10733, 10733.2, and 10733.8, Water Code					
§ 354.36.			**Representative Monitoring**					
			Each Agency may designate a subset of monitoring sites as representative of conditions in the basin or an area of the basin, as follows:					
(a)			Representative monitoring sites may be designated by the Agency as the point at which sustainability indicators are monitored, and for which quantitative values for minimum thresholds, measurable objectives, and interim milestones are defined.	182:200	3.3			
(b)			(b) Groundwater elevations may be used as a proxy for monitoring other sustainability indicators if the Agency demonstrates the following:					
	(1)		Significant correlation exists between groundwater elevations and the sustainability indicators for which groundwater elevation measurements serve as a proxy.	194:196, 200				
	(2)		Measurable objectives established for groundwater elevation shall include a reasonable margin of operational flexibility taking into consideration the basin setting to avoid undesirable results for the sustainability indicators for which groundwater elevation measurements serve as a proxy.	200:215, 601-653	3.4.1, Appendix 3-C			
(c)			The designation of a representative monitoring site shall be supported by adequate evidence demonstrating that the site reflects general conditions in the area.	191:195	3.3.1			
			Note: Authority cited: Section 10733.2, Water Code.					
			Reference: Sections 10727.2 and 10733.2, Water Code					
§ 354.38.			**Assessment and Improvement of Monitoring Network**					

Article 5.			Plan Contents for Sample Basin	GSP Document References				
				Page Numbers of Plan	Or Section Numbers	Or Figure Numbers	Or Table Numbers	Notes
(a)			Each Agency shall review the monitoring network and include an evaluation in the Plan and each five-year assessment, including a determination of uncertainty and whether there are data gaps that could affect the ability of the Plan to achieve the sustainability goal for the basin.	182:191				
(b)			Each Agency shall identify data gaps wherever the basin does not contain a sufficient number of monitoring sites, does not monitor sites at a sufficient frequency, or utilizes monitoring sites that are unreliable, including those that do not satisfy minimum standards of the monitoring network adopted by the Agency.	182:191				
(c)			If the monitoring network contains data gaps, the Plan shall include a description of the following:					
	(1)		The location and reason for data gaps in the monitoring network.	182:191, 580:592				
	(2)		Local issues and circumstances that limit or prevent monitoring.	182:191, 580:592				
(d)			Each Agency shall describe steps that will be taken to fill data gaps before the next five-year assessment, including the location and purpose of newly added or installed monitoring sites.	182:191, 580:592				
(e)			Each Agency shall adjust the monitoring frequency and density of monitoring sites to provide an adequate level of detail about site-specific surface water and groundwater conditions and to assess the effectiveness of management actions under circumstances that include the following:					
	(1)		Minimum threshold exceedances.	182:191				
	(2)		Highly variable spatial or temporal conditions.	182:191				
	(3)		Adverse impacts to beneficial uses and users of groundwater.	182:191				
	(4)		The potential to adversely affect the ability of an adjacent basin to implement its Plan or impede achievement of sustainability goals in an adjacent basin.	182:191				
			Note: Authority cited: Section 10733.2, Water Code.					
			Reference: Sections 10723.2, 10727.2, 10728.2, 10733, 10733.2, and 10733.8, Water Code					
§ 354.40.			**Reporting Monitoring Data to the Department**					
			Monitoring data shall be stored in the data management system developed pursuant to Section 352.6. A copy of the monitoring data shall be included in the Annual Report and submitted electronically on forms provided by the Department.					
			Note: Authority cited: Section 10733.2, Water Code.					
			Reference: Sections 10728, 10728.2, 10733.2, and 10733.8, Water Code.					
SubArticle 5.			**Projects and Management Actions**					
§ 354.42.			**Introduction to Projects and Management Actions**					
			This Subarticle describes the criteria for projects and management actions to be included in a Plan to meet the sustainability goal for the basin in a manner that can be maintained over the planning and implementation horizon.					

Article 5.			Plan Contents for Sample Basin	GSP Document References				
				Page Numbers of Plan	Or Section Numbers	Or Figure Numbers	Or Table Numbers	Notes
			Note: Authority cited: Section 10733.2, Water Code.					
			Reference: Section 10733.2, Water Code.					
§ 354.44.			**Projects and Management Actions**					
(a)			Each Plan shall include a description of the projects and management actions the Agency has determined will achieve the sustainability goal for the basin, including projects and management actions to respond to changing conditions in the basin.	229:264, 654:660	Chapter 4, Appendix 5-A			
(b)			Each Plan shall include a description of the projects and management actions that include the following:					
	(1)		A list of projects and management actions proposed in the Plan with a description of the measurable objective that is expected to benefit from the project or management action. The list shall include projects and management actions that may be utilized to meet interim milestones, the exceedance of minimum thresholds, or where undesirable results have occurred or are imminent. The Plan shall include the following:					
		(A)	A description of the circumstances under which projects or management actions shall be implemented, the criteria that would trigger implementation and termination of projects or management actions, and the process by which the Agency shall determine that conditions requiring the implementation of particular projects or management actions have occurred.	274				
		(B)	The process by which the Agency shall provide notice to the public and other agencies that the implementation of projects or management actions is being considered or has been implemented, including a description of the actions to be taken.	274:275	5.1.3			
	(2)		If overdraft conditions are identified through the analysis required by Section 354.18, the Plan shall describe projects or management actions, including a quantification of demand reduction or other methods, for the mitigation of overdraft.	229:264	Chapter 4			
	(3)		A summary of the permitting and regulatory process required for each project and management action.	229:264	Chapter 4			
	(4)		The status of each project and management action, including a time-table for expected initiation and completion, and the accrual of expected benefits.	229:264				
	(5)		An explanation of the benefits that are expected to be realized from the project or management action, and how those benefits will be evaluated.	229:264, 616:622				
	(6)		An explanation of how the project or management action will be accomplished. If the projects or management actions rely on water from outside the jurisdiction of the Agency, an explanation of the source and reliability of that water shall be included.	229:264				
	(7)		A description of the legal authority required for each project and management action, and the basis for that authority within the Agency.	229:264				
	(8)		A description of the estimated cost for each project and management action and a description of how the Agency plans to meet those costs.	275:276	5.2			

Article 5.			Plan Contents for Sample Basin	GSP Document References				
				Page Numbers of Plan	Or Section Numbers	Or Figure Numbers	Or Table Numbers	Notes
	(9)		A description of the management of groundwater extractions and recharge to ensure that chronic lowering of groundwater levels or depletion of supply during periods of drought is offset by increases in groundwater levels or storage during other periods.	229:264				
(c)			Projects and management actions shall be supported by best available information and best available science.	229:264				
(d)			An Agency shall take into account the level of uncertainty associated with the basin setting when developing projects or management actions.	229:264				
			Note: Authority cited: Section 10733.2, Water Code.					
			Reference: Sections 10727.2, 10727.4, and 10733.2, Water Code.					

Appendix 2-A. Expanded Basin Setting

Contents

Expanded Basin Setting

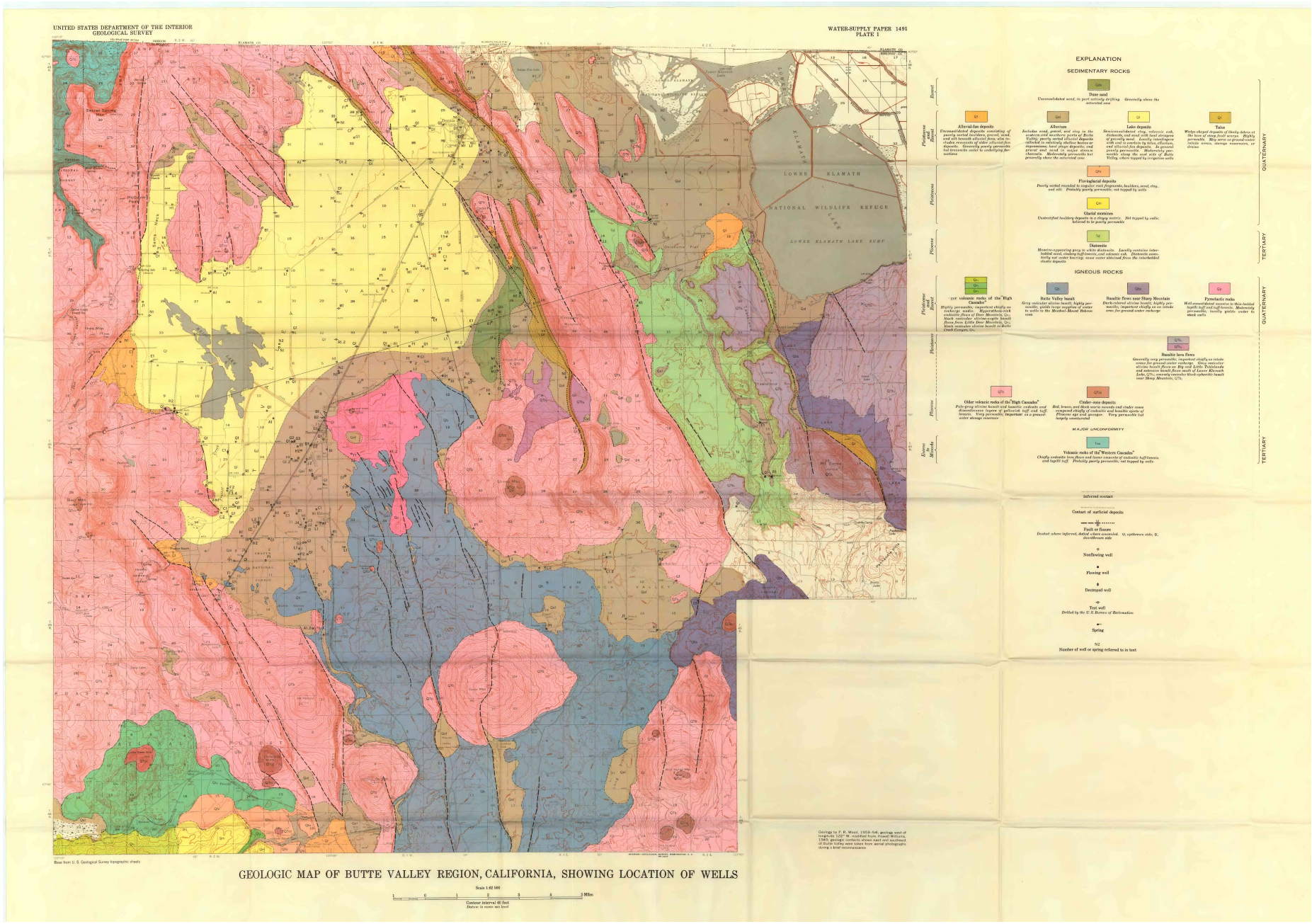
This Appendix provides further background information for Section 2.2 - Basin Setting, such as additional geologic maps, cross-sections, and groundwater elevation maps.

Geology Background

The geologic map based on observations of May 1954 forms the basis of the hydrogeologic model and is shown in Figure 1 (Wood 1960).

The locations of all cross-sections in the GSP are show in Figure 2.

Cross-sections D-D', E-E' and F-F' are shown in Figure 3, Figure 4, and Figure 5. Cross-sections A-A', B-B', and C-C' are in the main text.



GEOLOGIC MAP OF BUTTE VALLEY REGION, CALIFORNIA, SHOWING LOCATION OF WELLS

Figure 1: Detailed geology map that forms the basis of the hydrogeologic model (Wood 1960). The image is high quality so text can be distinguised when zoomed in.

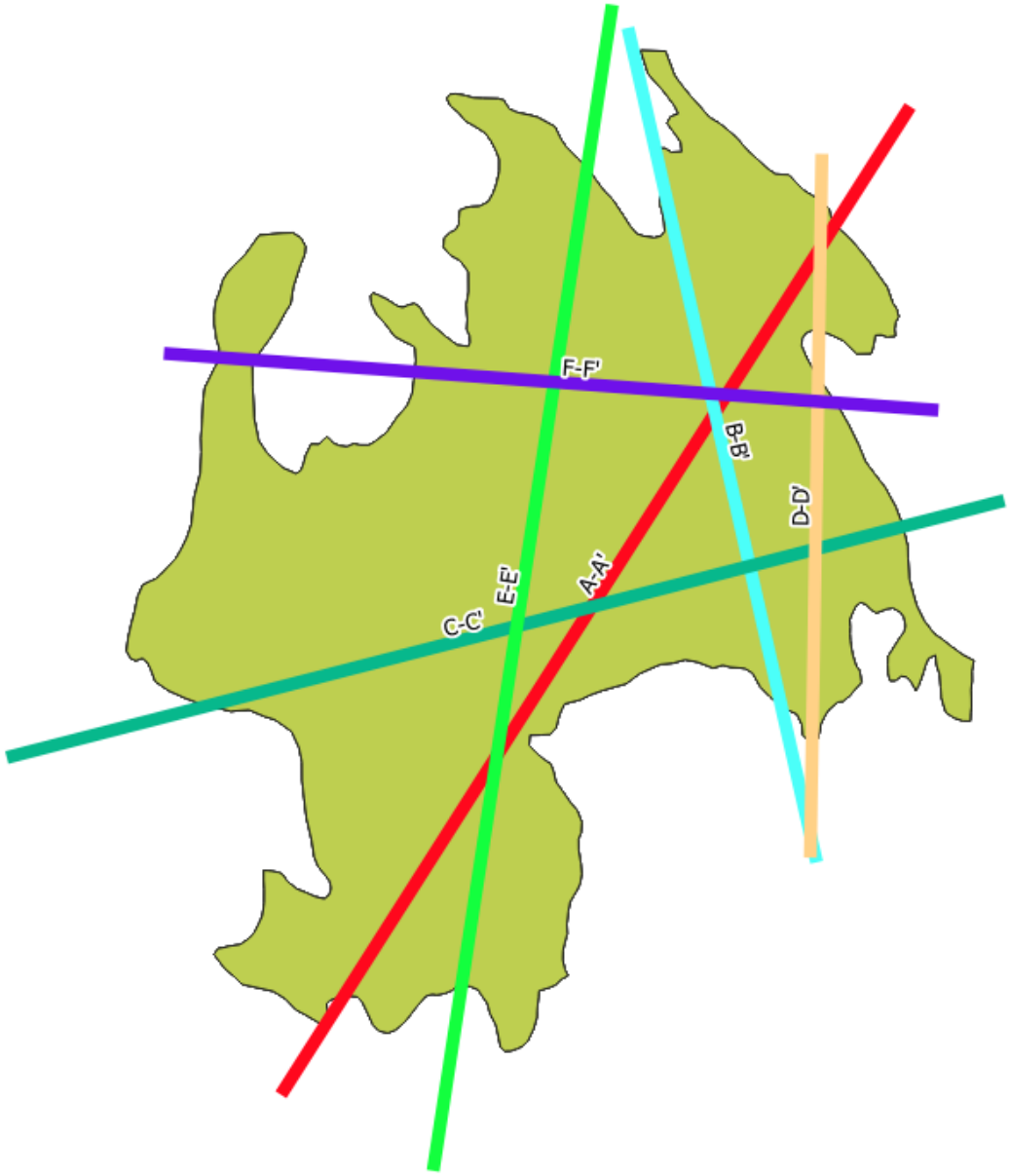


Figure 2: General cross-section locations - *this figure will be updated in the final Appendix*.

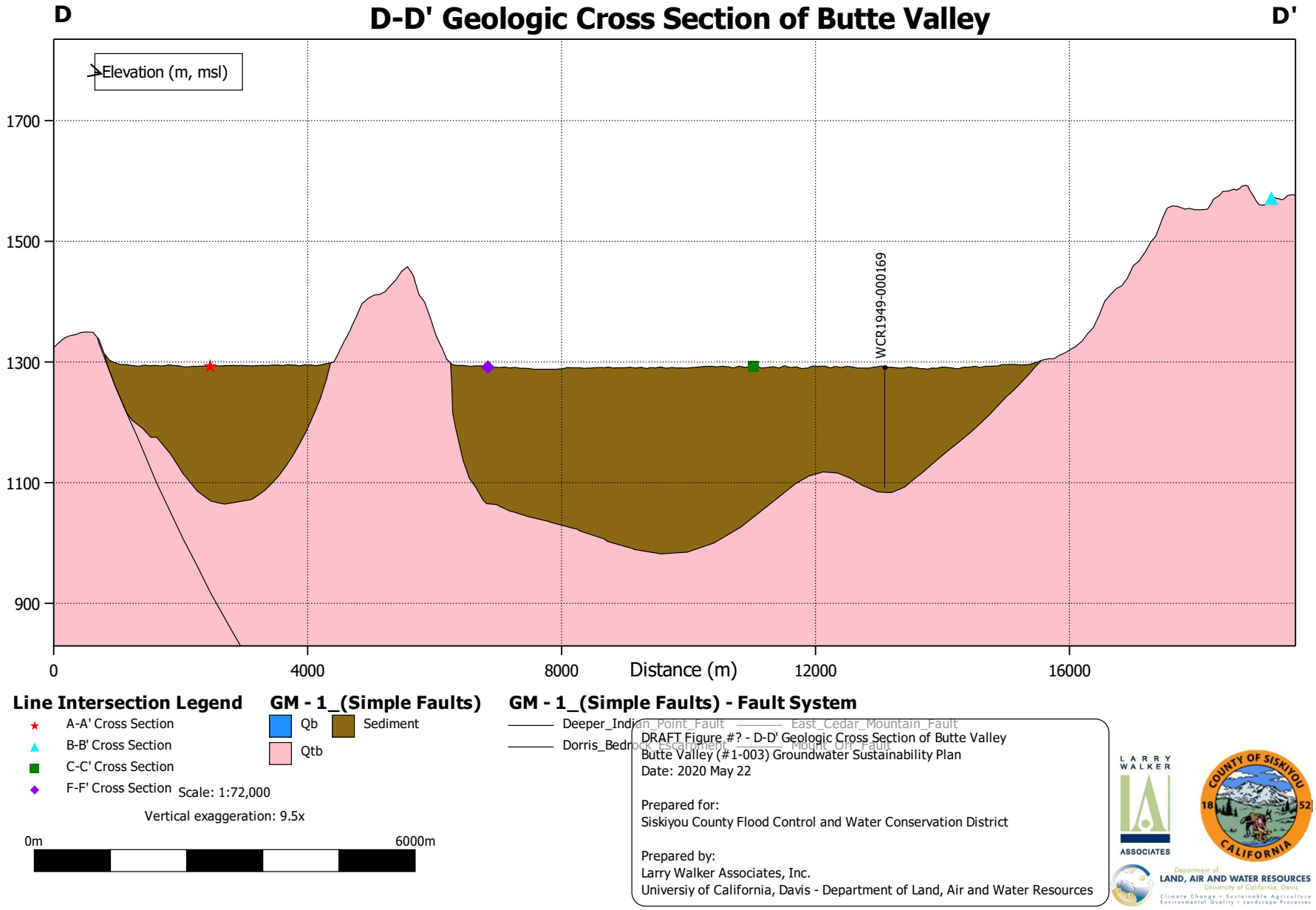


Figure 3: Cross Section D-D'

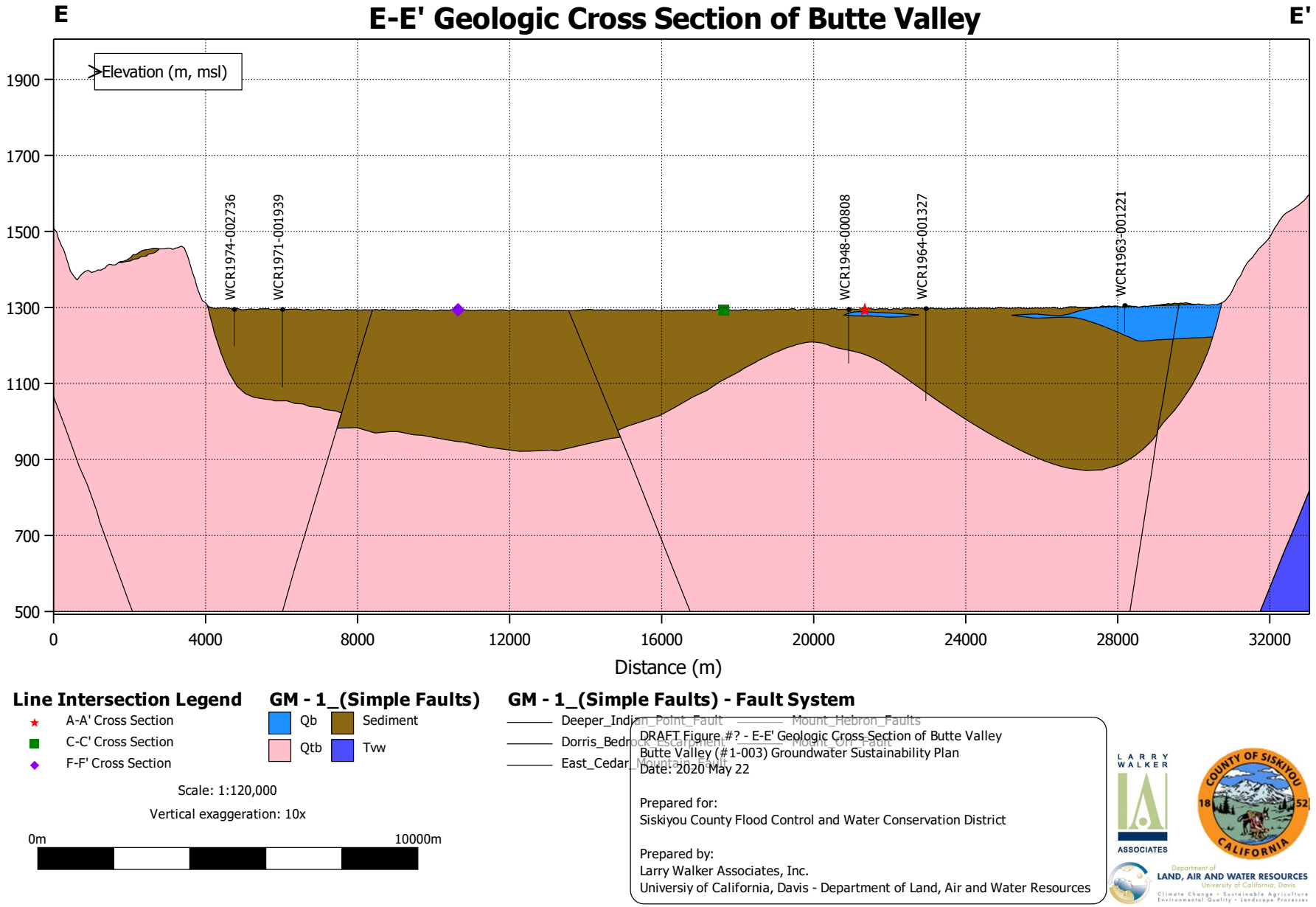


Figure 4: Cross Section E-E'

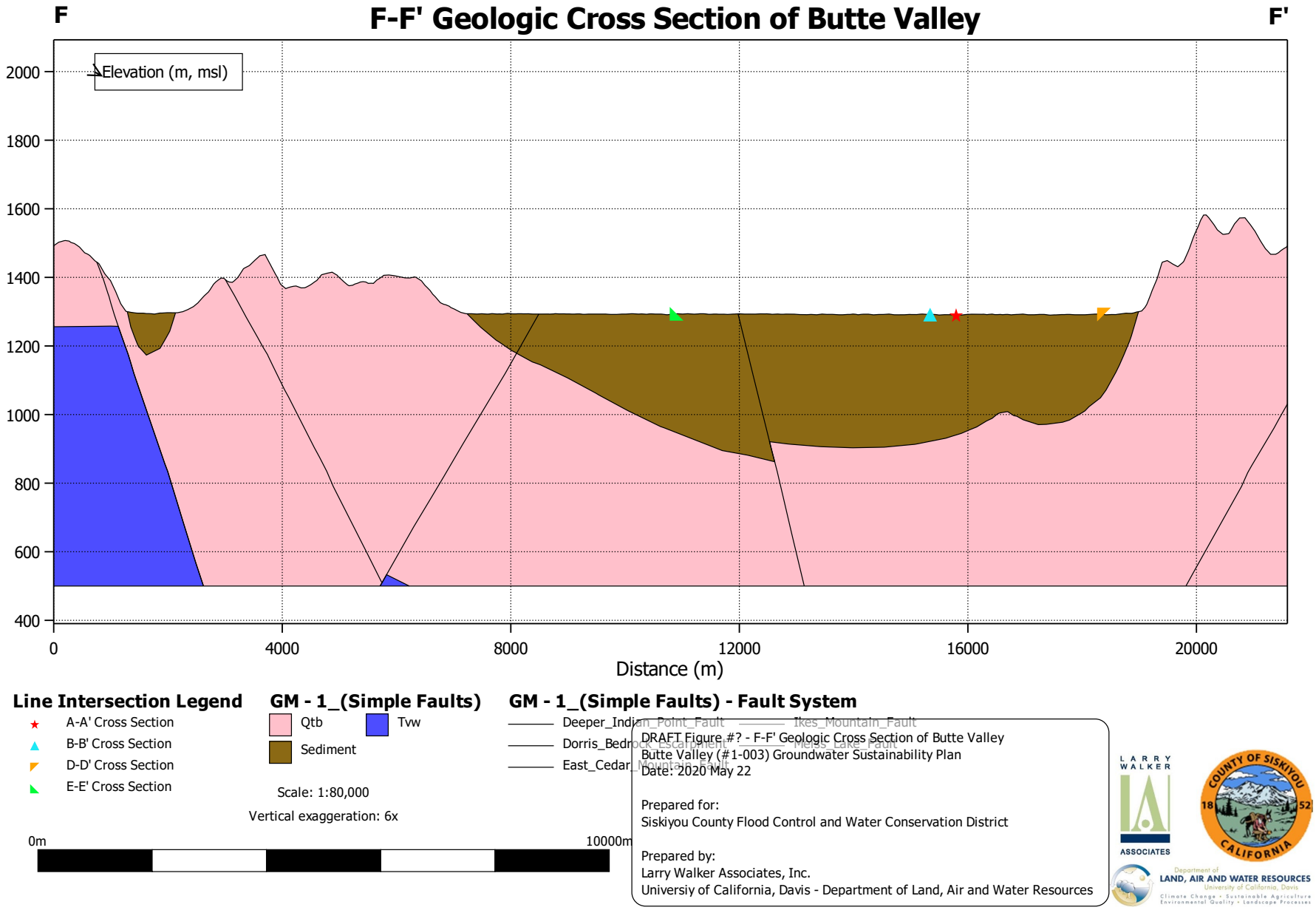


Figure 5: Cross Section F-F'

Soils

The original map of general soil units in Butte Valley, as defined by the 1994 USDA Soil Survey of the Butte Valley-Tule Lake Area, is shown in Figure 6.

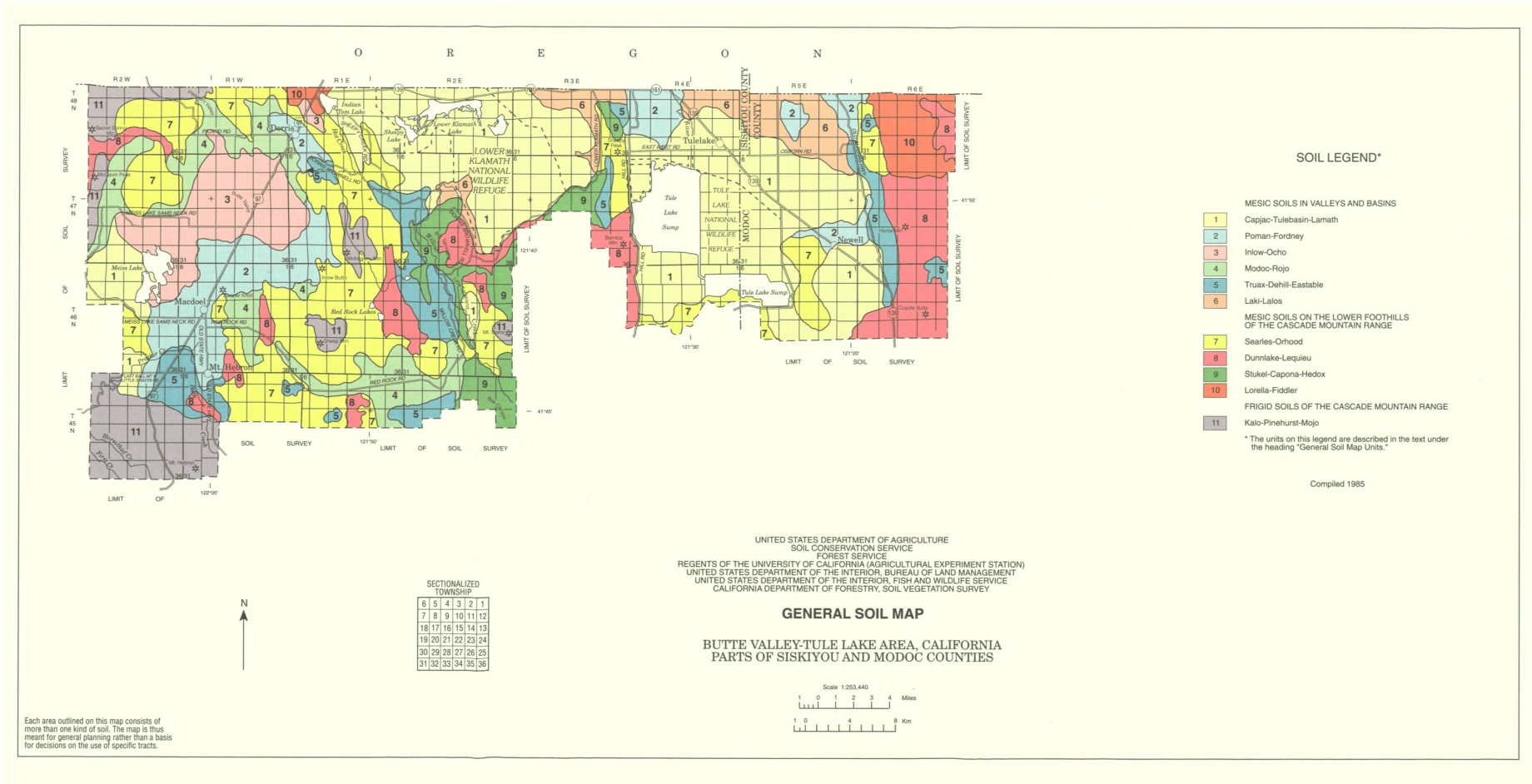


Figure 6: 1994 USDA Soil Survey of the Butte Valley-Tule Lake Area

Groundwater Elevation

Water level changes are shown in Figure 21 for the period between Spring 1978 and Spring 2018. Groundwater Elevations in Spring 2019 are shown in Figure 9. Spring 2018 groundwater elevations are shown in Figure 11. Spring 2017 groundwater elevations are shown in Figure 12. Spring 2016 groundwater elevations are shown in Figure 13. Spring 2008 groundwater elevations are shown in Figure 16. Spring 1991 groundwater elevations are shown in Figure 17. Spring 1986 groundwater elevations are shown in Figure 18. Spring 1979 groundwater elevations are shown in Figure 19.

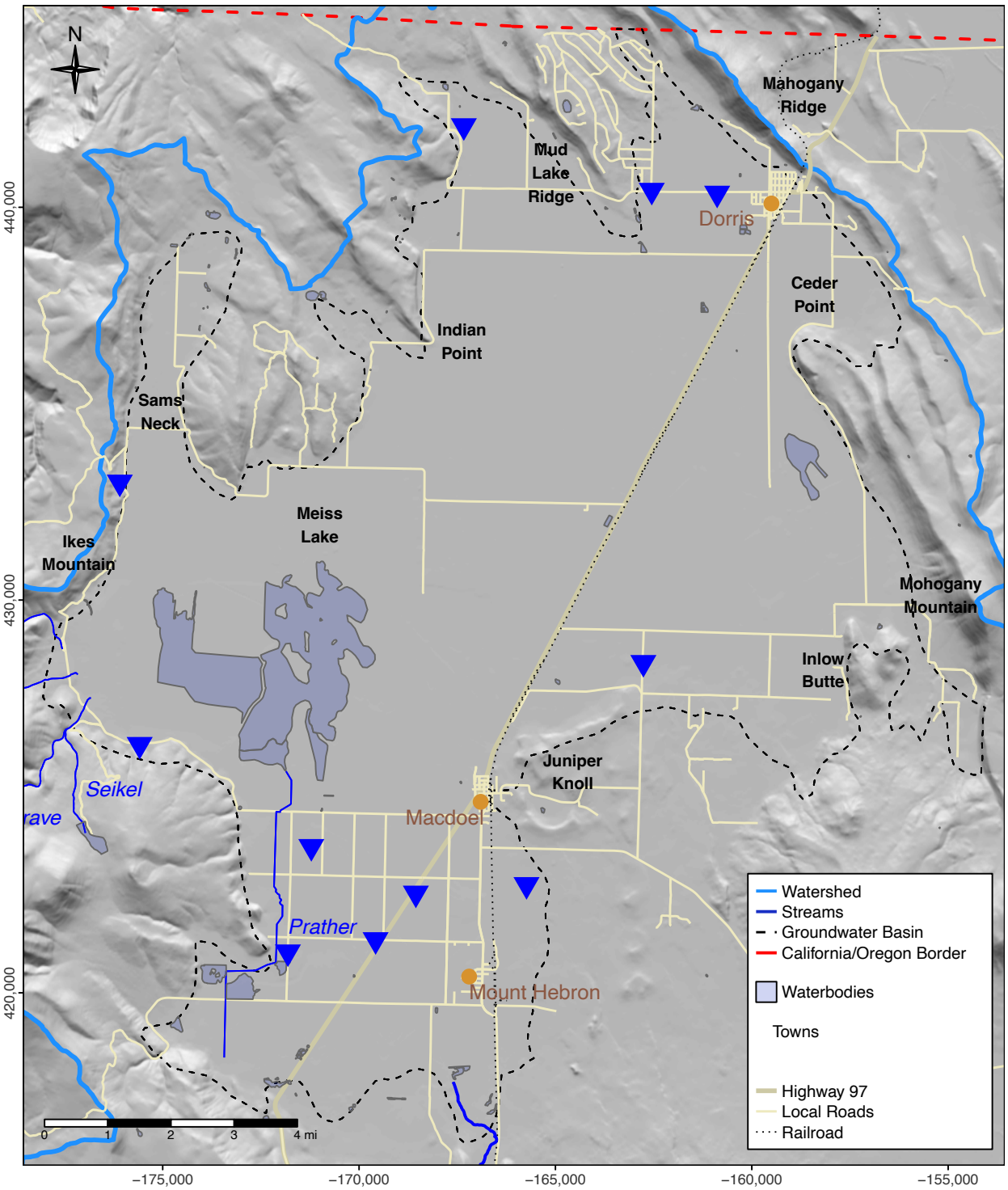


Figure 7: Continuous Monitoring Well Locations

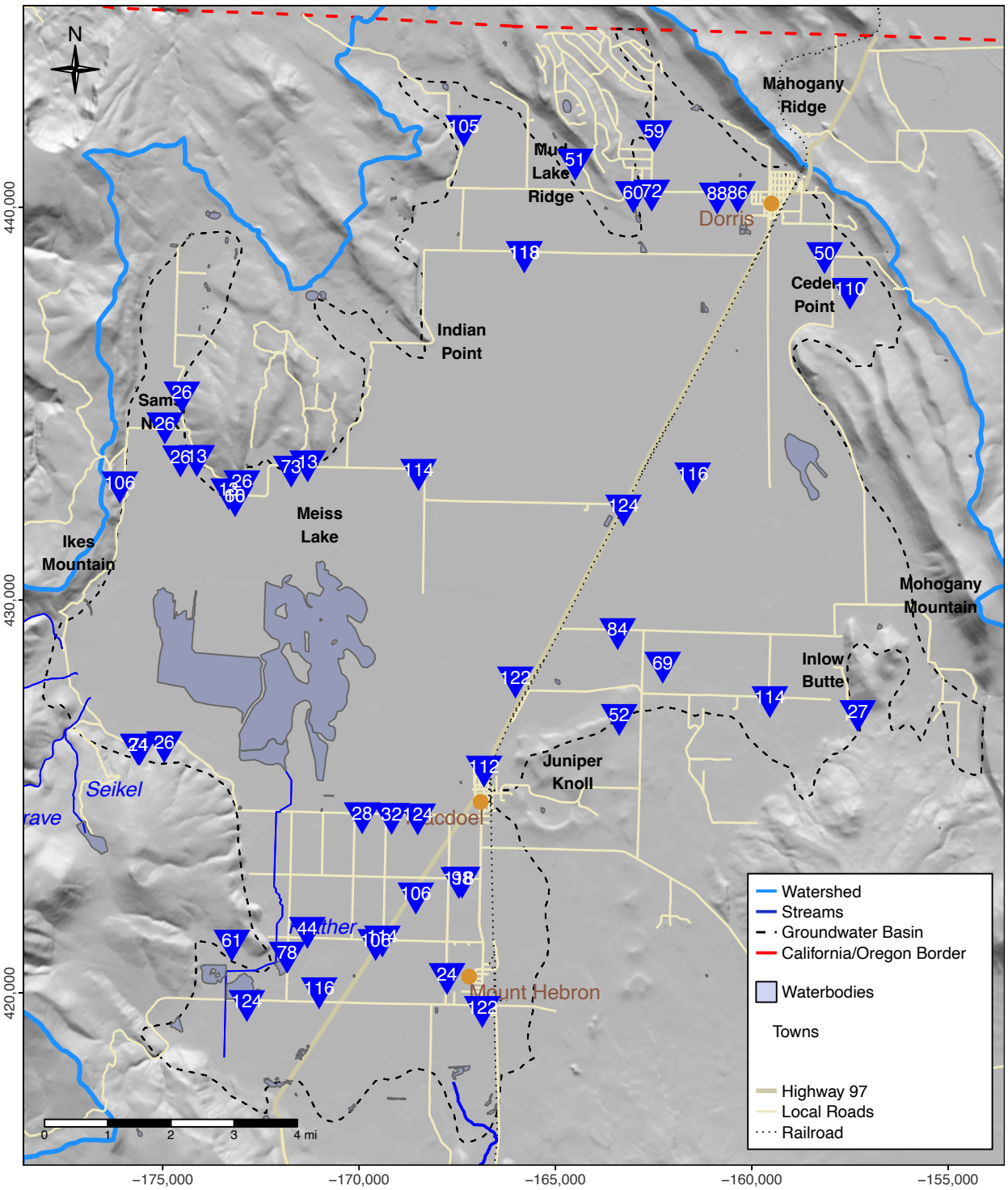


Figure 8: Periodic Monitoring Well Locations

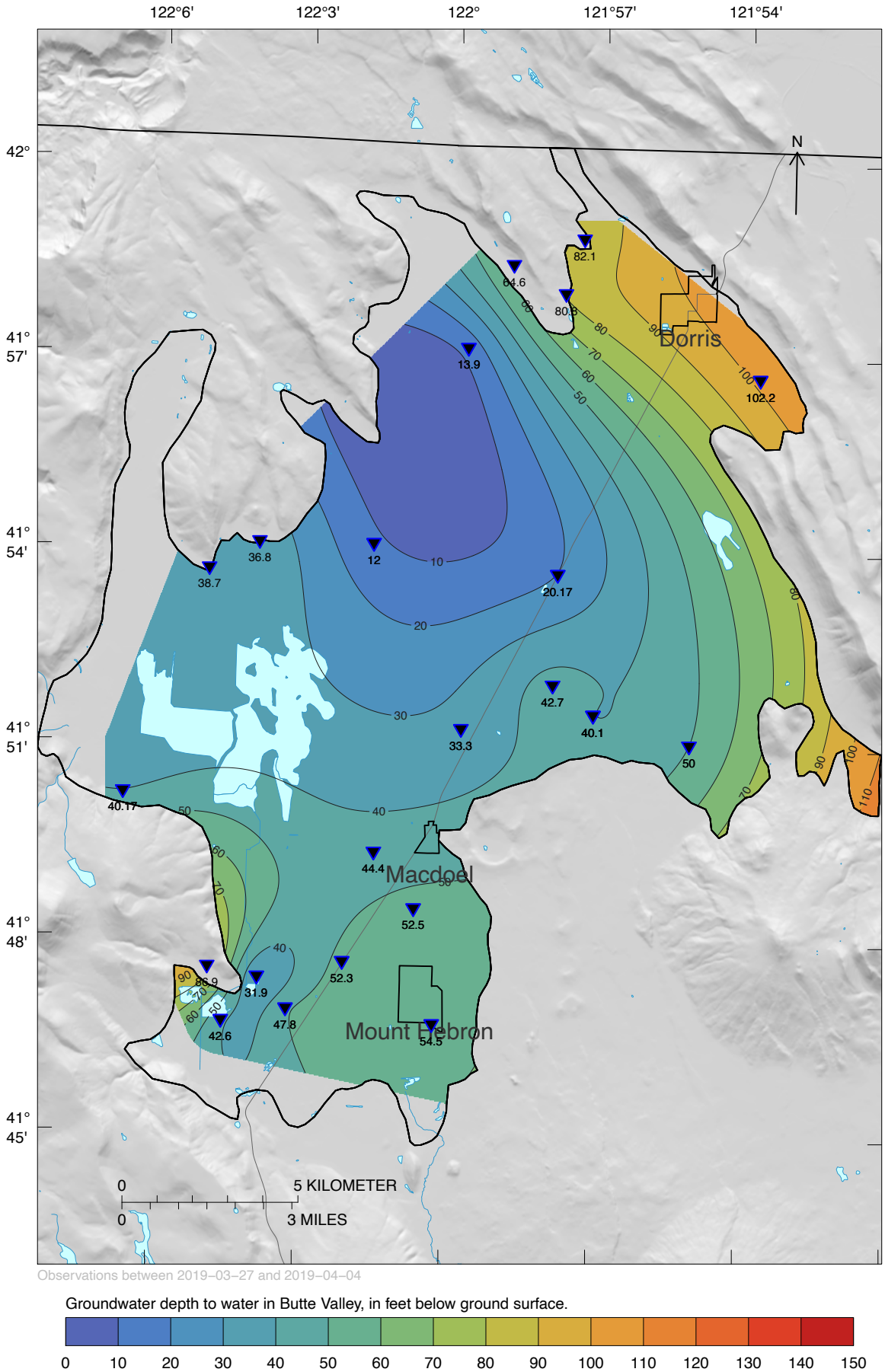


Figure 9: Butte Valley Groundwater Elevations, Spring 2019

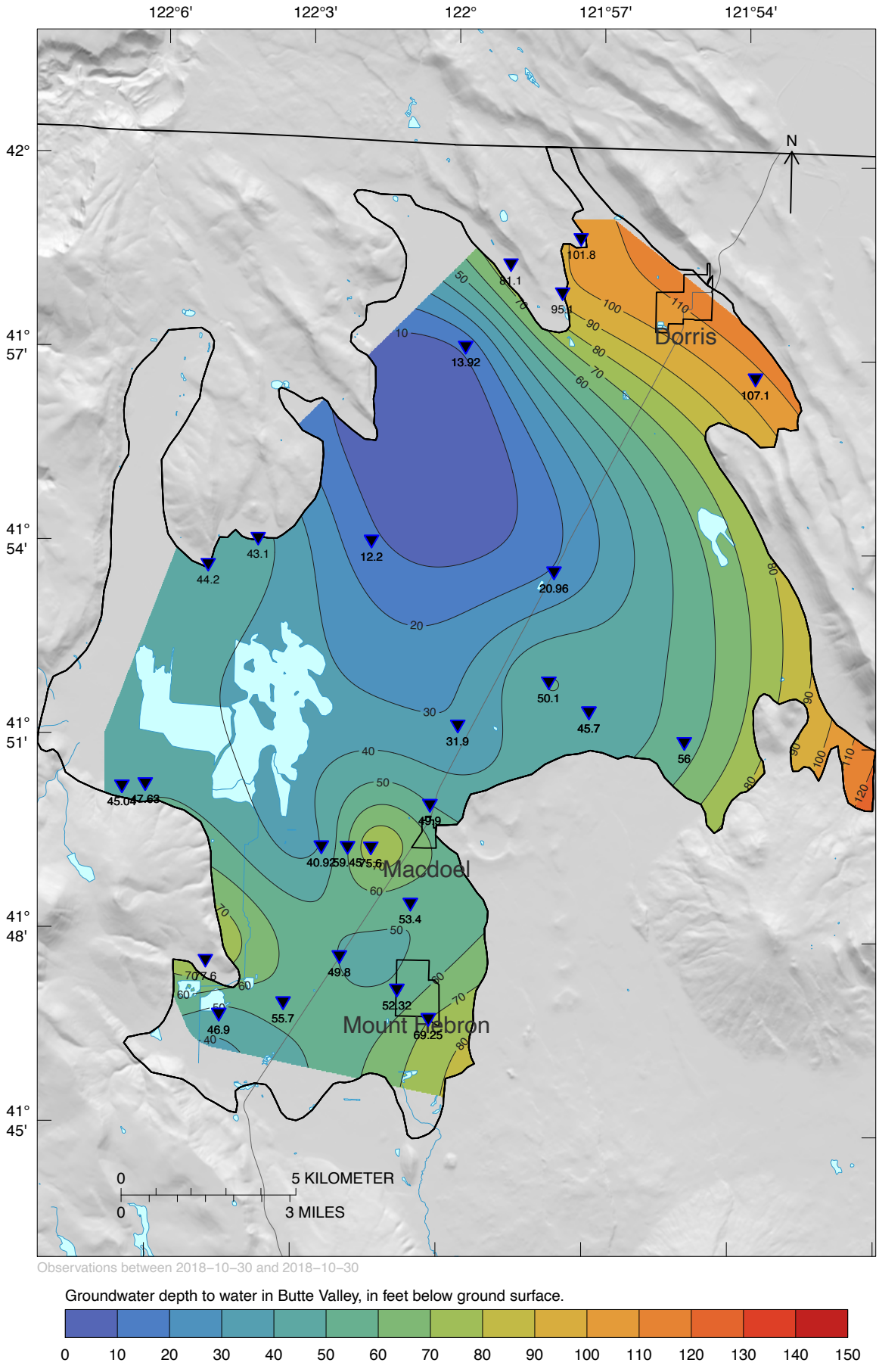


Figure 10: Butte Valley Groundwater Elevations, Fall 2018

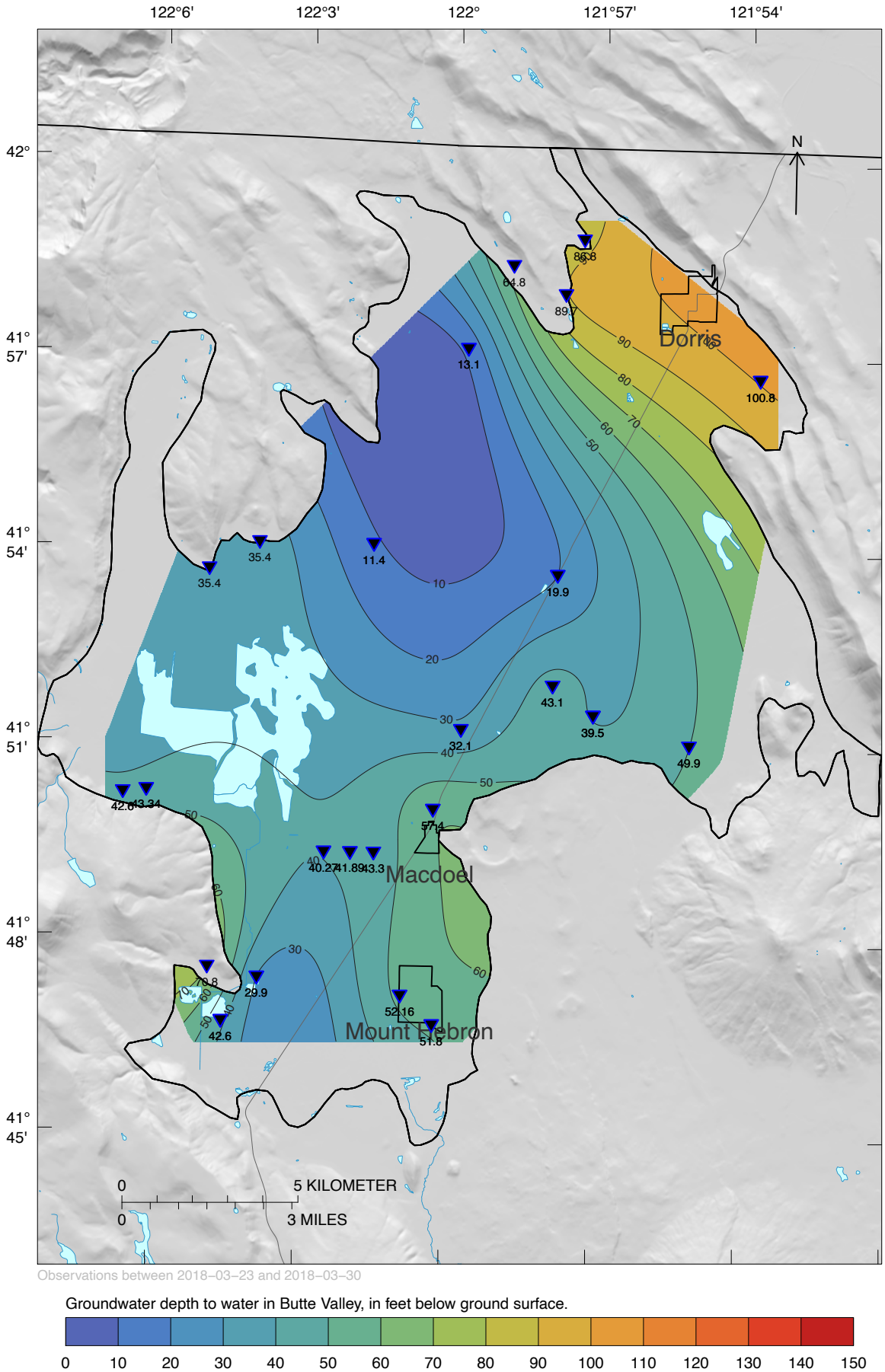


Figure 11: Butte Valley Groundwater Elevations, Spring 2018

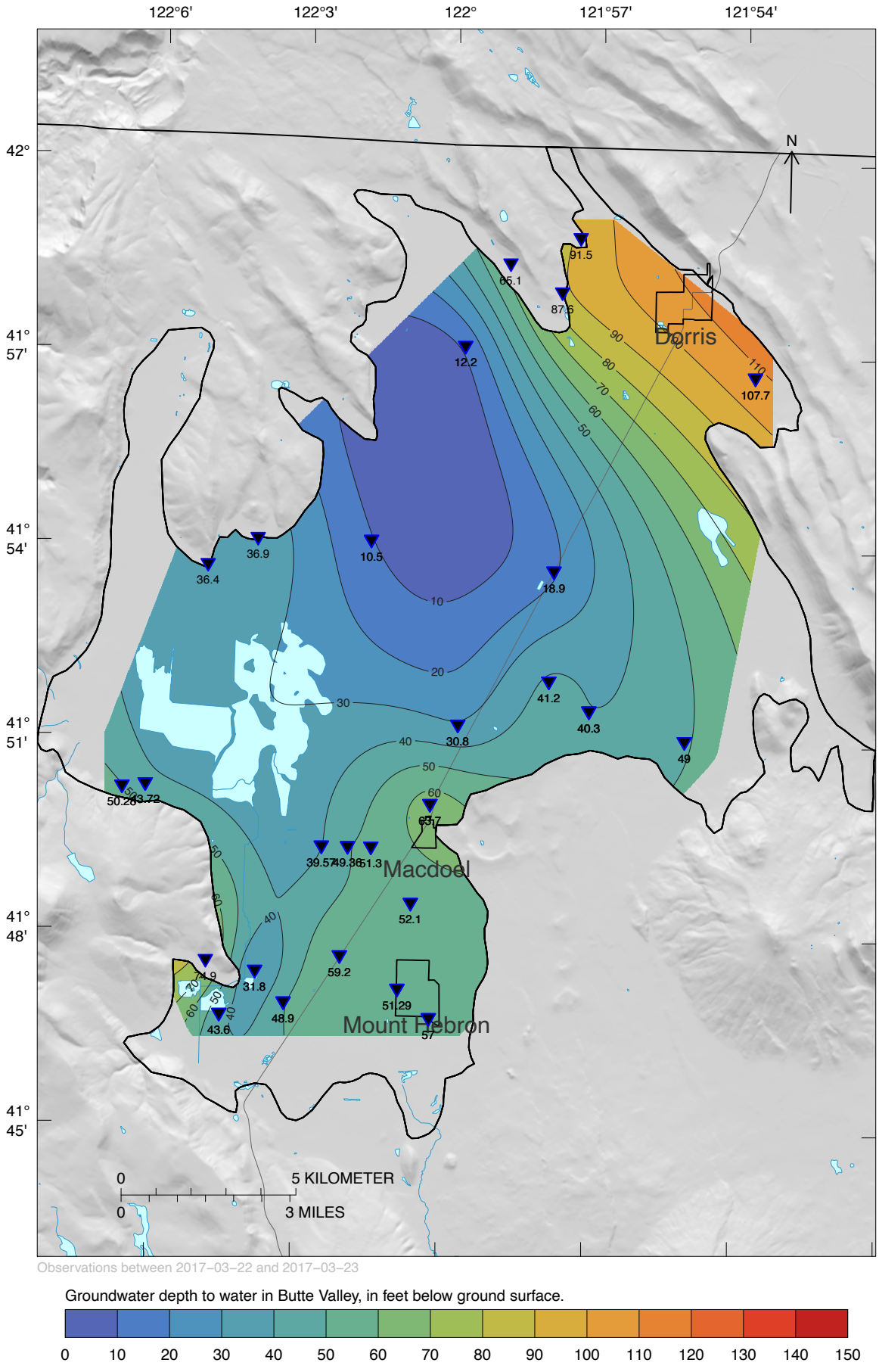


Figure 12: Butte Valley Groundwater Elevations, Spring 2017

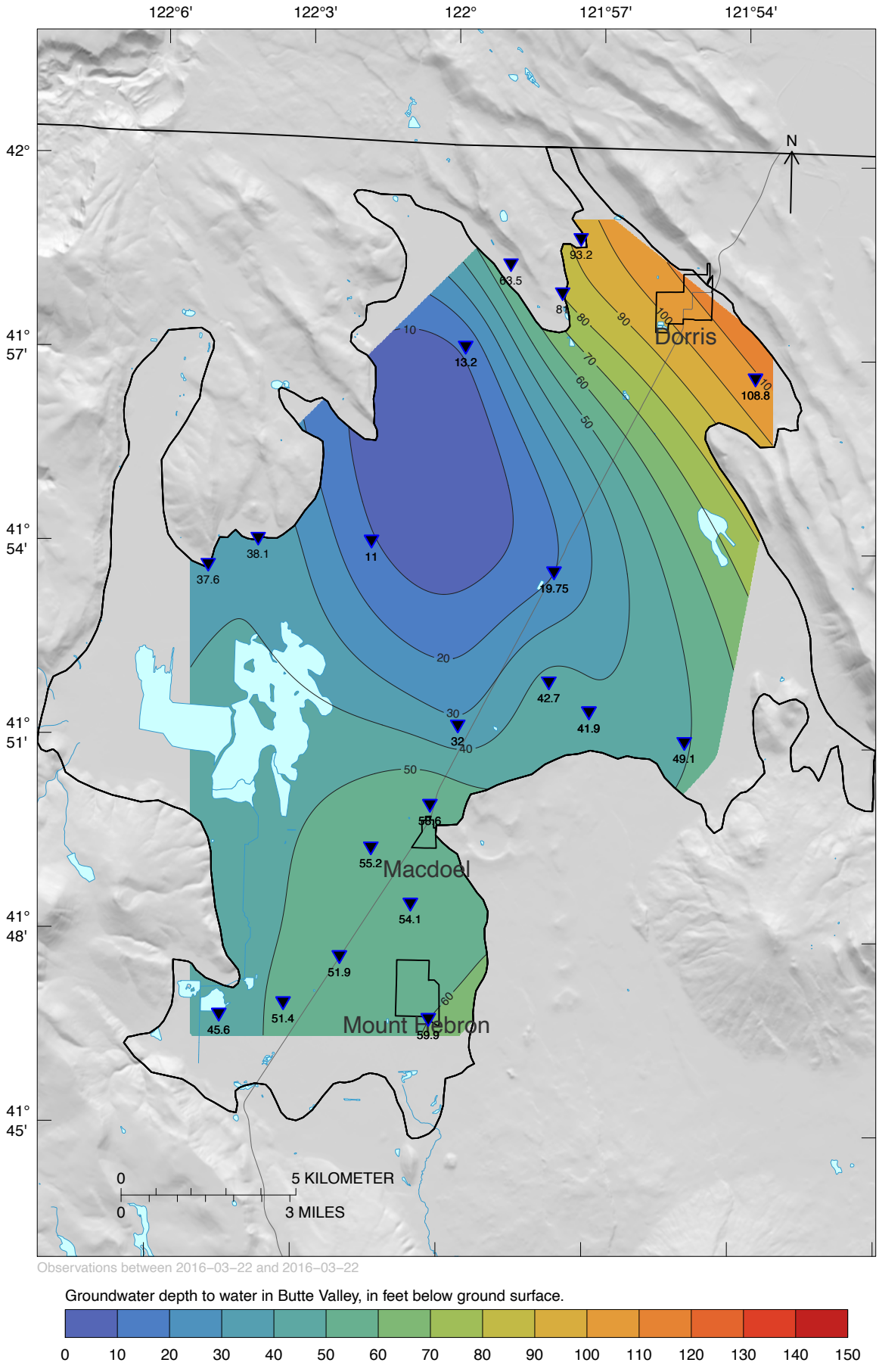


Figure 13: Butte Valley Groundwater Elevations, Spring 2016

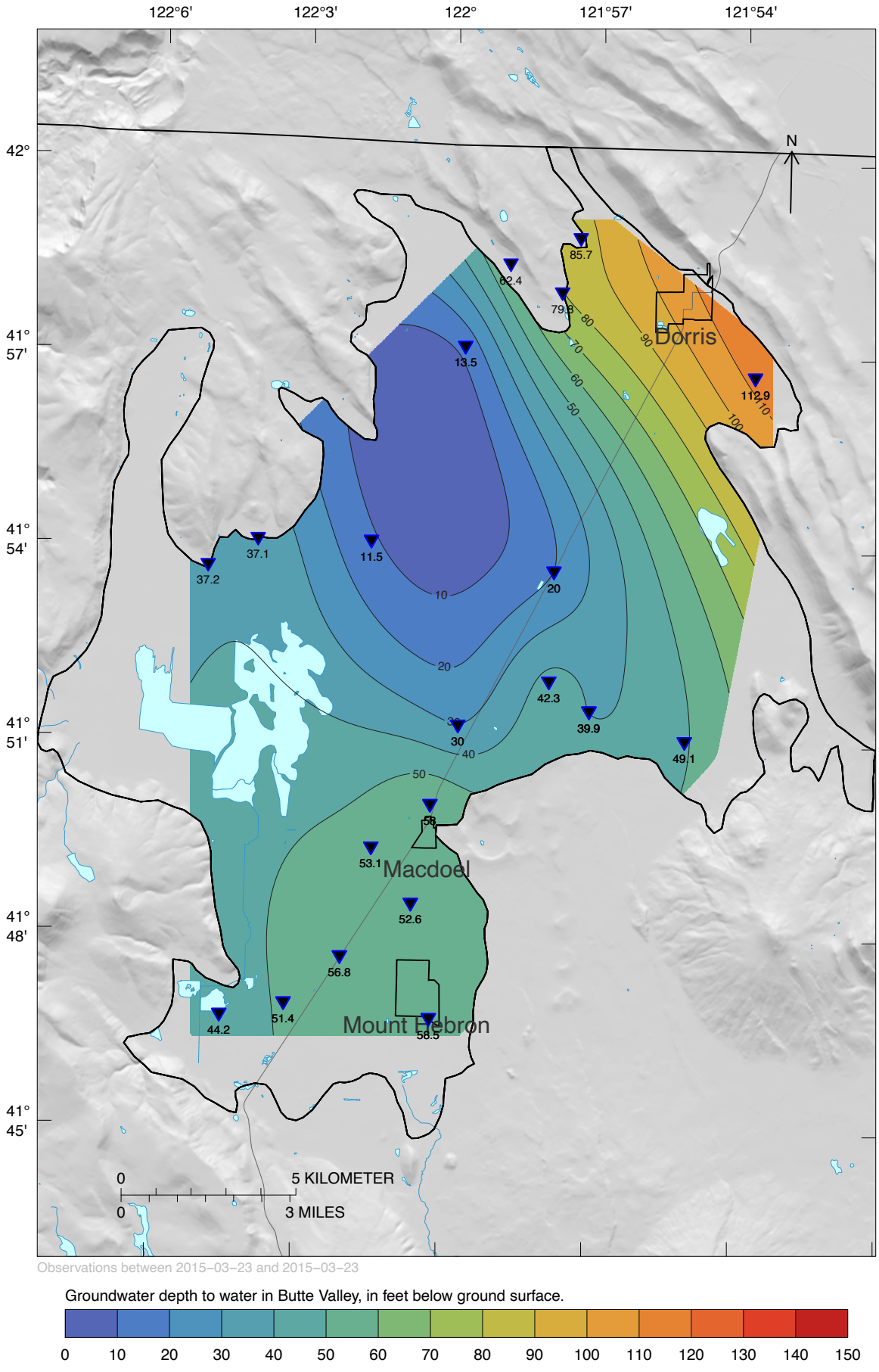


Figure 14: Butte Valley Groundwater Elevations, Spring 2015

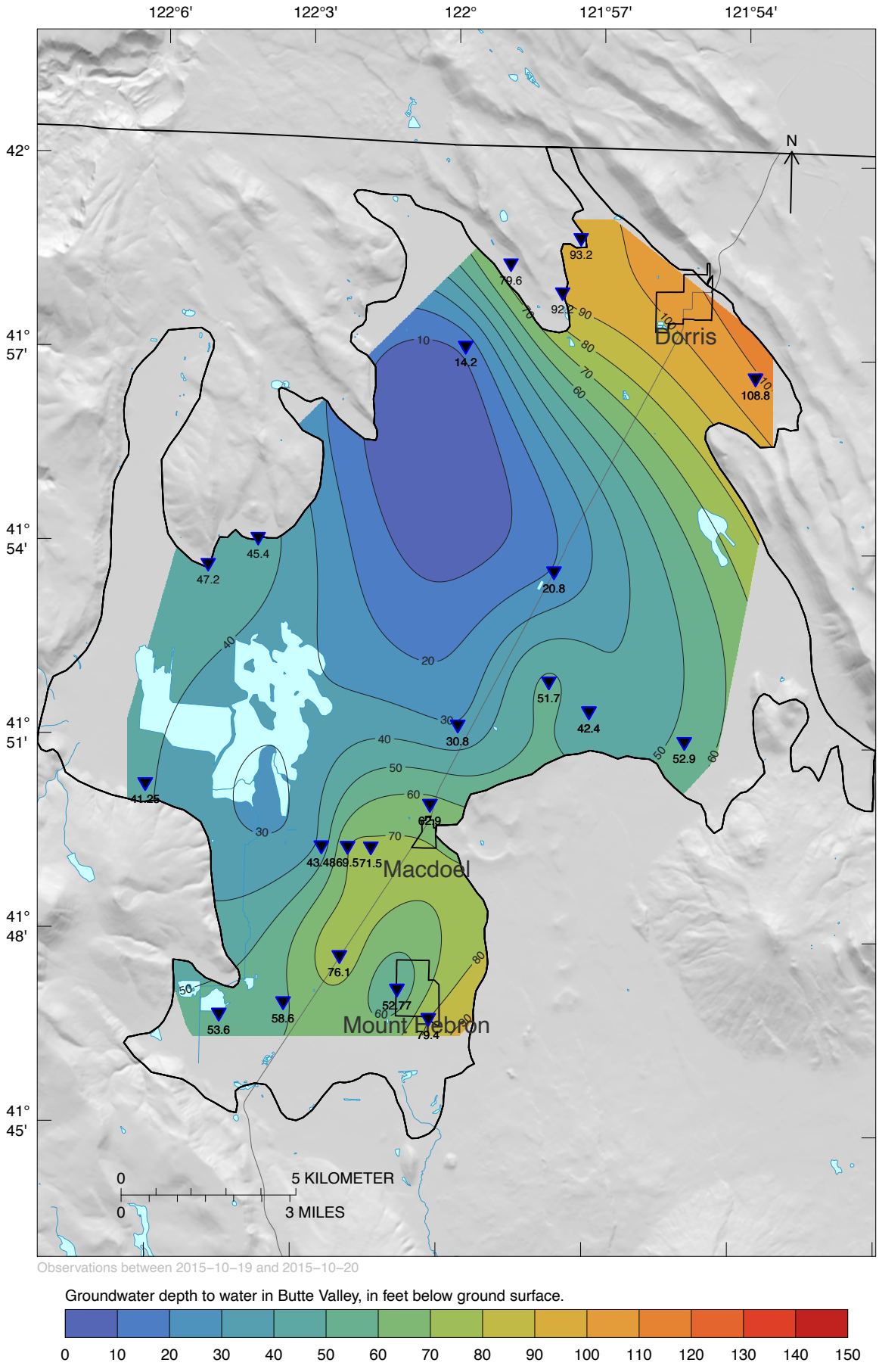


Figure 15: Butte Valley Groundwater Elevations, Fall 2015

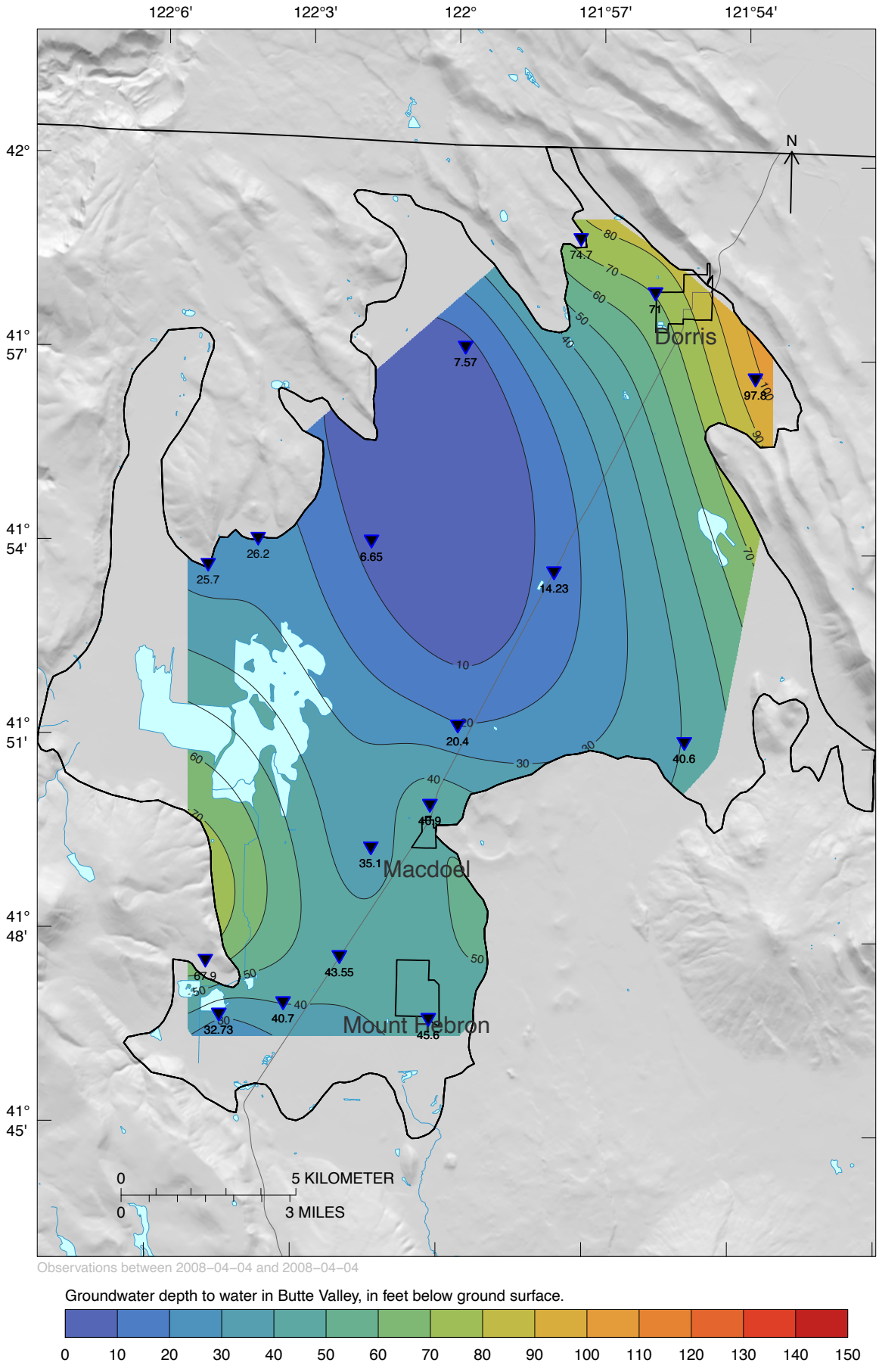


Figure 16: Butte Valley Groundwater Elevations, Spring 2008

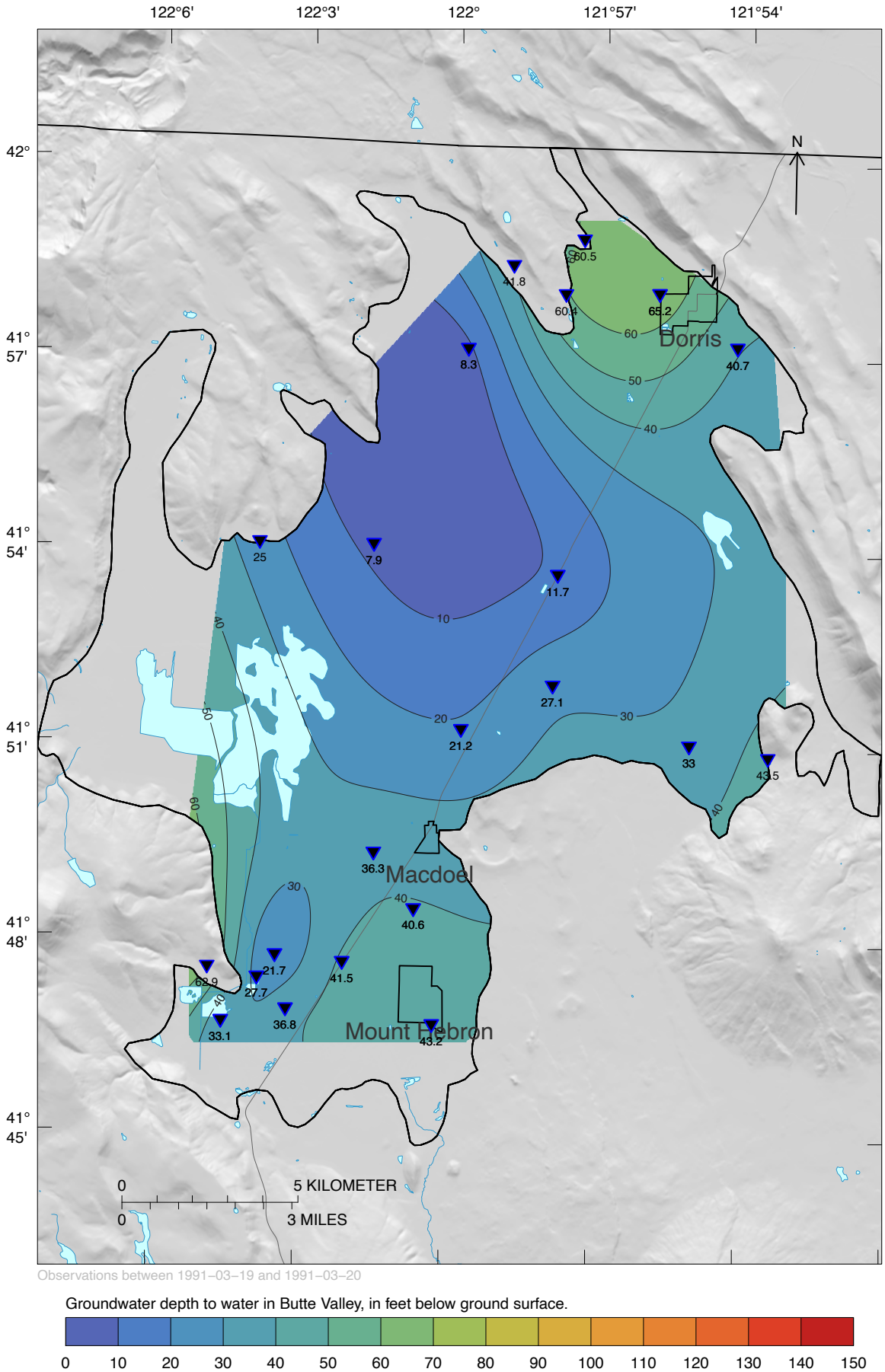


Figure 17: Butte Valley Groundwater Elevations, Spring 1991

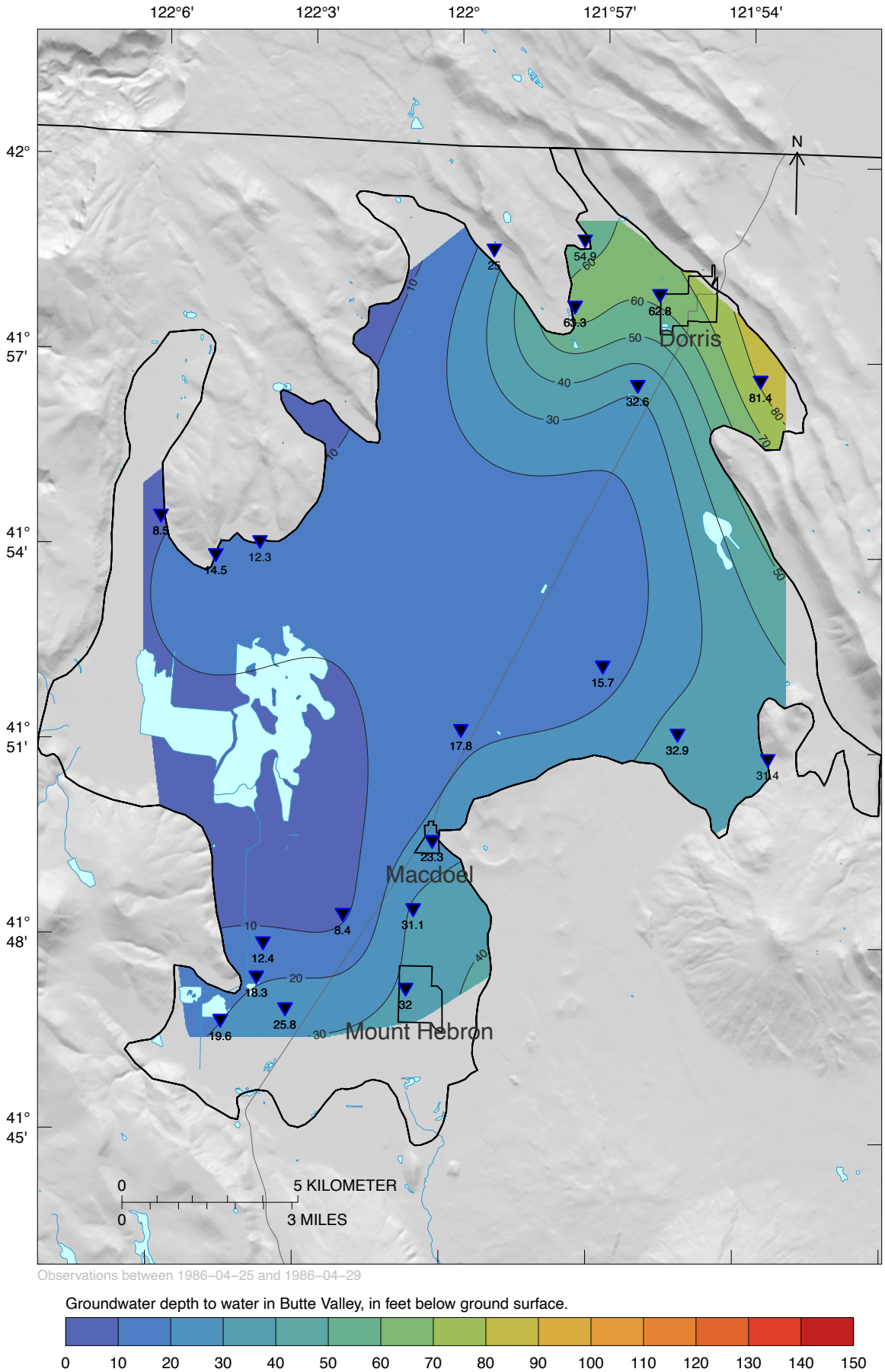


Figure 18: Butte Valley Groundwater Elevations, Spring 1986

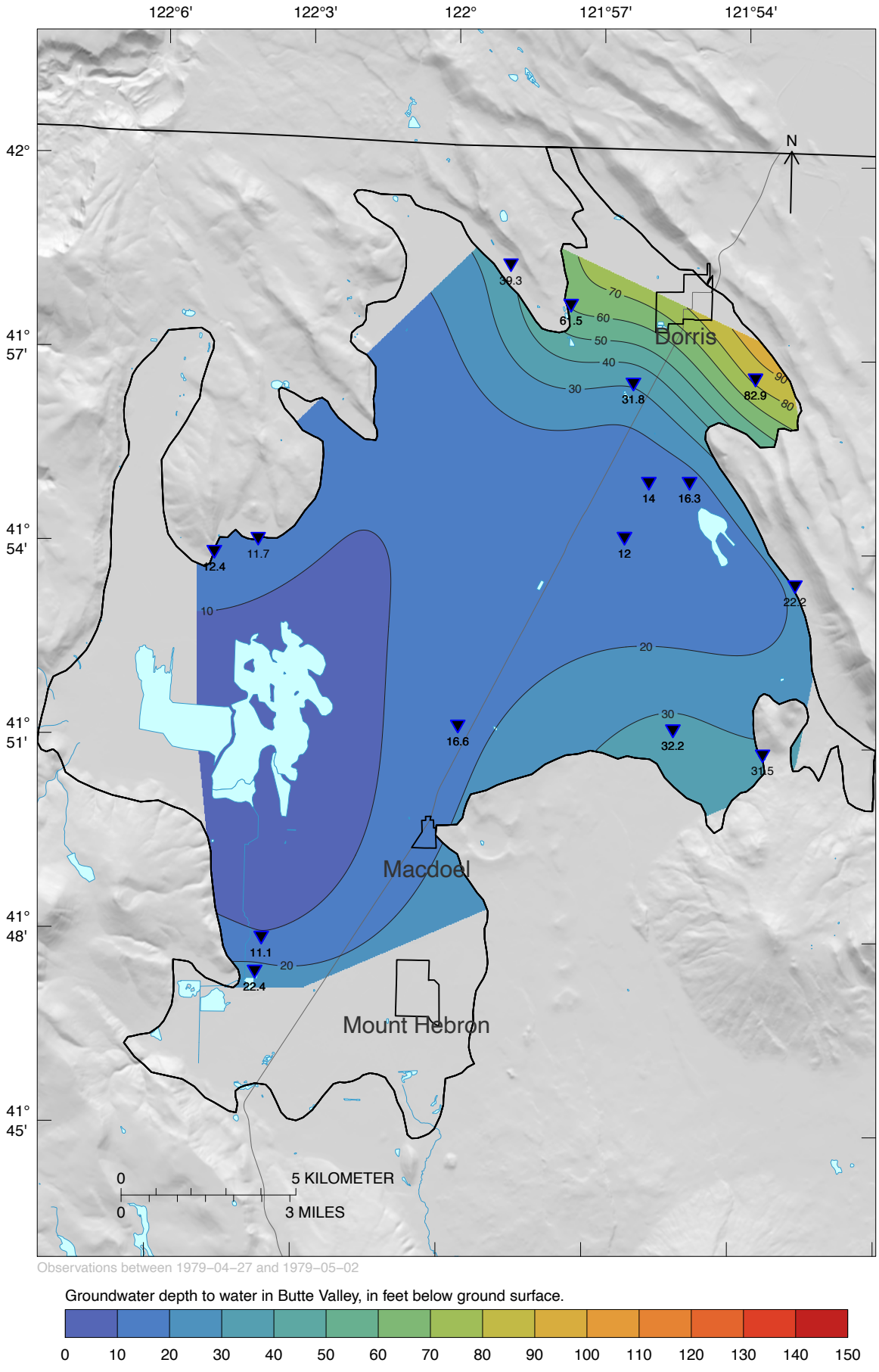


Figure 19: Butte Valley Groundwater Elevations, Spring 1979

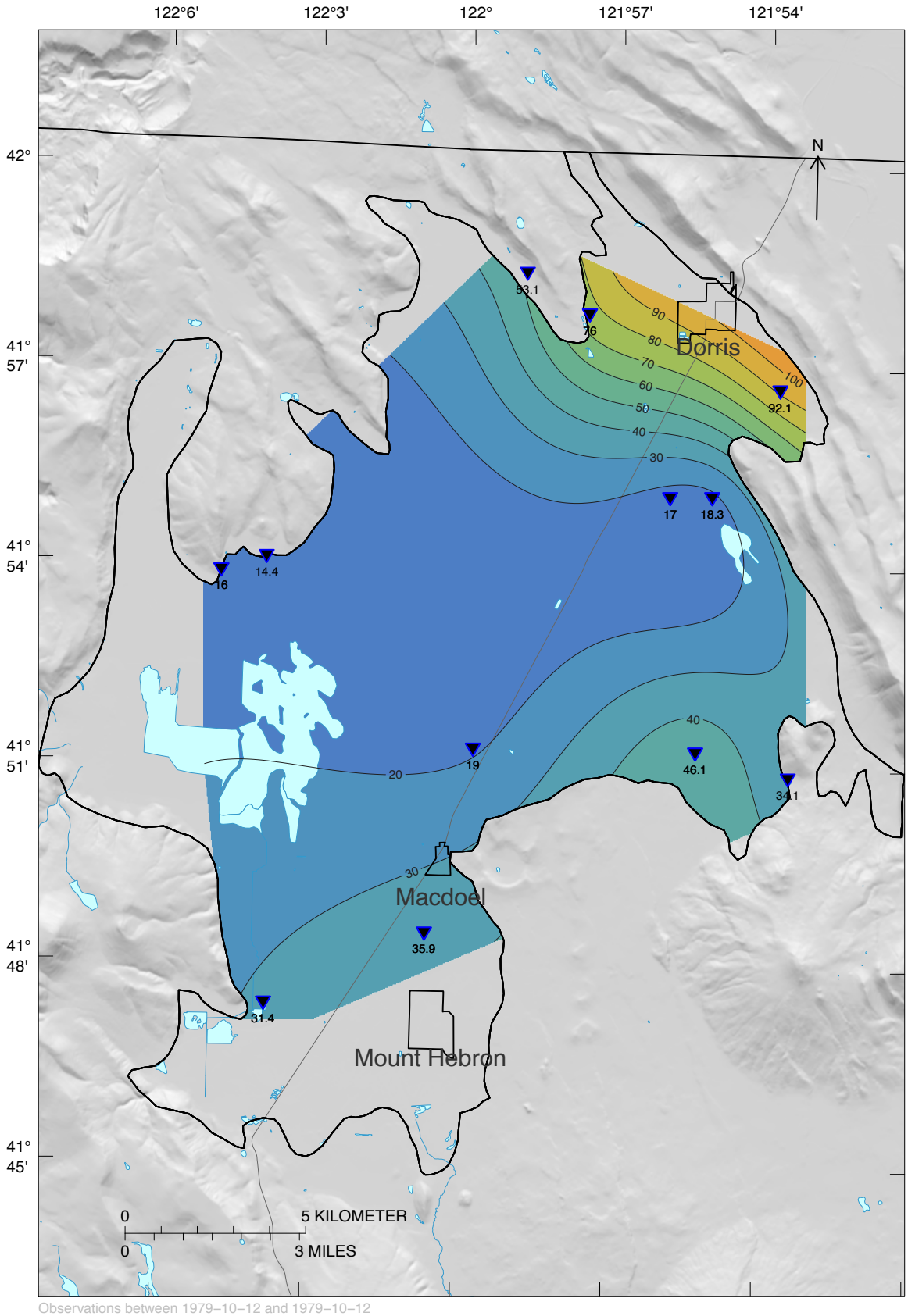


Figure 20: Butte Valley Groundwater Elevations, Fall 1979

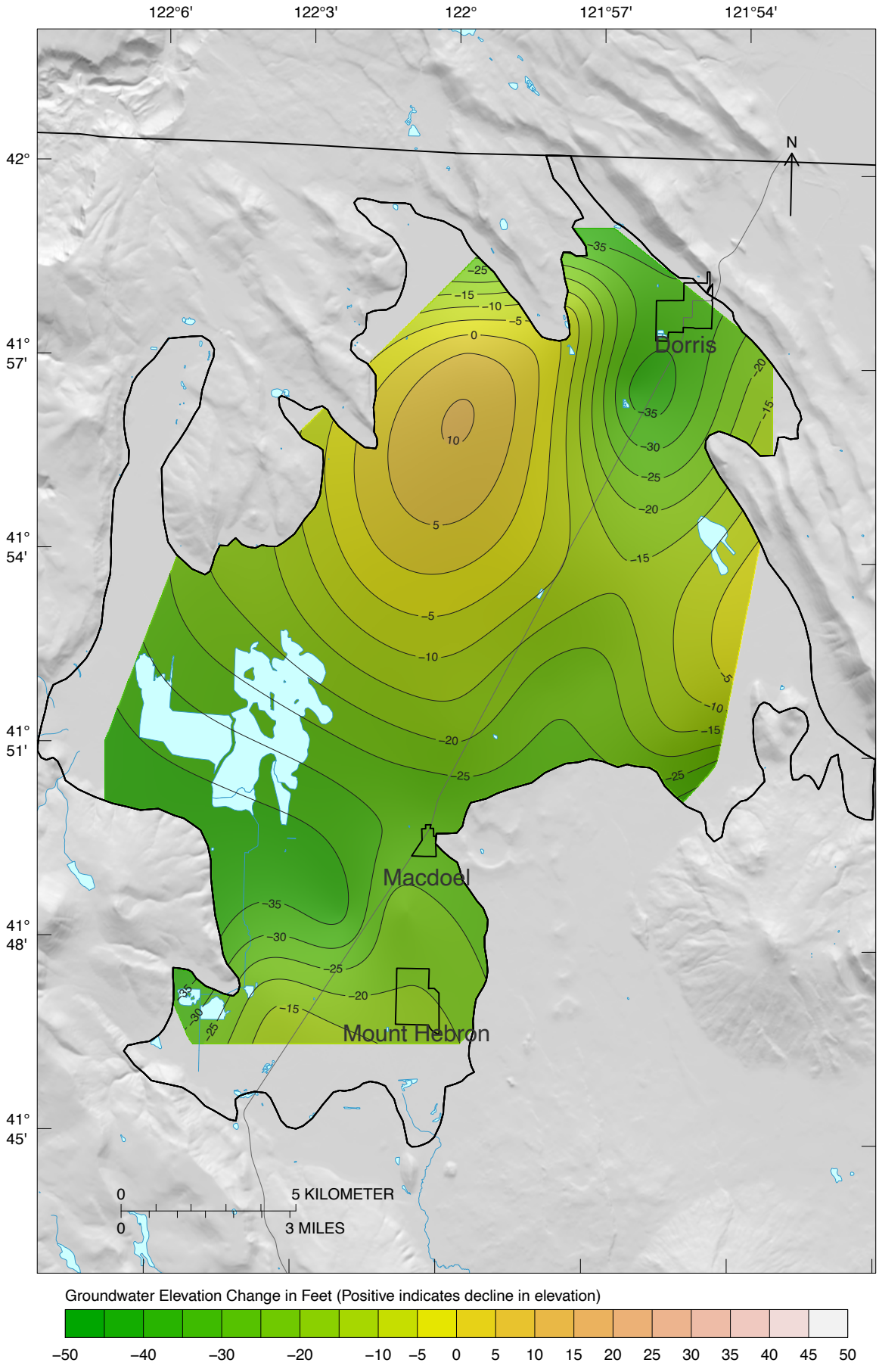


Figure 21: Butte Valley Groundwater Change from Spring 1986 to Spring 2018

References

Wood, P. R. 1960. “Geology and Groundwater Features of the Butte Valley Region, Siskiyou County California,” no. 1491: 1–155.

Appendix 2-B. Water Quality Assessment

Contents

Regulatory Background

Federal and State Regulations

The overarching federal law concerning water quality is the Clean Water Act, passed in 1972, and is applicable to surface waters and wetlands. In contrast, the federal Safe Drinking Water Act (SDWA) applies to both surface and groundwater, providing protection to drinking water supplies. Under the SDWA, federal standards were established through the United States Environmental Protection Agency (USEPA), in the form of maximum contaminant levels (MCLs). Secondary maximum contaminant levels (SMCLs) have also been established at the federal level; these address esthetics of drinking water sources and are not enforceable. The state of California has its own Safe Drinking Water Act that includes MCLs and SMCLs which are, for select constituents, stricter than those set at the federal level. The California MCLs and SMCLs are codified in Title 22 of the California Code of Regulations (CCR). The standards established under the federal and state Safe Drinking Water Acts are enforced through the State Water Resource Control Board's (SWRCB's) Division of Drinking Water (DDW).

The California Porter-Cologne Water Quality Act, contained in California Water Code Division 7, applies to groundwater and surface waters, designating responsibility for water quality and safe drinking water to the SWRCB and the nine Regional Water Quality Control Boards (RWQCB) in California. The Act requires RWQCBs to develop water quality control plans to manage the quality of surface water and groundwater in specific hydrologic regions; the plans contain defined water quality objectives for each region. These water quality objectives protect the quality of surface waters, groundwaters, and associated beneficial uses. The water quality control plan must be approved by both the SWRCB and the USEPA. The Butte Valley Basin is in the North Coast Region and is regulated under the North Coast Regional Water Quality Control Board (Regional Water Board), with water quality objectives detailed in the Water Quality Control Plan for the North Coast Region (Basin Plan).[1]

The SWRCB's Policy for Water Quality Control For Recycled Water (Recycled Water Policy),[2] most recently amended in 2018, includes additional requirements to address salt and nutrients. Under this policy, Regional Water Boards are required to assess basins or subbasins within the region where water quality is threatened by salt and nutrients, and where management is required. In basins or subbasins where salt and nutrients are identified as a threat, a salt and nutrient management plan (SNMP) or equivalent management plan is required; this plan can address other constituents in addition to salt and nutrients.

Water Quality Control Plan for the North Coast Region

The Water Quality Control Plan for the North Coast Region (Basin Plan) is a regulatory tool used by the North Coast Regional Water Quality Control Board (Regional Water Board) to protect water quality within the North Coast Region. The Basin Plan is adopted by the NCRWQCB and approved by the State Water Resources Control Board; the water quality standards are approved by the United States Environmental Protection Agency (USEPA). Within the Basin Plan, beneficial uses of water, water quality objectives, including an antidegradation policy and plans for implementing

[1]{North Coast Regional Water Quality Control Board. 2018. "Water Quality Control Plan for the North Coast Region". Available: https://www.waterboards.ca.gov/northcoast/water_issues/programs/basin_plan/}

[2]{SWRCB Resolution No. 2018-0057 and "Amendment to the Policy for Water Quality Control For Recycled Water". Available: https://www.waterboards.ca.gov/board_decisions/adopted_orders/resolutions/2018/121118_7_final_amendment_oal.pdf}

protections are included. Table 2-1 of the Basin Plan designates the following beneficial uses for all groundwater (California North Coast Regional Water Quality Control Board 2018):

- Municipal and Domestic Supply (MUN)
- Agricultural Supply (AGR)
- Industrial Service Supply (IND)
- Native American Culture (CUL)

Potential beneficial uses of groundwater include:

- Industrial Process Supply (PRO)
- Aquaculture (AQUA)

For chemical constituents in waters with MUN beneficial uses, the Basin Plan specifies that no waters are to exceed the MCL in Title 22 of the California Code of Regulations (CCR). The Basin Plan also includes numeric water quality objectives, specifically for groundwaters in the Butte Valley hydrologic area.

A complete list of constituents, comparison concentrations and sources are listed in Table 2.

Water Quality Assessment

Data Sources

Water quality data was obtained from several databases and supplemented with data provided by local organizations and community members. The majority of the water quality data used in the assessment was sourced from the SWRCB's Groundwater Ambient Monitoring and Assessment Program (GAMA), a database containing datasets from agencies including the Department of Pesticide Regulation (DPR), Department of Water Resources (DWR), the State Water Board, Lawrence Livermore National Laboratory (LLNL) and the United States Geological Survey (USGS). Additional data in the Butte Valley Wildlife Area was directly provided by the California Department of Fish and Wildlife.

The datasets in GAMA with information in Butte Valley Groundwater Basin are:

- **The Public Water System Wells** dataset includes wells regulated by the State Water Board's Division of Drinking Water (DDW). This dataset includes information for active and inactive drinking water sources with 15 or more connections or more than 25 people per day.
- **National Water Information System (NWIS)**, a dataset provided by USGS with samples from water supply wells and reported quarterly to the State Water Board's data management system, GeoTracker.
- **Monitoring wells** regulated by the State Water Board includes wells under different regulatory programs, with data available for download through GeoTracker. There are monitoring wells in Butte Valley Basin for the following programs:

  - Leaking Underground Storage Tank (LUST) Cleanup sites
  - Cleanup Program Sites
  - Land Disposal Sites

- **GAMA's Priority Basin Project**, a State Water Board, USGS and LLNL initiative to assess groundwater quality statewide. Data primarily collected from public water system wells but private domestic, monitoring and irrigation wells are also sampled.
- **DWR's Water Data Library**, a dataset including groundwater quality and depth data with samples from multiple well types including irrigation, stock, domestic and public supply.
- **Department of Pesticide Regulation's Groundwater Protection program**, a compilation of information from DPR and other public agencies from domestic, public supply and irrigation wells.

Selection of Numeric Thresholds

Numeric thresholds are used with well data to evaluate groundwater quality. These numeric standards are selected to satisfy all relevant groundwater quality standards and objectives; the general selection approach used is consistent with recommendations by the State Water Board for determination of assessment thresholds for groundwater [Reference]. More than one water quality objective or standard may apply to a constituent and a prioritization process is used to select the numeric threshold value. Where available, the strictest value, of the federal and state regulated water quality standards, and water quality objectives specified in the Basin Plan, is used.

The following sources were used in establishing the numeric thresholds:

i) Basin Plan numeric water quality objectives

Specific groundwater quality objectives are defined in the Basin Plan for specific conductance, pH, hardness and boron. These limits are listed in Table 1 below.

ii) State and Federal Maximum Contaminant Levels (MCLs)

MCL-CA: State of California MCLs

MCL-US: Federal MCLs

Per the Basin Plan, groundwaters in the Butte Valley hydrologic area have a designated beneficial use as domestic or municipal water supply (MUN) beneficial use and must not exceed the maximum contaminant levels (MCLs) and secondary maximum contaminant levels (SMCLs) defined in Title 22 of the California Code of Regulations (CCR). The strictest value of the state and federal MCLs and SMCLs is used.

The complete list of constituents and corresponding sources and values for comparison concentrations used in the water quality analysis can be found in Table 2.

Table 1: Basin Plan Specific Water Quality Objectives for Groundwaters in the Butte Valley Hydrologic Area

Constituent	Limit Type	Value
Specific Conductance (mmhos) at 77 degrees F	90% Upper Limit	800
Specific Conductance (mmhos) at 77 degrees F	50% Upper Limit	400
pH	Maximum	8.5
pH	Minimum	6.5
Boron (mg/L)	90% Upper Limit	0.2
Boron (mg/L)	50% Upper Limit	0.1
Hardness (mg/L)	50% Upper Limit	120

[a] 90% upper and lower limits represent the 90 percentile values for a calendar year. 90% or more of the values must be less than or equal to an upper limit and greater than or equal to a lower limit

[b] 50% upper and lower limits represent the 50 percentile values of the monthly means for a calendar year. 50% or more of the monthly means must be less than or equal to an upper limit and greater than or equal to a lower limit

Table 2: Comparison concentrations and data sources for constituents used in the water quality assessment

Full Name	MCL	Units	Source
1,1 Dichloroethane (1,1 DCA)	5	ug/L	Title 22 Table 64444-A
1,1 Dichloroethylene (1,1 DCE)	6	ug/L	Title 22 Table 64444-A
1,1,1 Trichloroethane	200	ug/L	Title 22 Table 64444-A
1,1,2 Trichloro-1,2,2-Trifluoroethane (Freon 113)	1.2	mg/L	Title 22 Table 64444-A
1,1,2 Trichloroethane	5	ug/L	Title 22 Table 64444-A
1,1,2,2 Tetrachloroethane (PCA)	1	ug/L	Title 22 Table 64444-A
1,2 Dibromo-3-chloropropane (DBCP)	0.2	ug/L	Title 22 Table 64444-A
1,2 Dibromoethane (EDB)	0.05	ug/L	Title 22 Table 64444-A
1,2 Dichlorobenzene (1,2-DCB)	600	ug/L	Title 22 Table 64444-A
1,2 Dichloroethane (1,2 DCA)	0.5	ug/L	Title 22 Table 64444-A
1,2 Dichloropropane (1,2 DCP)	5	ug/L	Title 22 Table 64444-A
1,2,3 Trichloropropane (1,2,3 TCP)	0.005	ug/L	Title 22 Table 64444-A
1,2,4 Trichlorobenzene (1,2,4 TCB)	5	ug/L	Title 22 Table 64444-A
1,2,4 Trimethylbenzene	330	ug/L	NL
1,3 Dichlorobenzene	600	ug/L	US-HAL
1,3 Dichloropropene	0.5	ug/L	Title 22 Table 64444-A
1,3,5 Trimethylbenzene	330	ug/L	NL
1,4 Dichlorobenzene (p-DCB)	5	ug/L	Title 22 Table 64444-A
1,4 Dioxane	1	ug/L	HBSL
2 Chlorotoluene	140	ug/L	US-HAL
2,3,7,8 TCDD	0.00003	ug/L	MCL-US
2,4 Dichlorophenoxyacetic acid (2,4 D)	70	ug/L	Title 22 Table 64444-A
2,4,5 TP (Silvex)	50	ug/L	Title 22 Table 64444-A
2,4,6 Trinitrotoluene (TNT)	1	ug/L	US-HAL
4 Chlorotoluene	140	ug/L	HBSL
4,4’ DDD	0.1	ug/L	CA-CPF
4,4’ DDE	0.1	ug/L	CA-CPF
4,4’ DDT	0.1	ug/L	CA-CPF
Acetone	6300	ug/L	RfD
Alachlor	2	ug/L	Title 22 Table 64444-A
Aldicarb	7	ug/L	HBSL
Aldicarb Sulfone	7	ug/L	HBSL
Aldicarb sulfoxide	7	ug/L	HBSL
Alpha-Benzene Hexachloride (Alpha-BHC)	0.15	ug/L	CA-Prop65
Aluminum	200	ug/L	Title 22 Table 64449-A
Ammonia	30	mg/L	US-HAL
Antimony	6	ug/L	Title 22 Table 64431-A
Arsenic	10	ug/L	Title 22 Table 64431-A
Asbestos	7	MFL	Title 22 Table 64431-A
Atrazine	1	ug/L	Title 22 Table 64444-A
Azinphos Ethyl	10	ug/L	HBSL
Barium	1	mg/L	Title 22 Table 64431-A

Continued on next page

Table 2: Comparison concentrations and data sources for constituents used in the water quality assessment

Full Name	MCL	Units	Source
Bensulfuron Methyl	1000	ug/L	HBSL
Bentazon	18	ug/L	Title 22 Table 64444-A
Benzene	1	ug/L	Title 22 Table 64444-A
Benzo(a)pyrene	0.2	ug/L	Title 22 Table 64444-A
Beryllium	4	ug/L	Title 22 Table 64431-A
Beta-Benzene Hexachloride (Beta-BHC)	0.25	ug/L	CA-Prop65
Boron	0.1 (50% UL), 0.2 (90% UL)	mg/L	Basin Plan Table 3-1
Bromacil	70	ug/L	US-HAL
Bromate	10	ug/L	MCL-US
Bromodichloromethane (THM)	80	ug/L	MCL
Bromoform (THM)	80	ug/L	MCL
Cadmium	5	ug/L	Title 22 Table 64431-A
Carbaryl (1-naphthyl methylcarbamate)	40	ug/L	HBSL
Carbofuran	18	ug/L	Title 22 Table 64444-A
Carbon Disulfide	160	ug/L	HBSL
Carbon Tetrachloride	0.5	ug/L	Title 22 Table 64444-A
Chlorate	800	ug/L	NAS-HAL
Chlordane	0.1	ug/L	Title 22 Table 64444-A
Chloride	500	mg/L	Title 22 Table 64449-B
Chlorite	1	mg/L	MCL-US
Chlorobenzene	70	ug/L	Title 22 Table 64444-A
Chloroform (THM)	80	ug/L	MCL
Chloropicrin	12	ug/L	NAS-HAL
Chromium	50	ug/L	Title 22 Table 64431-A
Chromium, Hexavalent (Cr6)	20	ug/L	HBSL
cis-1,2 Dichloroethylene	6	ug/L	Title 22 Table 64444-A
Copper	1	mg/L	Title 22 Table 64449-A
Cyanazine	0.3	ug/L	HBSL
Cyanide (CN)	150	ug/L	Title 22 Table 64431-A
Cypermethrin	40	ug/L	HBSL
Dacthal	70	ug/L	HBSL
Dalapon	200	ug/L	Title 22 Table 64444-A
Deethylatrazine	50	ug/L	CA-Prop65
Di(2-ethylhexyl)adipate	0.4	mg/L	Title 22 Table 64444-A
Di(2-ethylhexyl)phthalate (DEHP)	4	ug/L	Title 22 Table 64444-A
Diazinon	1.2	ug/L	HBSL
Dibromochloromethane (THM)	80	ug/L	MCL
Dicamba	210	ug/L	RfD
Dichlorodifluoromethane	1	mg/L	HBSL
Dichloromethane (Methylene Chloride)	5	ug/L	Title 22 Table 64444-A
Dichlorprop	300	ug/L	HBSL
Dichlorvos (DDVP)	0.4	ug/L	HBSL

Continued on next page

Table 2: Comparison concentrations and data sources for constituents used in the water quality assessment

Full Name	MCL	Units	Source
Dieldrin	0.002	ug/L	HBSL
Diesel	100	ug/L	US-HAL
Dimethoate	2	ug/L	HBSL
Dinoseb	7	ug/L	Title 22 Table 64444-A
Diquat	20	ug/L	Title 22 Table 64444-A
Diuron	2	ug/L	HBSL
Endosulfan I	42	ug/L	RfD
Endosulfan II	42	ug/L	RfD
Endosulfan Sulfate	42	ug/L	RfD
Endothall	100	ug/L	Title 22 Table 64444-A
Endrin	2	ug/L	Title 22 Table 64444-A
EPTC	200	ug/L	HBSL
Ethylbenzene	300	ug/L	Title 22 Table 64444-A
Ethylene glycol	14	mg/L	US-HAL
Fecal Coliform (bacteria)	0.99	Count	MCL
Fenamiphos	0.7	ug/L	HBSL
Fluoride	2	mg/L	Title 22 Table 64431-A
Foaming Agents (MBAS)	0.5	mg/L	Title 22 Table 64449-A
Fonofos	10	ug/L	HBSL
Formaldehyde	100	ug/L	US-HAL
Gasoline	5	ug/L	US-HAL
Glyphosate (Round-up)	700	ug/L	MCL-US
Gross Alpha radioactivity	15	pCi/L	Title 22 Table 64442
Gross beta	50	pCi/L	MCL-US
Guthion (Azinphos Methyl)	10	ug/L	HBSL
Heptachlor	0.01	ug/L	Title 22 Table 64444-A
Heptachlor Epoxide	0.01	ug/L	Title 22 Table 64444-A
Hexachlorobenzene (HCB)	1	ug/L	MCL-US
Hexachlorobutadiene	0.9	ug/L	HBSL
Hexachlorocyclopentadiene	50	ug/L	Title 22 Table 64444-A
Hexazinone	400	ug/L	HBSL
Iodide	1190	ug/L	NAS-HAL
Iprodione	0.8	ug/L	HBSL
Iron	300	ug/L	Title 22 Table 64449-A
Isopropylbenzene (Cumene)	770	ug/L	HBSL
Kerosene	100	ug/L	US-HAL
Lead	15	ug/L	AL
Lindane (Gamma-BHC)	0.2	ug/L	Title 22 Table 64444-A
Linuron	5	ug/L	HBSL
Malathion	500	ug/L	HBSL
Manganese	50	ug/L	Title 22 Table 64449-A
Mercury	2	ug/L	Title 22 Table 64431-A
Metalaxyl	500	ug/L	HBSL

Continued on next page

Table 2: Comparison concentrations and data sources for constituents used in the water quality assessment

Full Name	MCL	Units	Source
Methomyl	200	ug/L	HBSL
Methoxychlor	30	ug/L	Title 22 Table 64444-A
Methyl Bromide (Bromomethane)	10	ug/L	US-HAL
Methyl Isobutyl Ketone (MIBK)	120	ug/L	NL
Metolachlor	700	ug/L	HBSL
Metribuzin	90	ug/L	HBSL
Molinate	20	ug/L	Title 22 Table 64444-A
Molybdenum	40	ug/L	US-HAL
MTBE (Methyl-tert-butyl ether)	5	ug/L	Title 22 Table 64449-A
Naled	10	ug/L	HBSL
Naphthalene	17	ug/L	HBSL
Napropamide	800	ug/L	HBSL
n-Butylbenzene	260	ug/L	NL
Nickel	100	ug/L	Title 22 Table 64431-A
Nitrate as N	10	mg/L	Title 22 Table 64431-A
Nitrate+Nitrite	10	mg/L	Title 22 Table 64431-A
Nitrite as N	1	mg/L	Title 22 Table 64431-A
N-Nitrosodiethylamine (NDEA)	0.01	ug/L	CA-CPF
N-Nitrosodimethylamine (NDMA)	0.01	ug/L	CA-CPF
N-Nitrosodi-N-Propylamine (NDPA)	0.01	ug/L	CA-CPF
Norflurazon	10	ug/L	HBSL
n-Propylbenzene (Isocumene)	260	ug/L	NL
Octogen (HMX)	0.35	mg/L	US-HAL
Oxamyl	50	ug/L	Title 22 Table 64444-A
Oxyfluorfen	20	ug/L	HBSL
Parathion	0.02	ug/L	HBSL
PCNB	21	ug/L	RfD
Pentachlorophenol (PCP)	1	ug/L	MCL-US
Perchlorate	6	ug/L	Title 22 Table 64431-A
Perfluorooctanoic acid	5.1	ng/L	US-HAL
Perfluorooctanoic sulfonate	6.5	ng/L	NL
Permethrin	4	ug/L	HBSL
pH	6.5-8.5	-log[H+]	Basin Plan Table 3-1
Phorate	4	ug/L	HBSL
Picloram	0.5	mg/L	Title 22 Table 64444-A
Polychlorinated Biphenyls (PCBs)	0.5	ug/L	MCL-US
Prometon	400	ug/L	HBSL
Prometryn	300	ug/L	HBSL
Propachlor (2-Chloro-N-isopropylacetanilide)	90	ug/L	HBSL
Propanil	6	ug/L	HBSL
Propargite	1	ug/L	HBSL
Radium 226	5	pCi/L	Title 22 Table 64442
Radium 228	5	pCi/L	Title 22 Table 64442

Continued on next page

Table 2: Comparison concentrations and data sources for constituents used in the water quality assessment

Full Name	MCL	Units	Source
Radon 222	4000	pCi/L	MCL-US
RDX (hexahydro-1,3,5-trinitro-1,3,5-triazine)	0.3	mg/L	US-HAL
sec-Butylbenzene	260	ug/L	NL
Selenium	50	ug/L	Title 22 Table 64431-A
Silver	100	ug/L	Title 22 Table 64449-A
Simazine	4	ug/L	Title 22 Table 64444-A
Sodium	50	mg/L	AL
Specific Conductivity	400 (50% UL) - 800 (90% UL)	umhos	Basin Plan Table 3-1
Strontium	4000	ug/L	US-HAL
Strontium 90	8	pCi/L	Title 22 Table 64443
Styrene	100	ug/L	Title 22 Table 64444-A
Sulfate	500	mg/L	Title 22 Table 64449-B
tebuthiuron	1000	ug/L	HBSL
tert-Butyl alcohol (TBA)	12	ug/L	NL
tert-Butylbenzene	260	ug/L	NL
Tetrachloroethene (PCE)	5	ug/L	Title 22 Table 64444-A
Thallium	2	ug/L	Title 22 Table 64431-A
Thiabendazole	231	ug/L	HHBP
Thiobencarb	1	ug/L	Title 22 Table 64449-A
Toluene	150	ug/L	Title 22 Table 64444-A
Total Coliform Bacteria	0.99	Count	MCL
Total Dissolved Solids	1000	mg/L	Title 22 Table 64449-B
Total Trihalomethanes	80	ug/L	MCL-US
Toxaphene	3	ug/L	Title 22 Table 64444-A
trans-1,2, Dichloroethylene	10	ug/L	Title 22 Table 64444-A
Trichlopyr	400	ug/L	HBSL
Trichloroethene (TCE)	5	ug/L	Title 22 Table 64444-A
Trichlorofluoromethane (Freon 11)	150	ug/L	Title 22 Table 64444-A
Trifluralin	20	ug/L	HBSL
Tritium	20000	pCi/L	Title 22 Table 64443
Uranium	20	pCi/L	Title 22 Table 64442
Vanadium	50	ug/L	RfD
Vinyl Chloride	0.5	ug/L	Title 22 Table 64444-A
Warfarin	2	ug/L	HBSL
Xylene, Isomers m & p	1750	ug/L	Title 22 Table 64444-A
Xylenes (total)	1750	ug/L	Title 22 Table 64444-A
Zinc	5	mg/L	Title 22 Table 64449-A

Rank	Comparison Concentration	Description
1	Basin Plan / Title 22	Basin Plan Groundwater Requirements in Table 3-1 and specific Title 22 tables
2	MCL-CA	California drinking water maximum contaminant level
3	MCL-US	Federal drinking water maximum contaminant level
4	AL-US	Federal Action Level
5	HBSL	Cancer or non-cancer Health Based Screening Level
6	HHBP	Chronic non-cancer Human Health Benchmark for Pesticides
7	US-HAL	Federal Health Advisory Level
8	RfD	Reference Dose as a drinking water level
9	NAS-HAL	National Academy of Science Health Advisory Level
10	CA-CPF	California Cancer Potency Factor
11	CA-Prop. 65	California Proposition 65 Safe Harbor Levels as a drinking water level
12	SMCL	Secondary MCL
13	NL	Notification Level

Calculations

Specific water quality objectives for the Butte Valley hydrologic area groundwaters, as defined in the Basin Plan, have specific limits and calculation requirements associated with specific conductance, hardness and boron. Per the Basin Plan, the 50% upper limit and 90% upper limit are defined as follows:

- 50% upper limits represent “the 50 percentile values of the monthly means for a calendar year. 50% or more of the monthly means must be less than or equal to an upper limit and greater”

- 90% upper limits represent “the 90 percentile values for a calendar year. 90% or more of the values must be equal to an upper limit and greater than or equal to a lower limit”.

The monthly means of specific conductance and boron measurements were compared to the 50% and 90% upper limits.

Filtering Process

To analyze groundwater quality, several filters were applied for relevance and quality. Though groundwater quality data for the Basin is available from 1952, data was limited to only include information collected in the past 30 years. Restricting the timespan from which data was collected increases confidence in data collection methods and quality of the data and focuses on information that is reflective of current groundwater quality conditions.

Groundwater quality for each constituent was analyzed by comparing the well data to the corresponding comparison concentration. Maps showing the location of wells where samples were collected were generated for each constituent. The maximum concentration sampled at each well is displayed on the map as one of the following groups:

a) Not detected
b) Detected but below half of the comparison concentration
c) Detected and above half of the comparison concentration
d) Above the comparison concentration

The number of samples in each category is displayed in the map's legend. Two iterations of map generation were conducted with the following scenarios:

1. Data is limited to those collected in the past 30 years only (1989-2019)
2. Data is limited to wells that have more than one data point in the past 30 years (1989-2019)

For the second scenario, where data is limited to wells that have more than one data point in the past 30 years, timeseries are generated for each constituent and well to identify changes over time in groundwater quality at a location.

The following sections contain the maps produced from these analyses.

Results

Constituents of Concern (COCs)

Constituents of Concern (COCs) were identified based on visual identification of potential groundwater quality issues using the maps generated in this assessment, identification of common constituents of concern, and through discussion with stakeholders. Resulting from this analysis and discussion with stakeholders, the full list of constituents of concern (COCs) were:

1. Arsenic
2. Boron
3. Benzene
4. 1,2 Dibromoethane (EDB)
5. Nitrate as N
6. Specific Conductivity

A series of maps for each COC, with water quality data from the past 30 years (1990-2020), show the location of tested wells and whether the maximum concentration ever recorded in that well has exceeded the MCL. In Butte Valley, the water quality source database categorized some wells as either municipal or monitoring. Municipal wells are a public supply well related to a city or town. Monitoring wells are used for monitoring groundwater, such as for site cleanup programs or Irrigated Lands Regulatory Program. Time series graphs included in this section plot the concentration of the COC versus time for applicable wells. For easy visual assessment, each graph only includes seven wells. Multiple graphs were created for each constituent and are arranged from the maximum sampled concentration in each well, to the lowest.

Figure 1 shows all wells that have been tested for Total Arsenic, even if only one monitoring event has occurred. Figure 2 filters the wells for those with two or more monitoring events. In the past 30 years, two wells in the northeast section of the valley have high concentrations. Timeseries of wells

in Figure 2 show that the affected municipal well has decreasing arsenic concentrations (Figure 3). Figure 4 shows a number of high Dissolved Boron wells, though many of these wells have only one monitoring event and a trend analysis cannot be completed. Figure 5 has two high boron wells available for trend analysis. The two wells have decreasing or steady boron concentrations (Figure 3). High benzene in Butte Valley is associated with cleanup sites near Dorris (Figure 7 and Figure 8). The timeseries graphs show that benzene concentrations have been decreasing over time (Figure 9, Figure 10, and Figure 11). High 1,2-Dibromoethane appears in the same well cluster with the high benzene (Figure 12 and Figure 13). 1,2-Dibromoethane concentrations are either decreasing or not detected (Figure 14, Figure 15, and Figure 16). Nitrate is elevated in the south part of the valley (Figure 17 and Figure 18). The timeseries show that nitrate concentrations have been generally decreasing through time (Figure 19 and Figure 20). Specific conductivity is low compared to the 90% Upper Limit defined by the Basin Plan (Figure 21 and Figure 22). The timeseries graphs show that specific conductivity is relatively stable but higher than the 50% Upper Limit defined by the Basin Plan (Figure 23 and Figure 24).

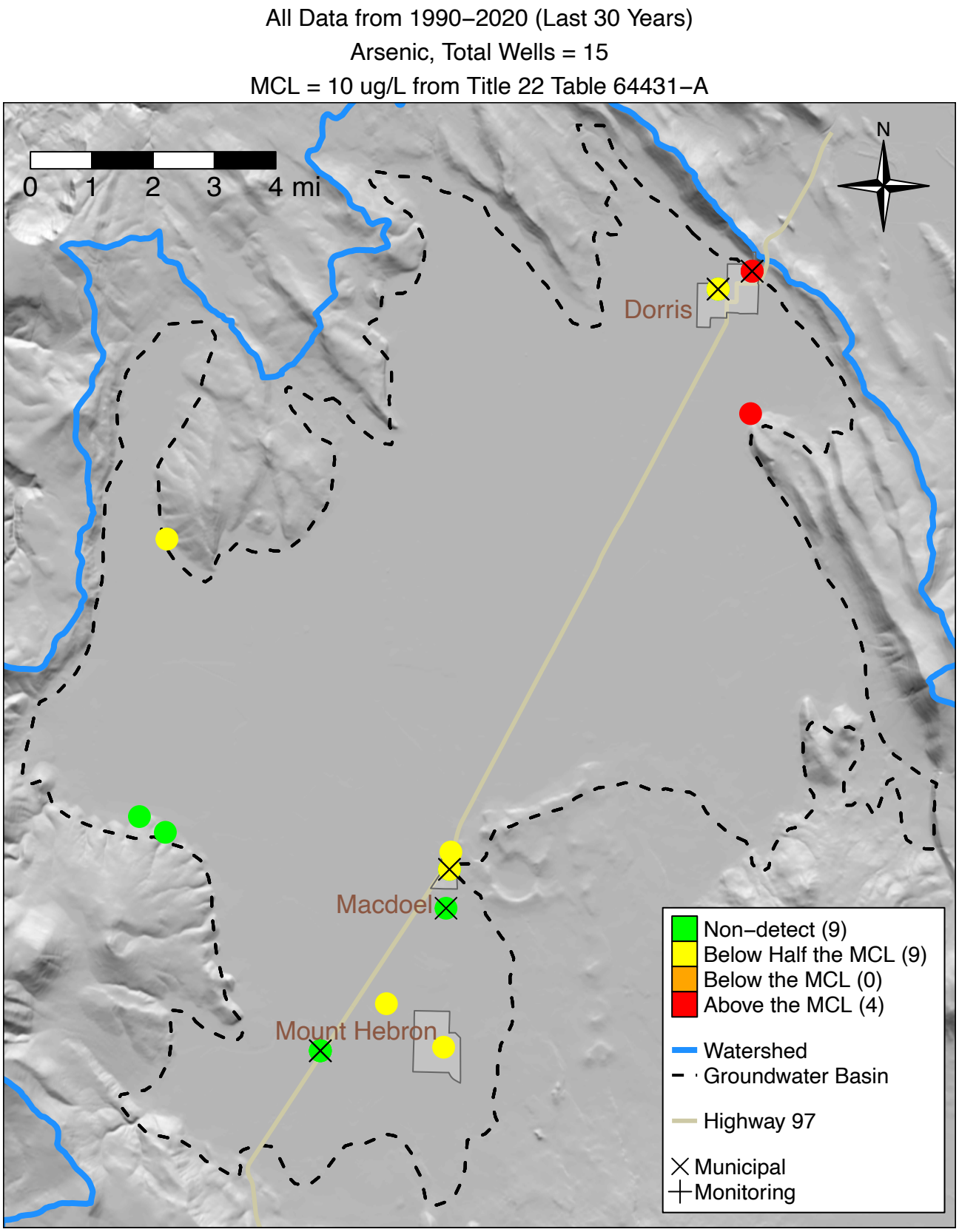


Figure 1: Groundwater Quality Observations of the Constituent Short List

Wells with two or more monitoring events, from 1990–2020 (Last 30 Years)
Arsenic, Total Wells = 4
MCL = 10 ug/L from Title 22 Table 64431–A

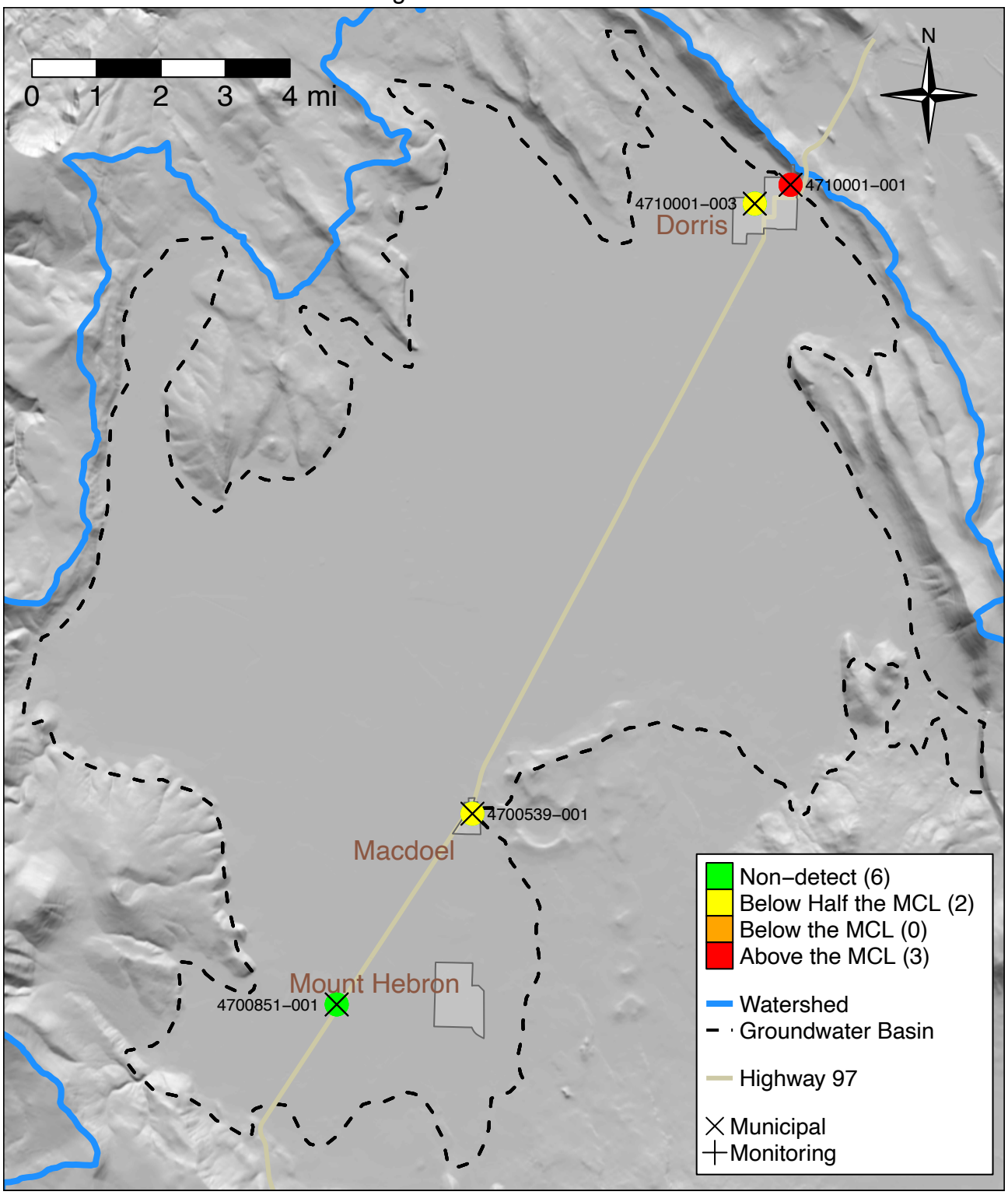


Figure 2: Filtered Groundwater Quality Observations of the Constituent Short List

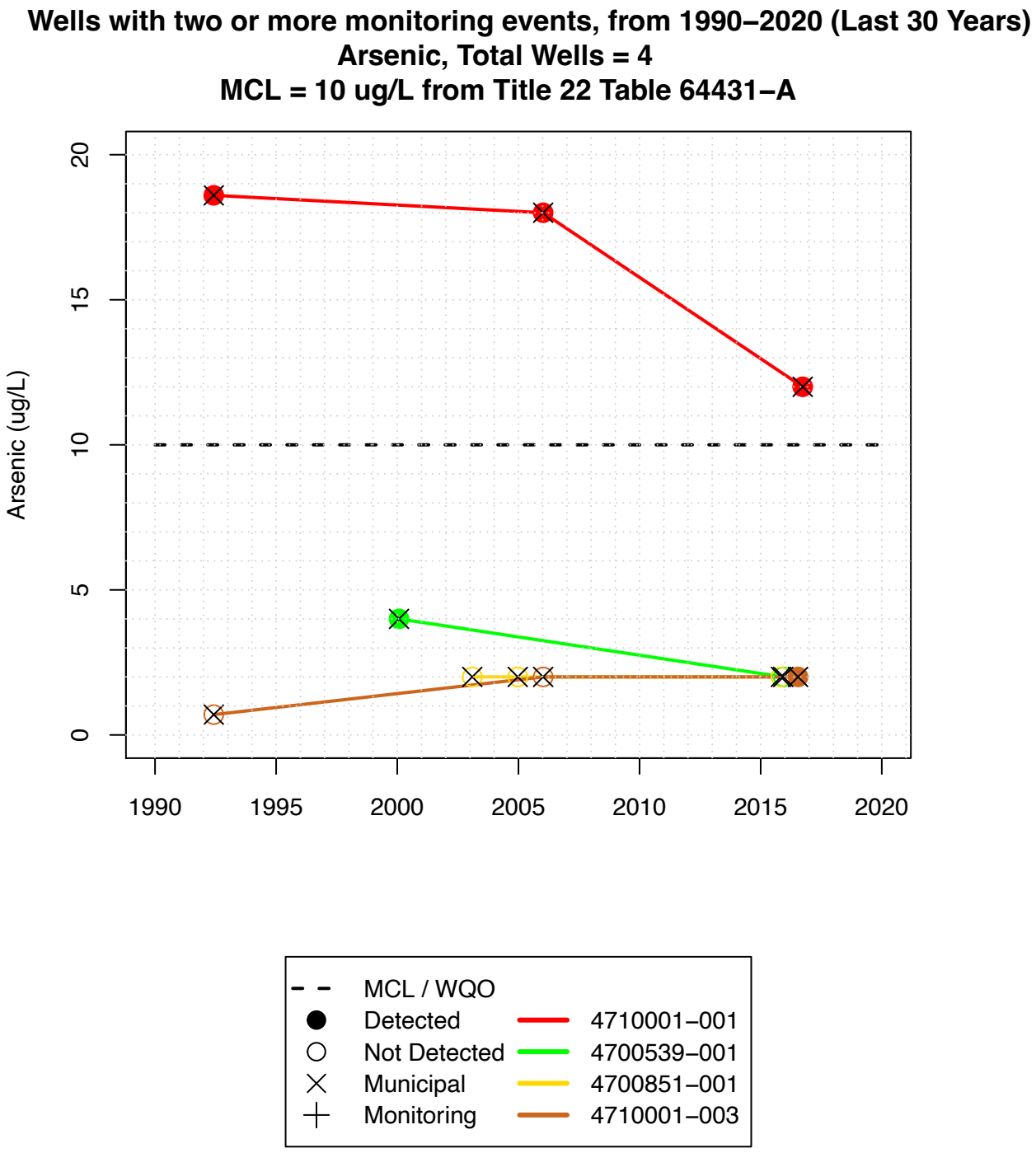


Figure 3: Filtered Groundwater Quality Observations of the Constituent Short List

All Data from 1990–2020 (Last 30 Years)
Boron, Total Wells = 19
WQO = 0.1 (50% UL), 0.2 (90% UL) mg/L from Basin Plan Table 3–1

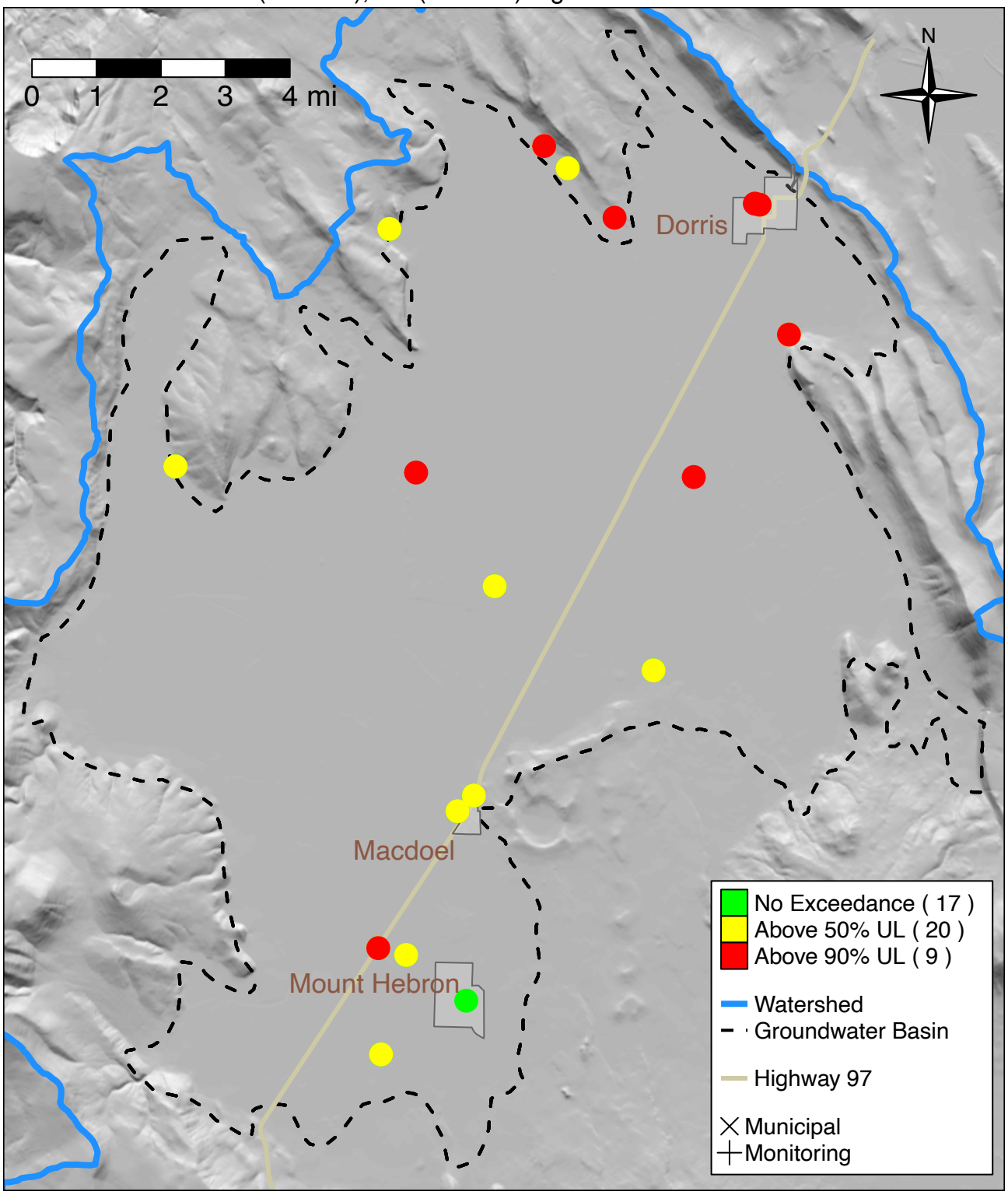


Figure 4: Groundwater Quality Observations of the Constituent Short List

Wells with two or more monitoring events, from 1990–2020 (Last 30 Years)
Boron, Total Wells = 7
WQO = 0.1 (50% UL), 0.2 (90% UL) mg/L from Basin Plan Table 3–1

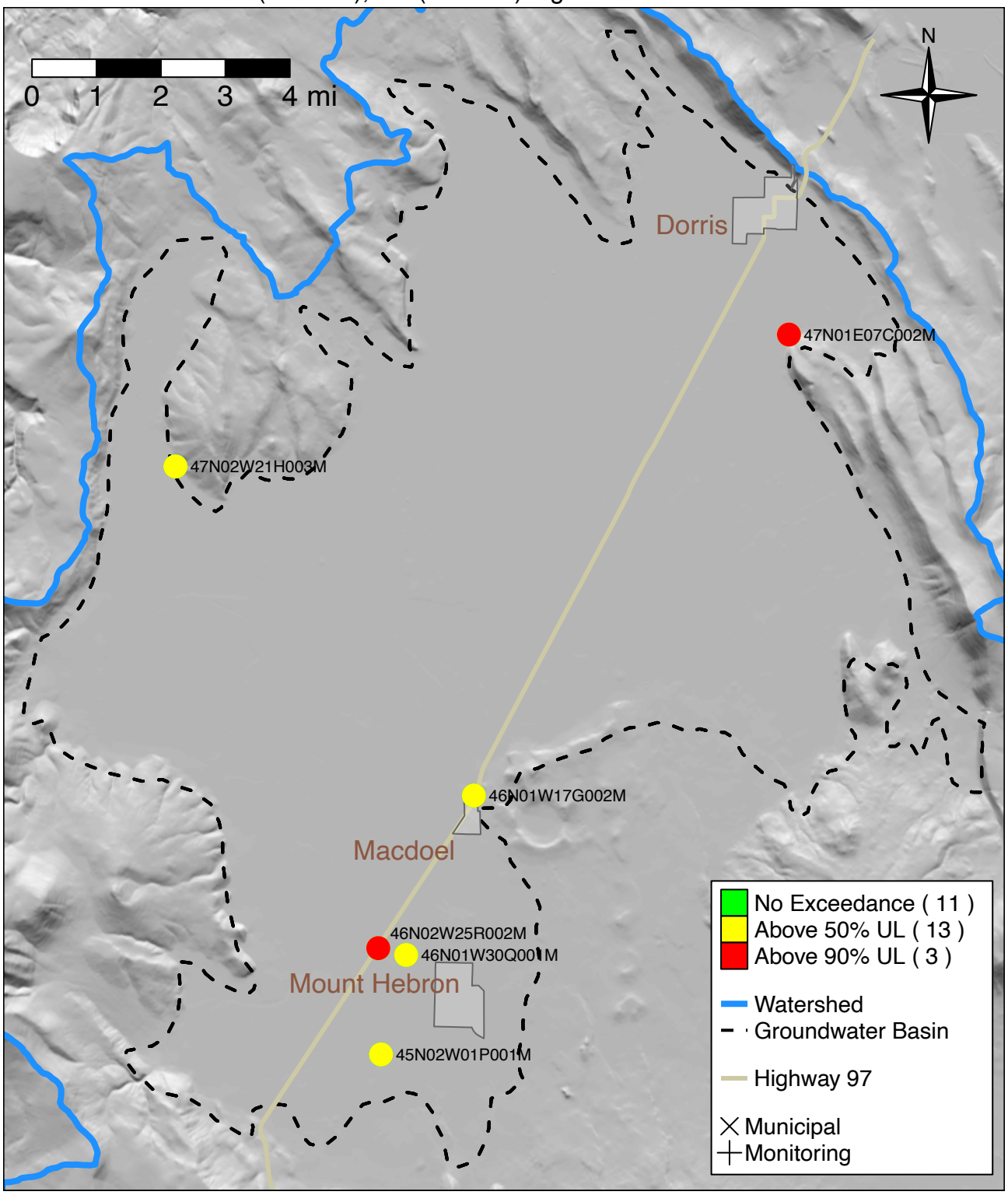


Figure 5: Filtered Groundwater Quality Observations of the Constituent Short List

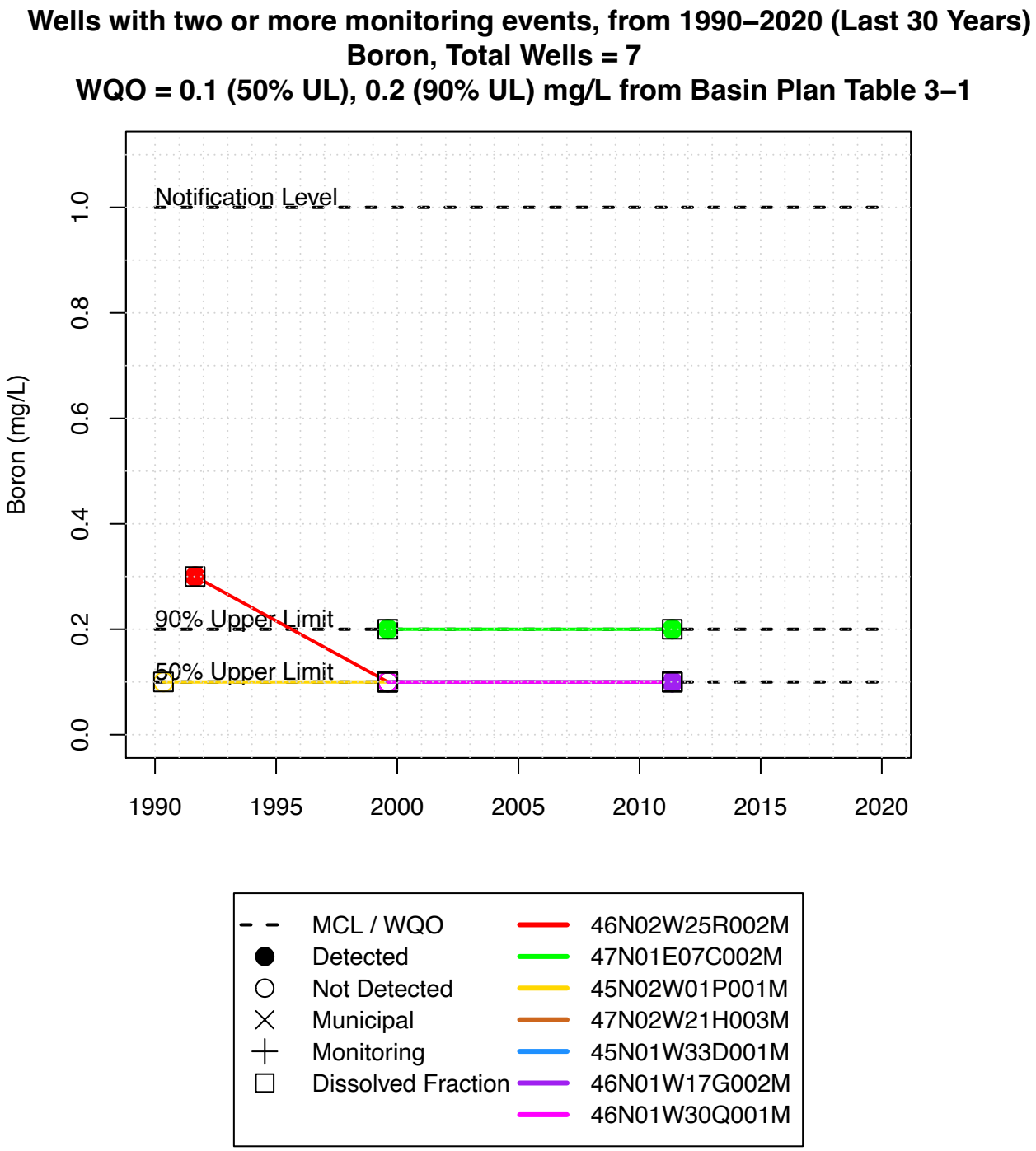


Figure 6: Filtered Groundwater Quality Observations of the Constituent Short List

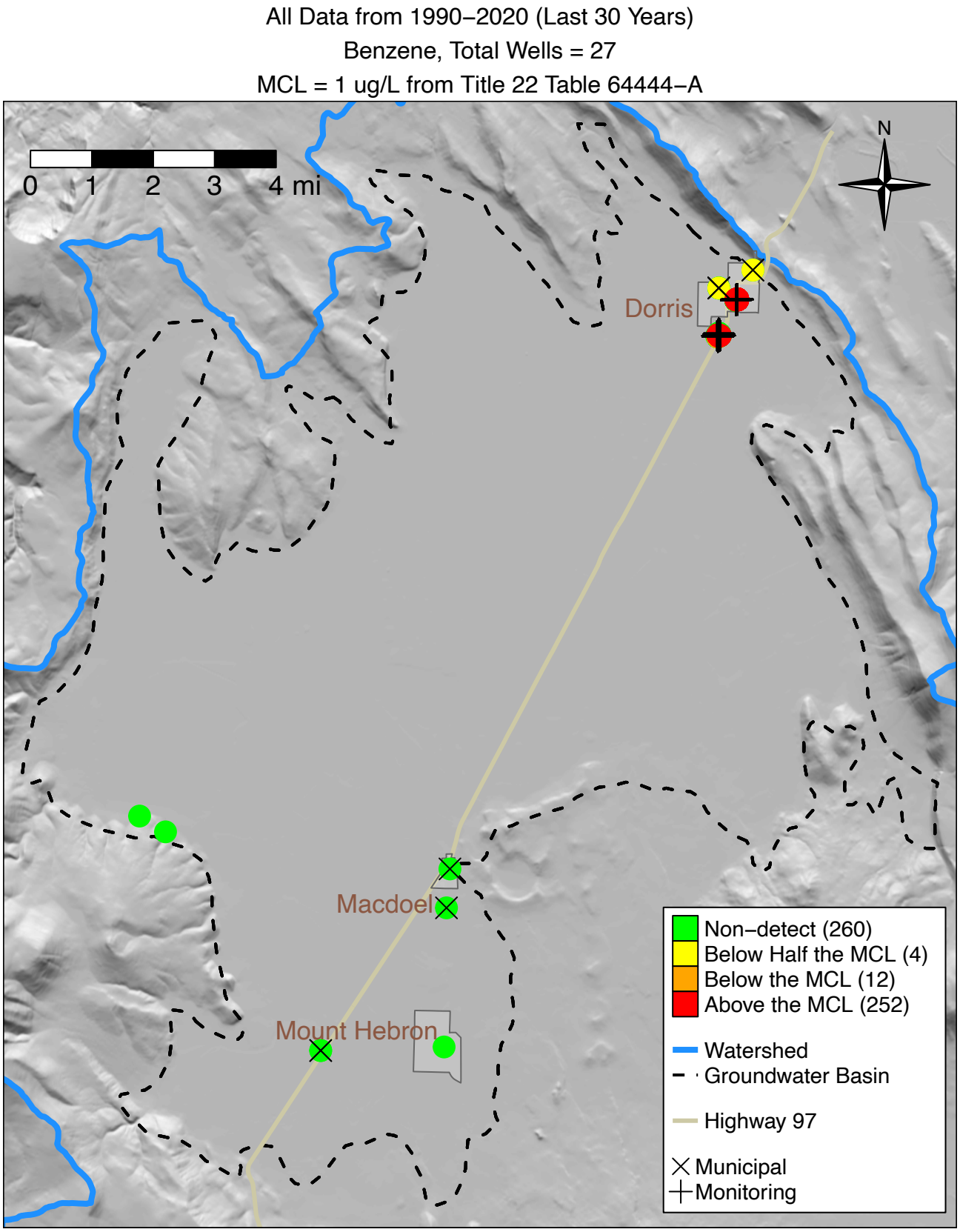


Figure 7: Groundwater Quality Observations of the Constituent Short List

Wells with two or more monitoring events, from 1990–2020 (Last 30 Years)
Benzene, Total Wells = 20
MCL = 1 ug/L from Title 22 Table 64444–A

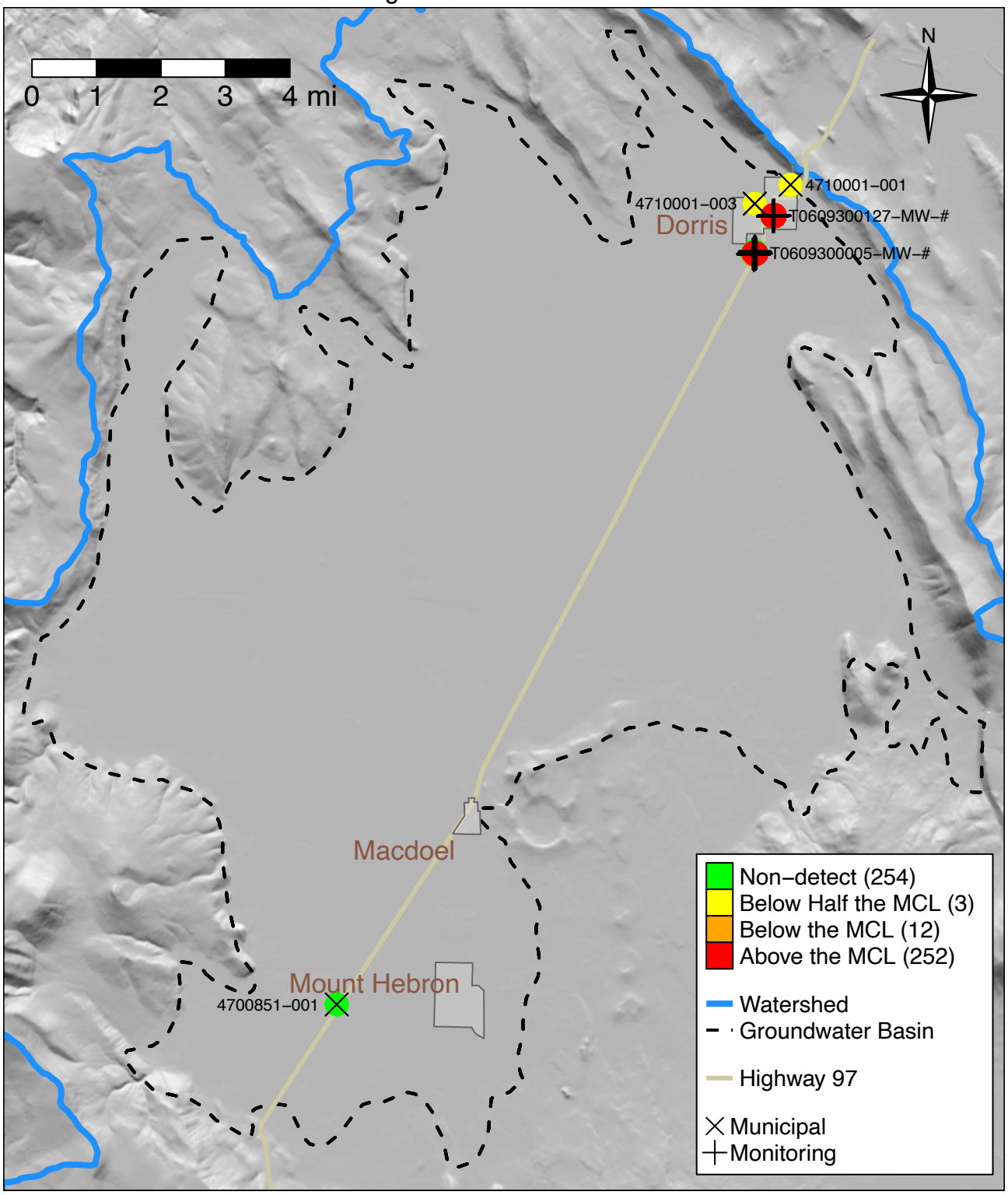


Figure 8: Filtered Groundwater Quality Observations of the Constituent Short List

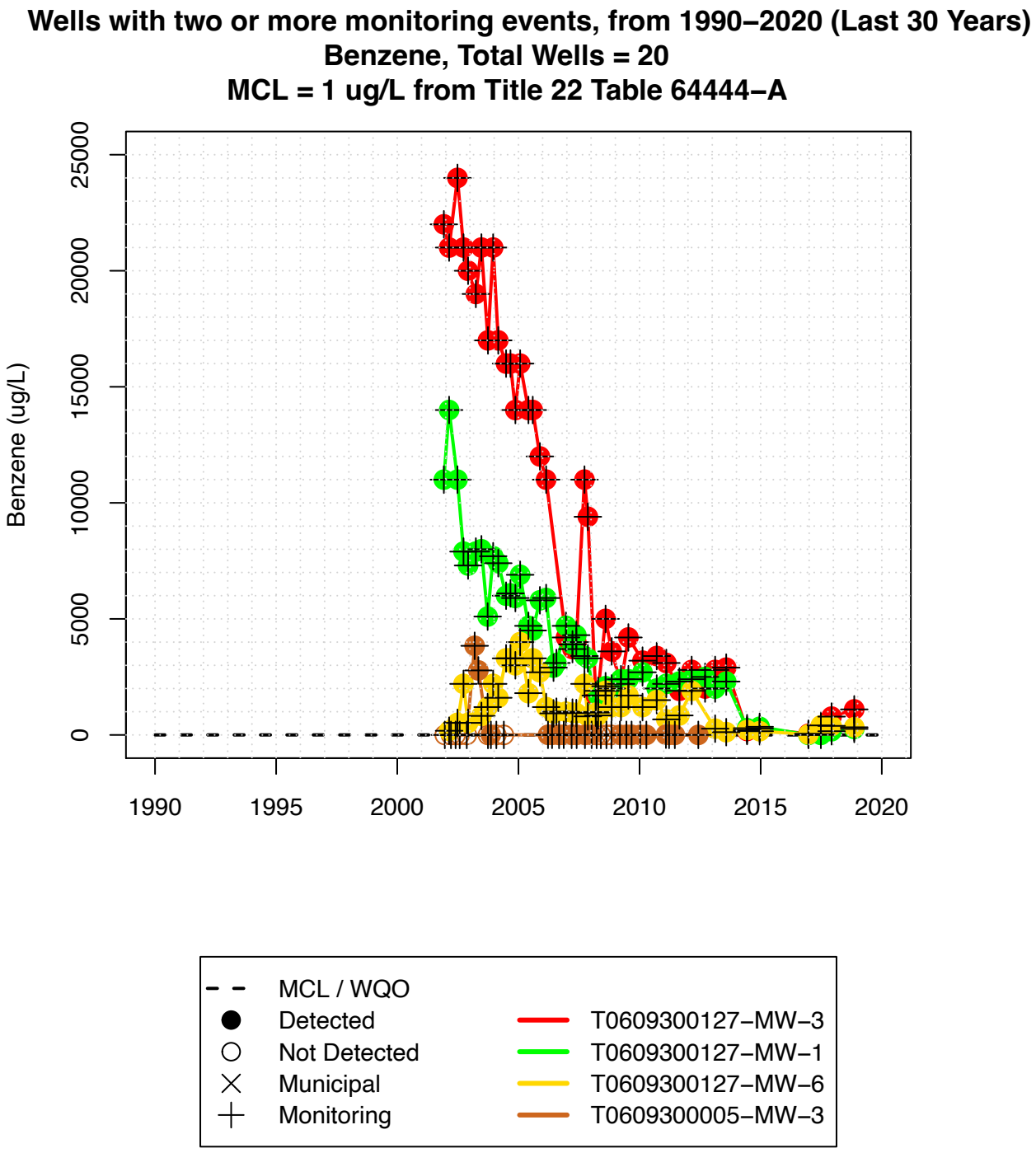


Figure 9: Filtered Groundwater Quality Observations of the Constituent Short List

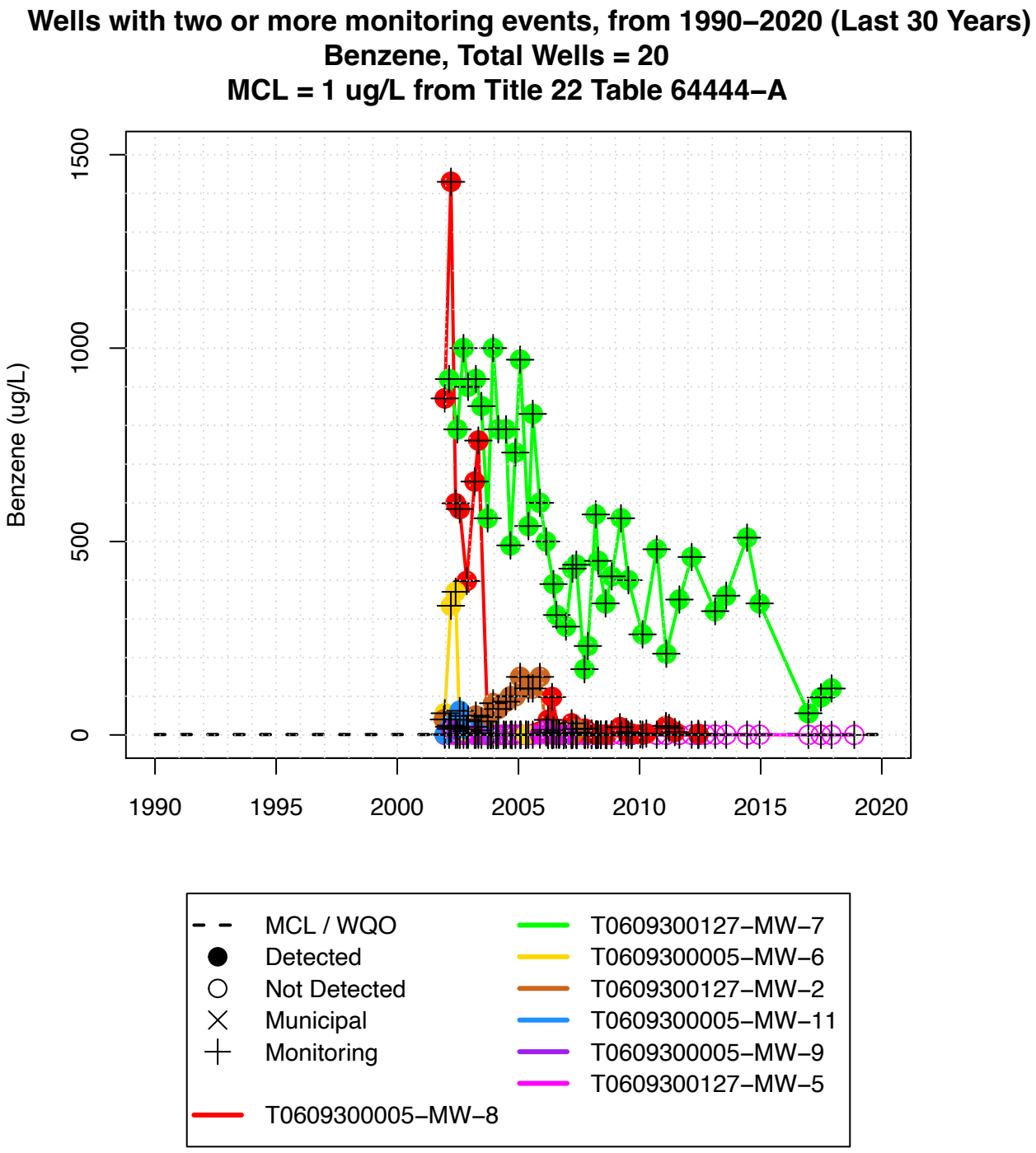


Figure 10: Filtered Groundwater Quality Observations of the Constituent Short List

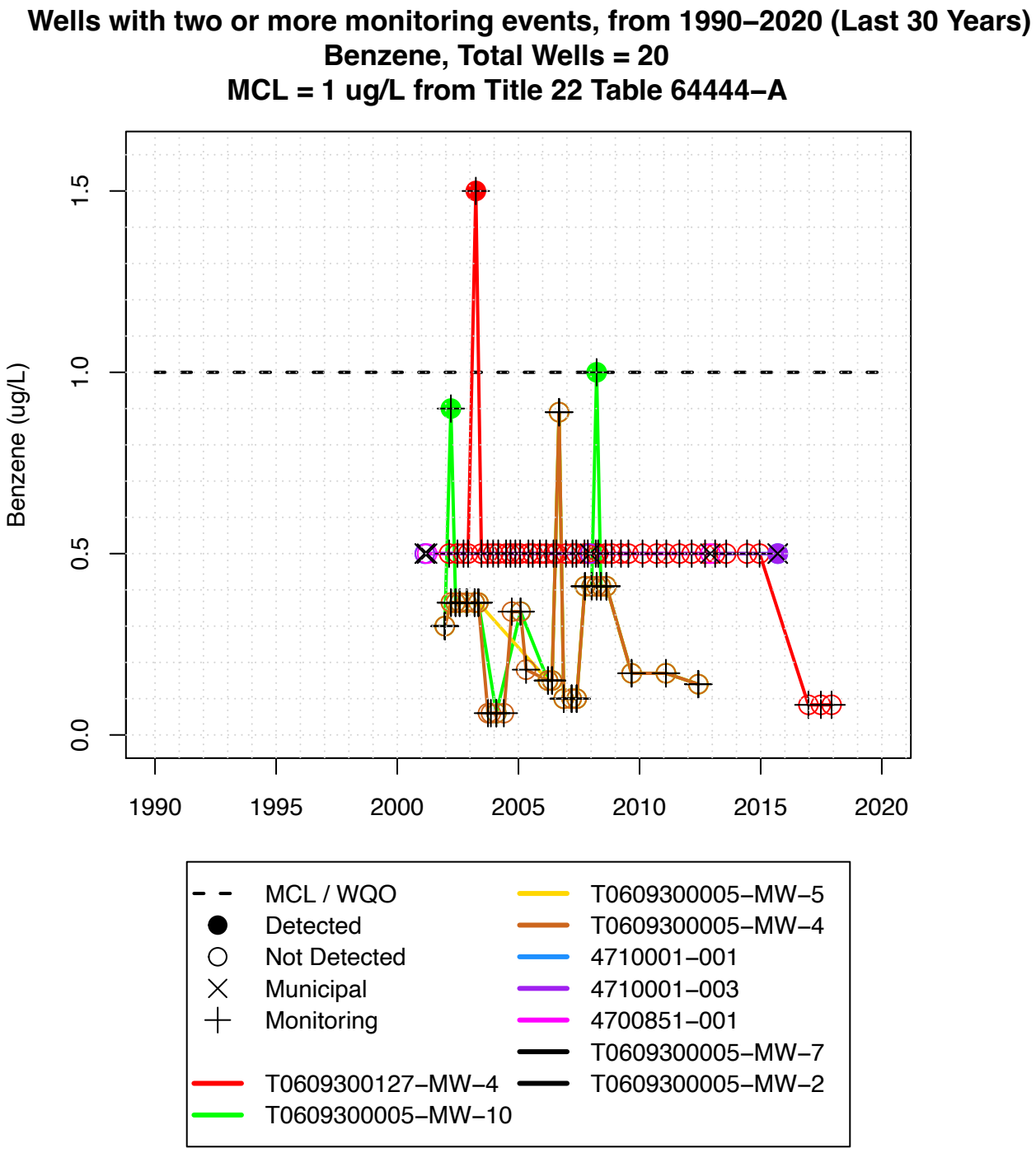


Figure 11: Filtered Groundwater Quality Observations of the Constituent Short List

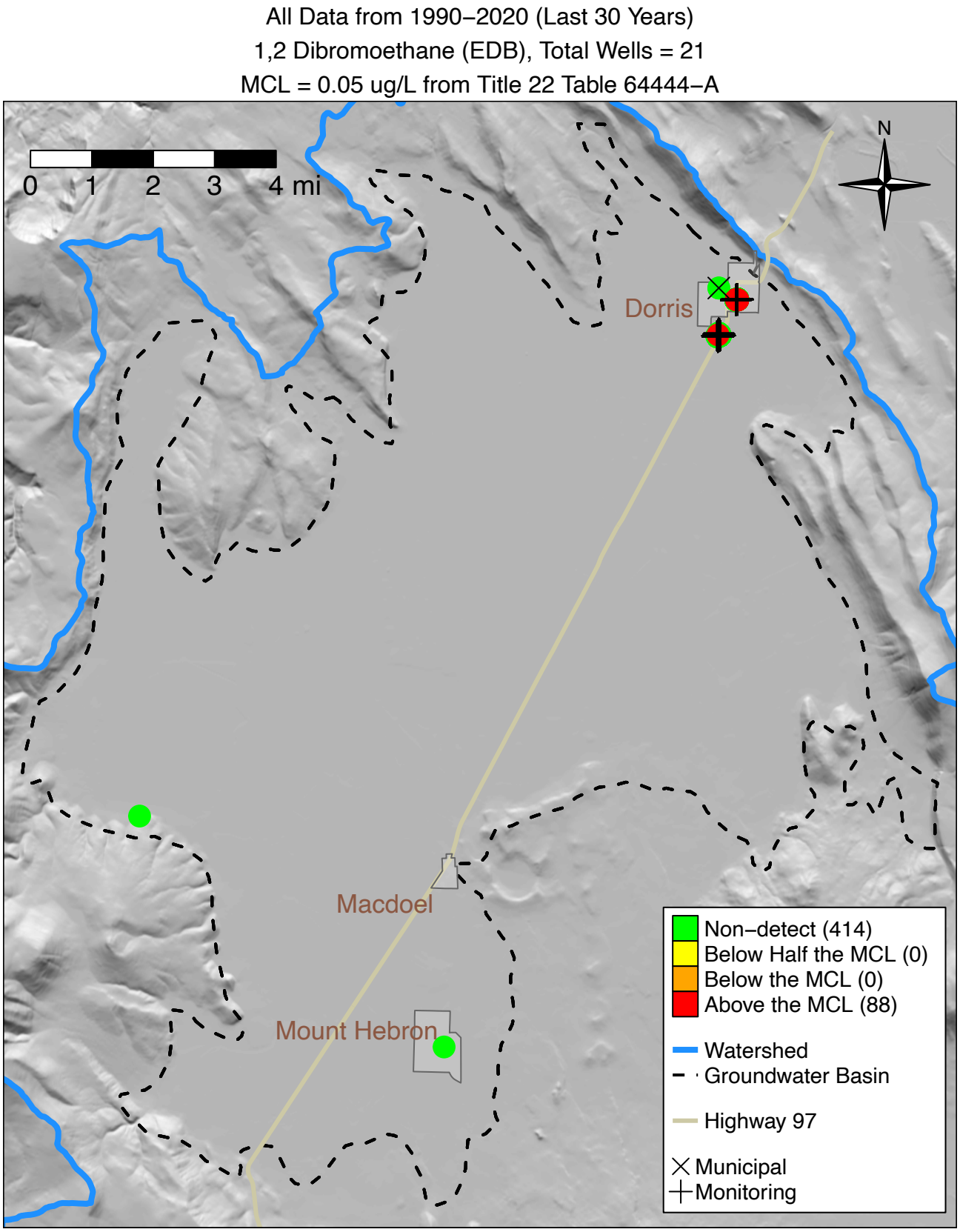


Figure 12: Groundwater Quality Observations of the Constituent Short List

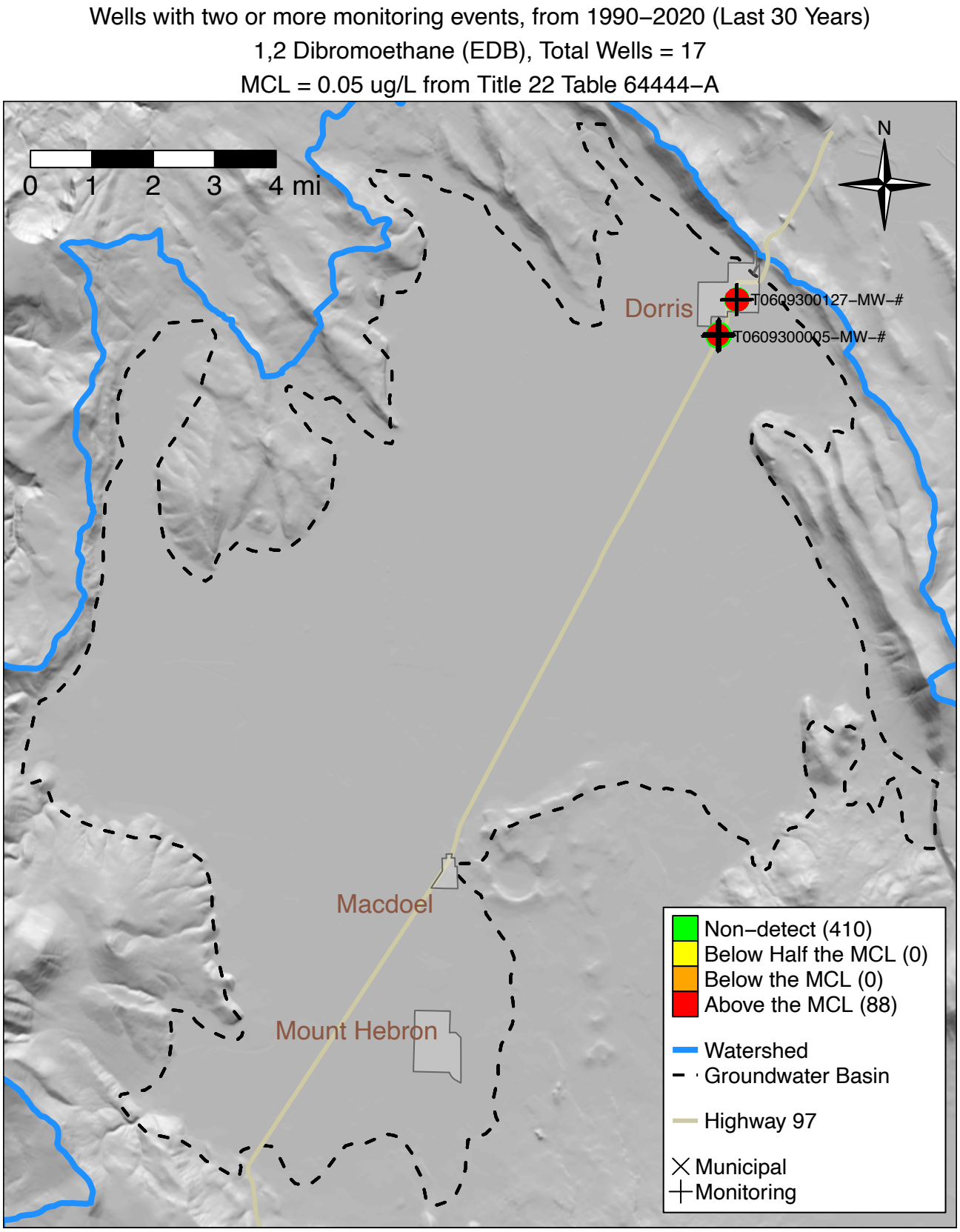


Figure 13: Filtered Groundwater Quality Observations of the Constituent Short List

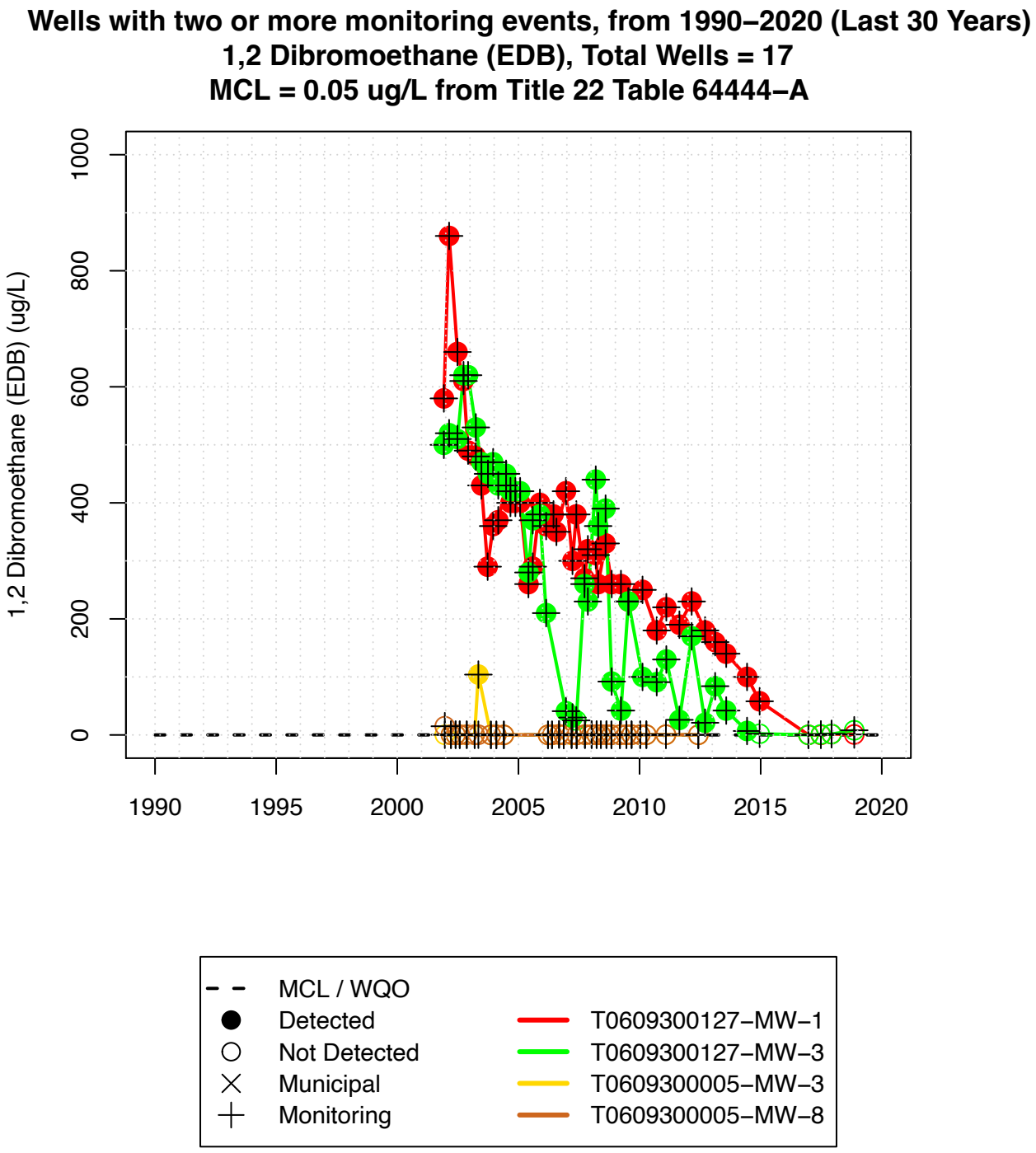


Figure 14: Filtered Groundwater Quality Observations of the Constituent Short List

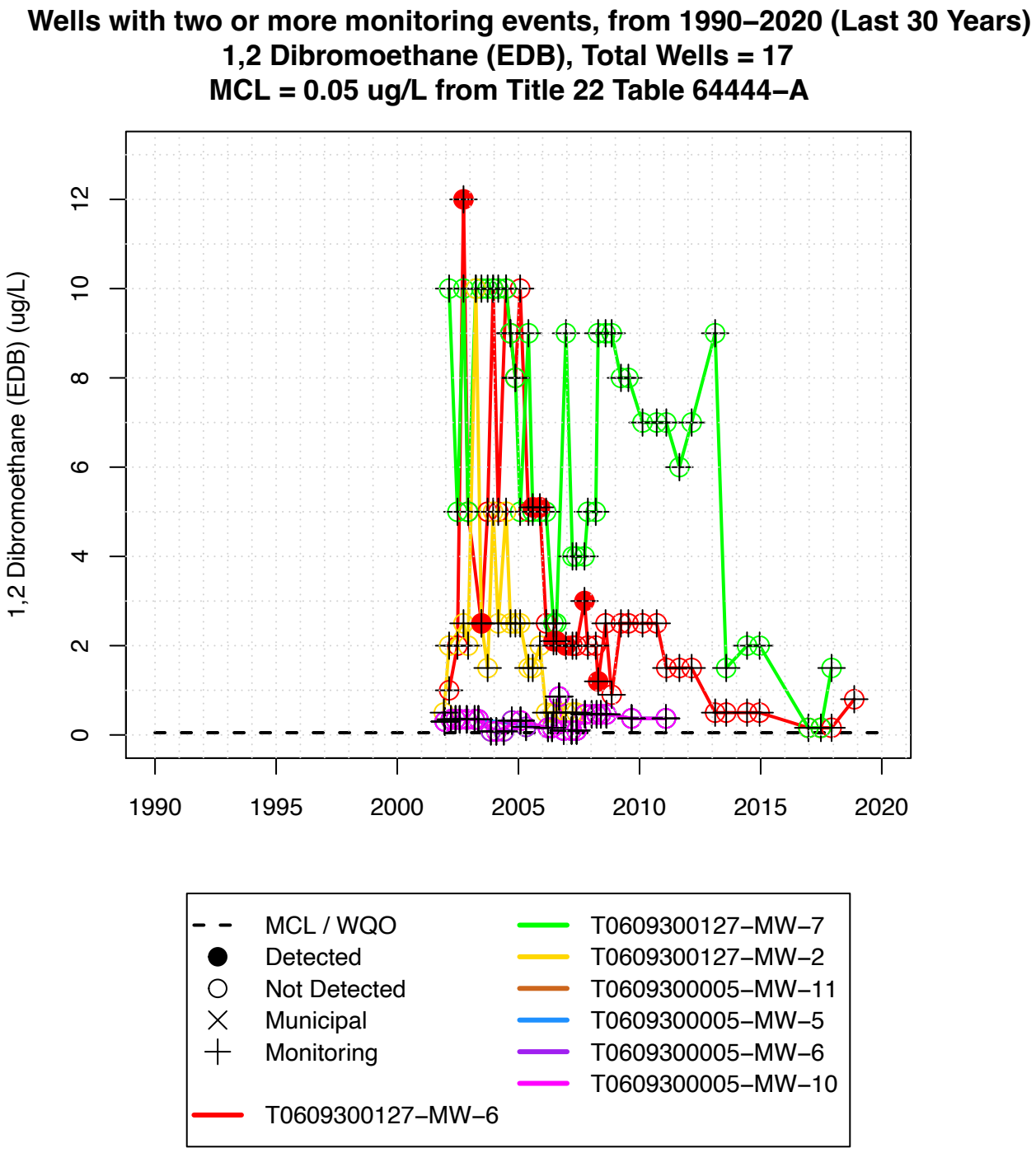


Figure 15: Filtered Groundwater Quality Observations of the Constituent Short List

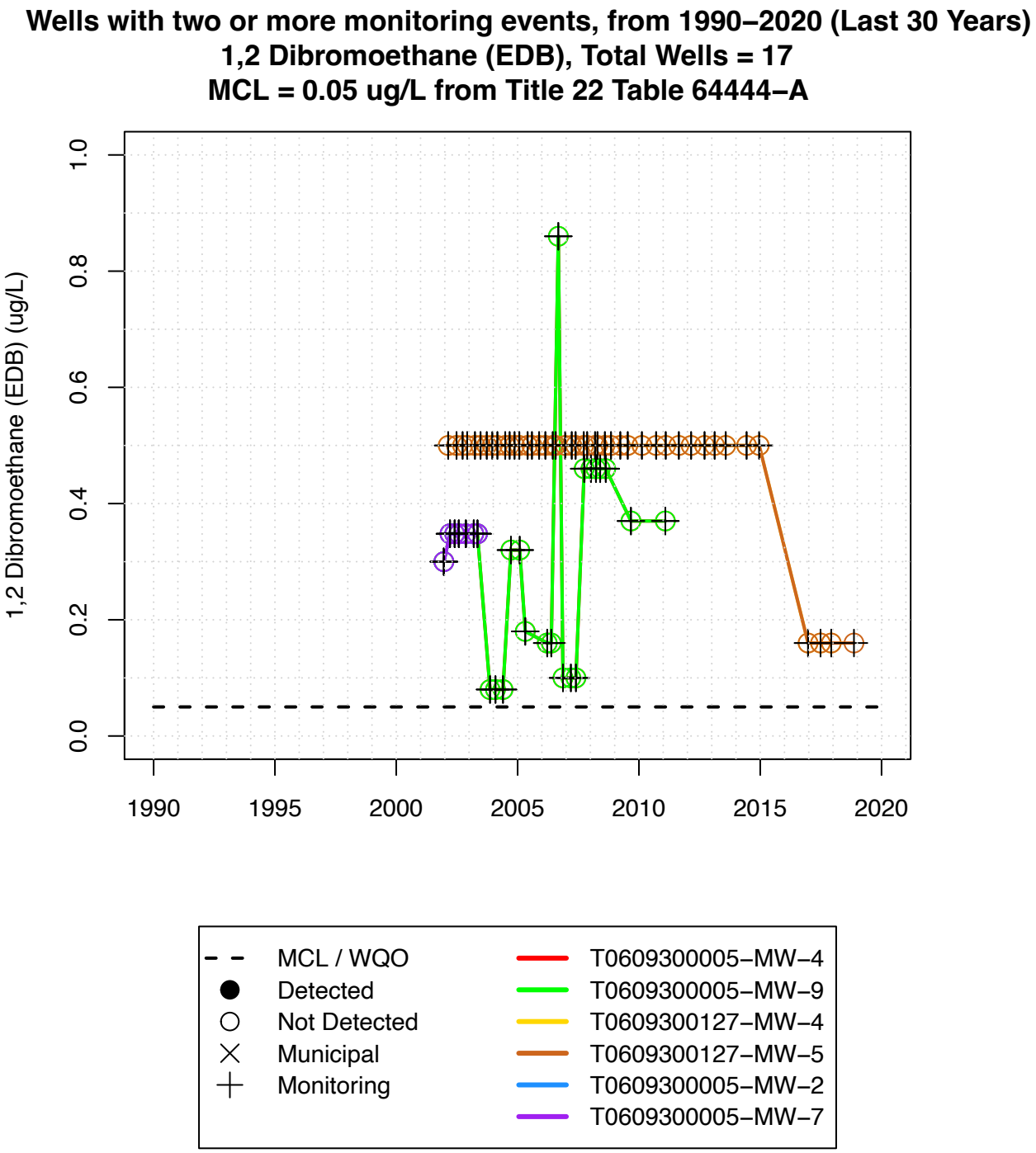


Figure 16: Filtered Groundwater Quality Observations of the Constituent Short List

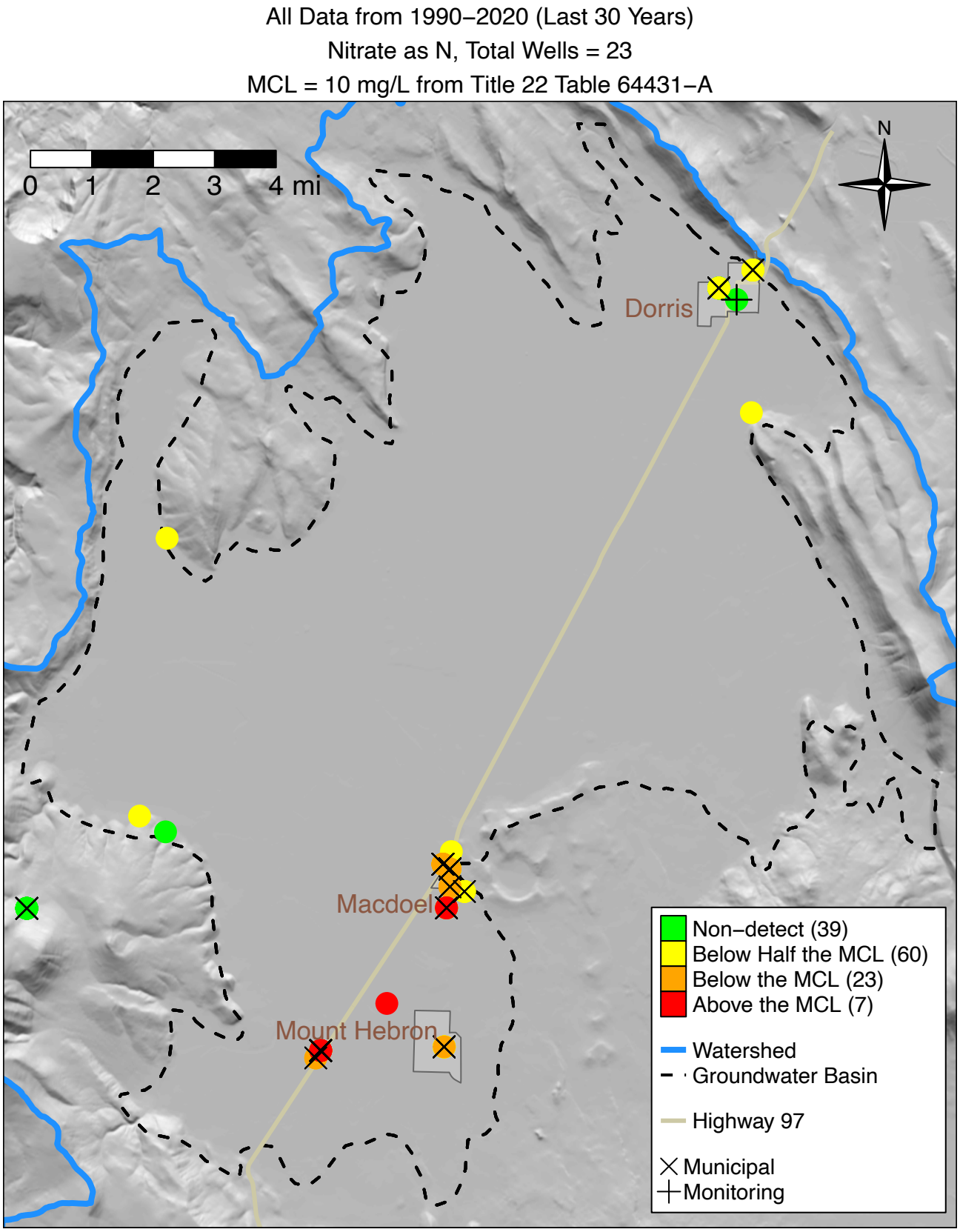


Figure 17: Groundwater Quality Observations of the Constituent Short List

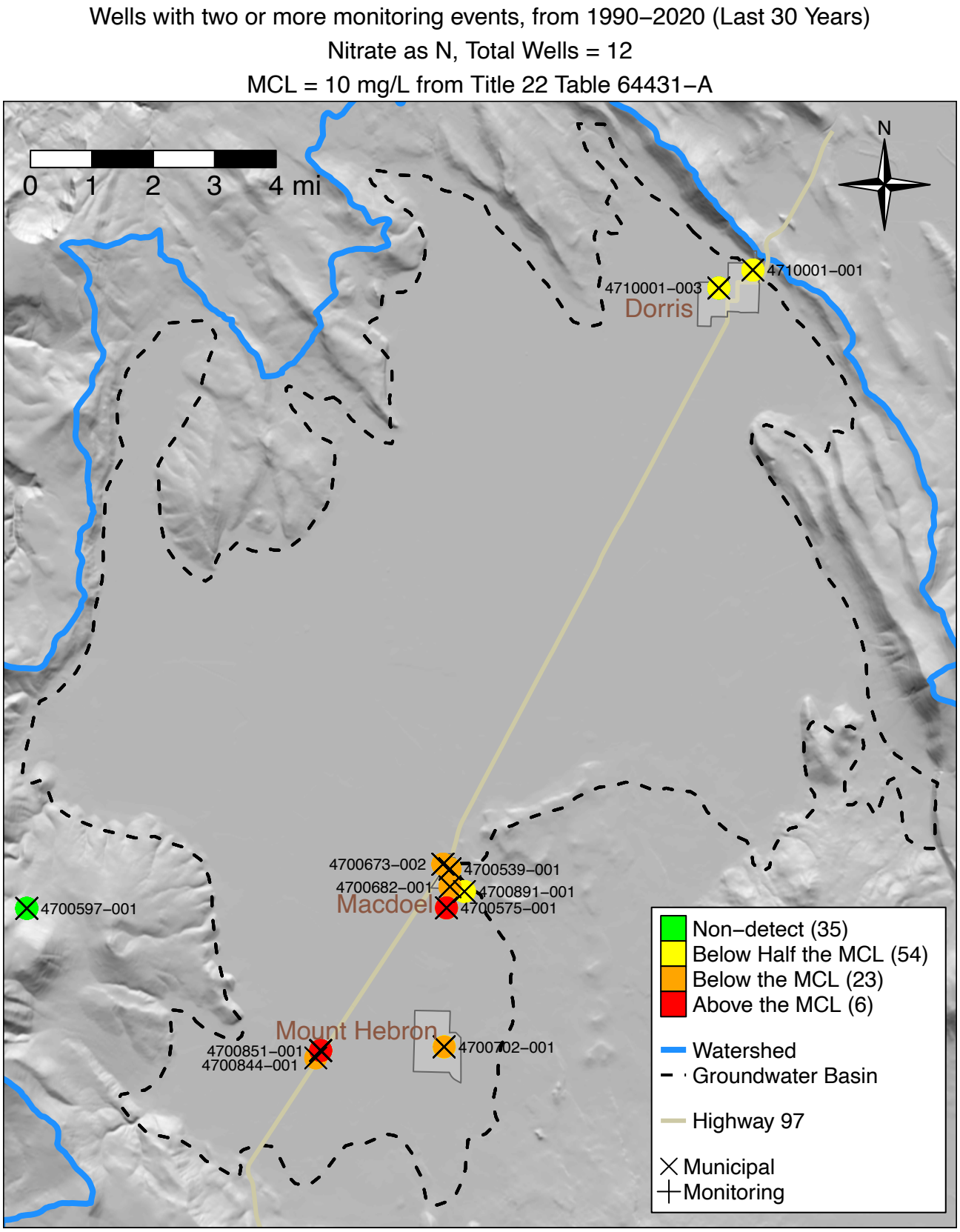


Figure 18: Filtered Groundwater Quality Observations of the Constituent Short List

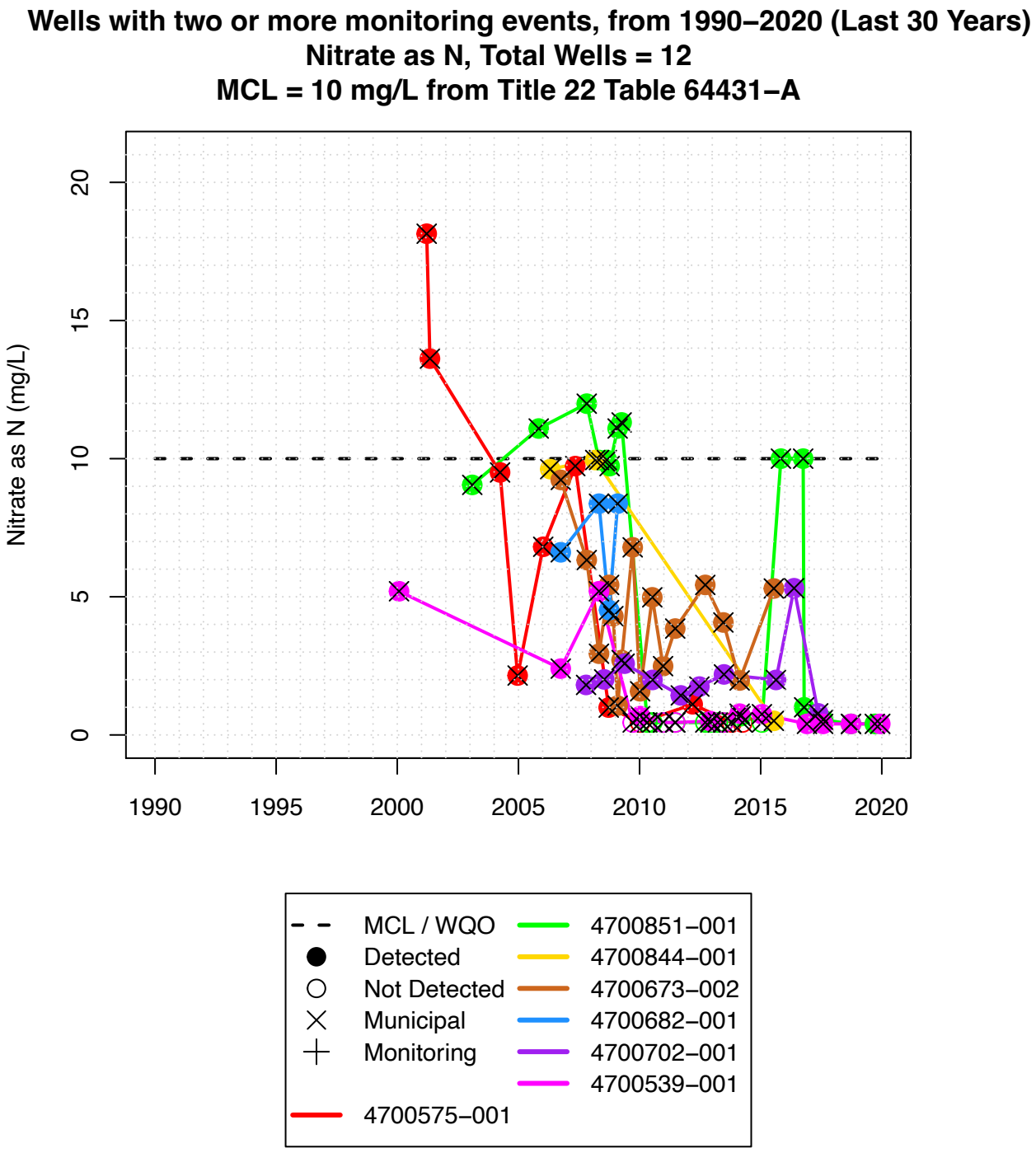


Figure 19: Filtered Groundwater Quality Observations of the Constituent Short List

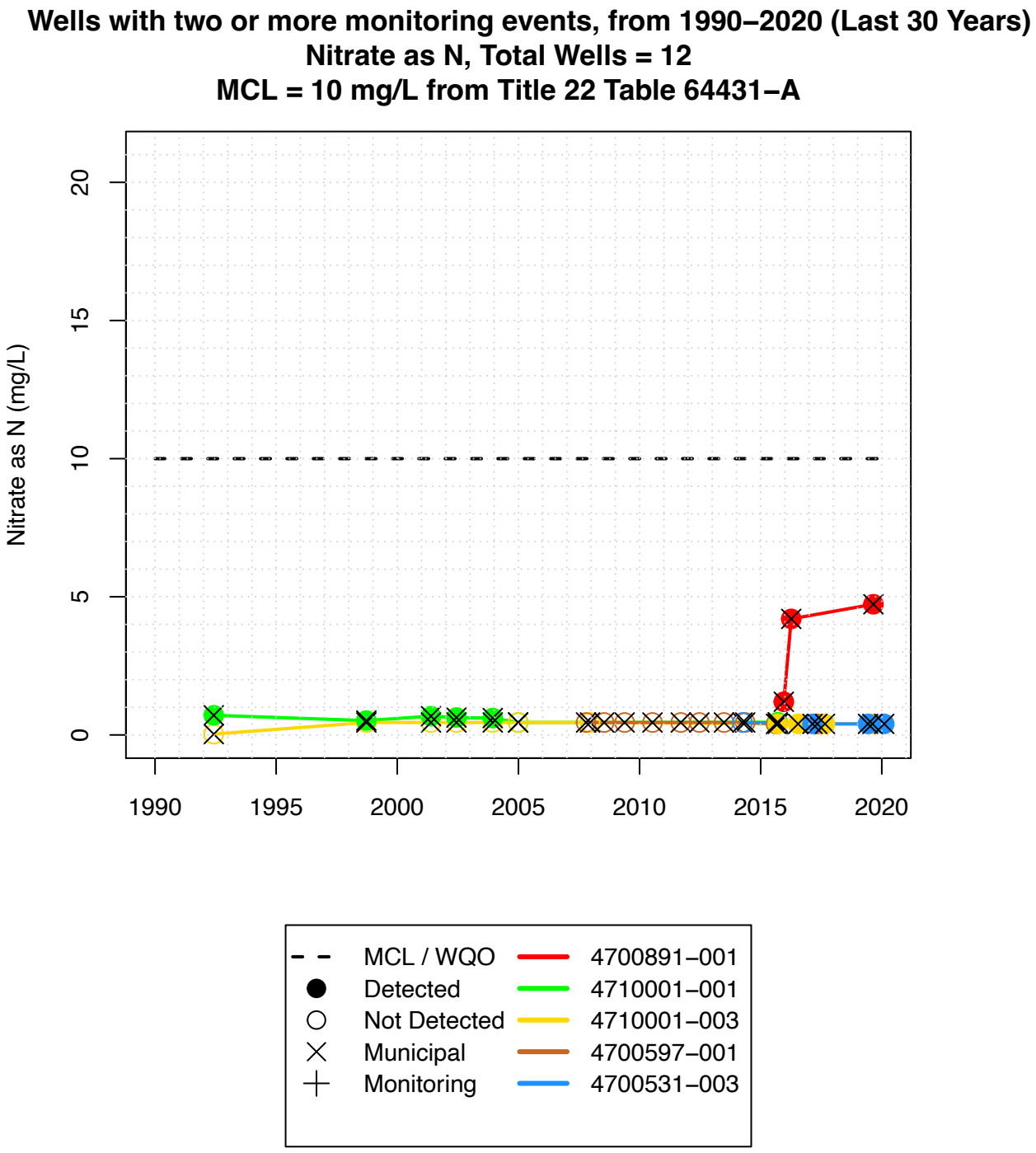


Figure 20: Filtered Groundwater Quality Observations of the Constituent Short List

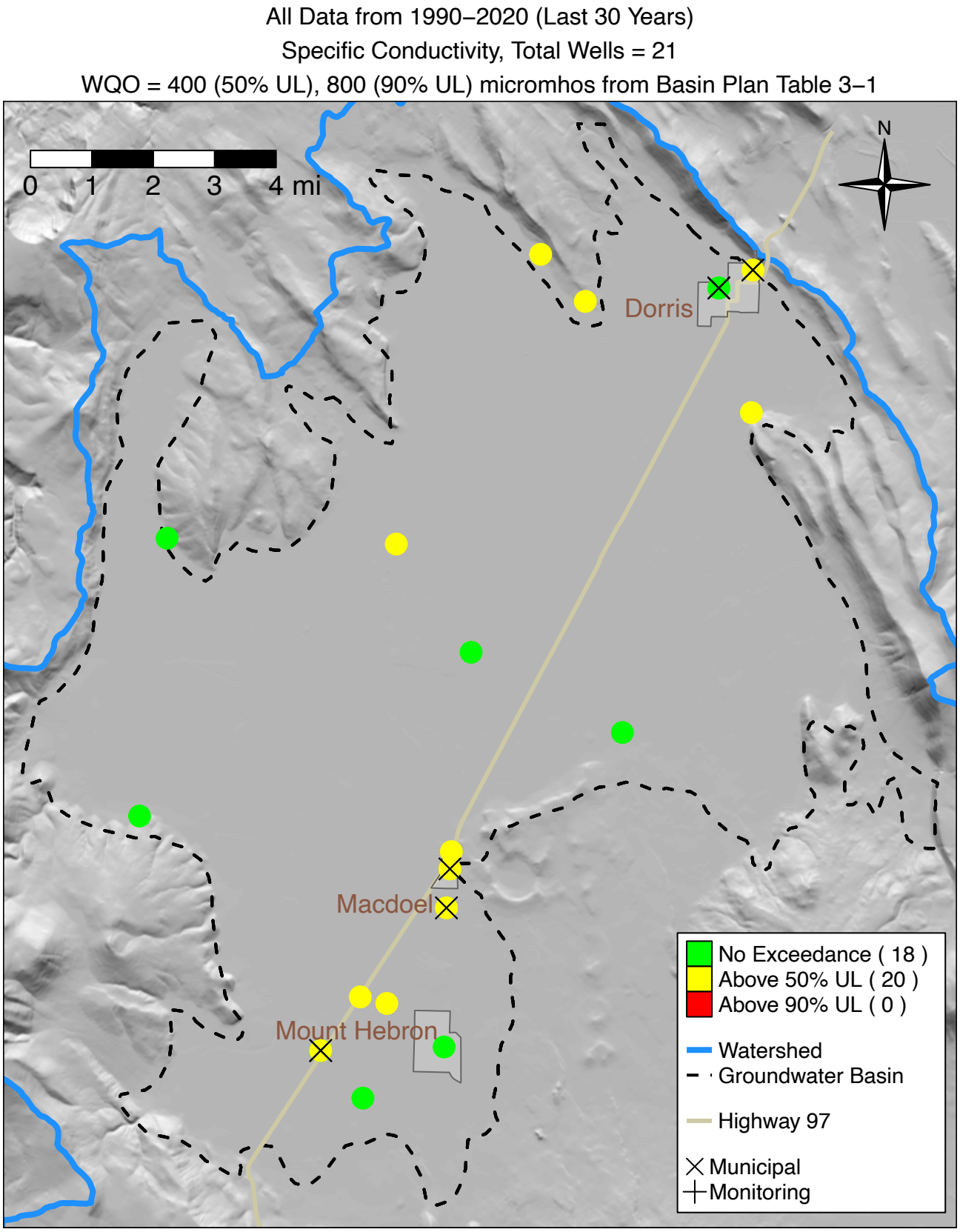


Figure 21: Groundwater Quality Observations of the Constituent Short List

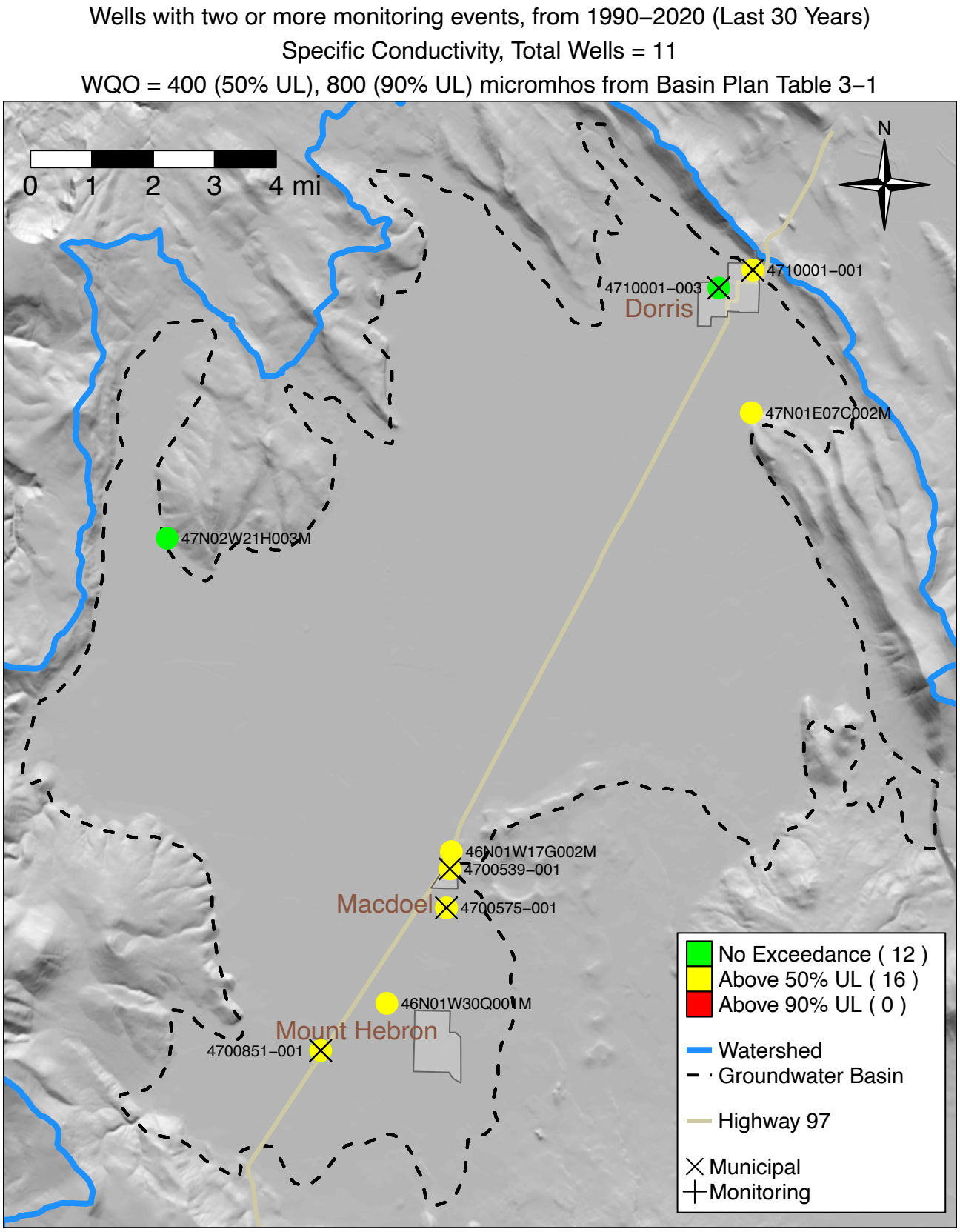


Figure 22: Filtered Groundwater Quality Observations of the Constituent Short List

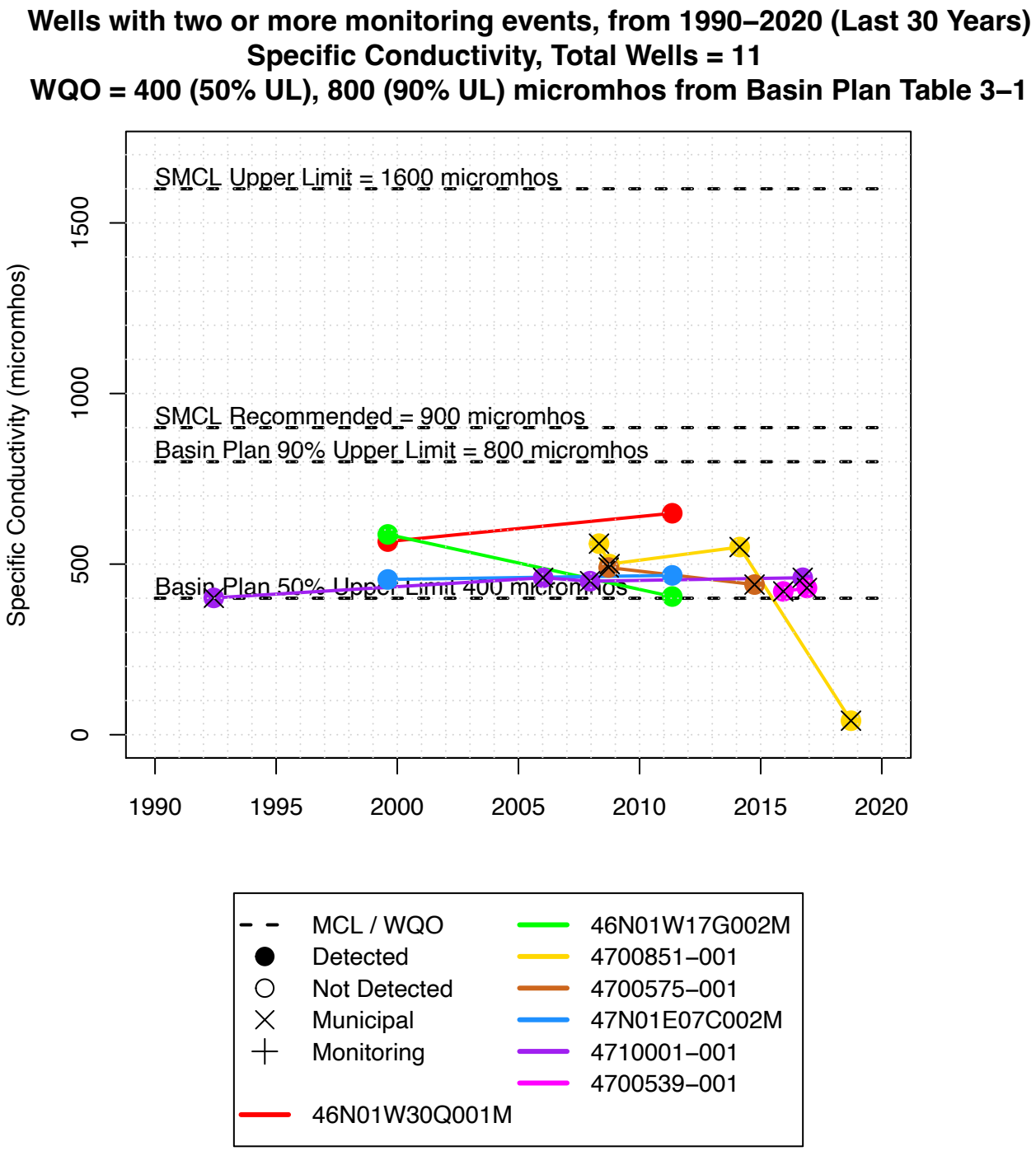


Figure 23: Filtered Groundwater Quality Observations of the Constituent Short List

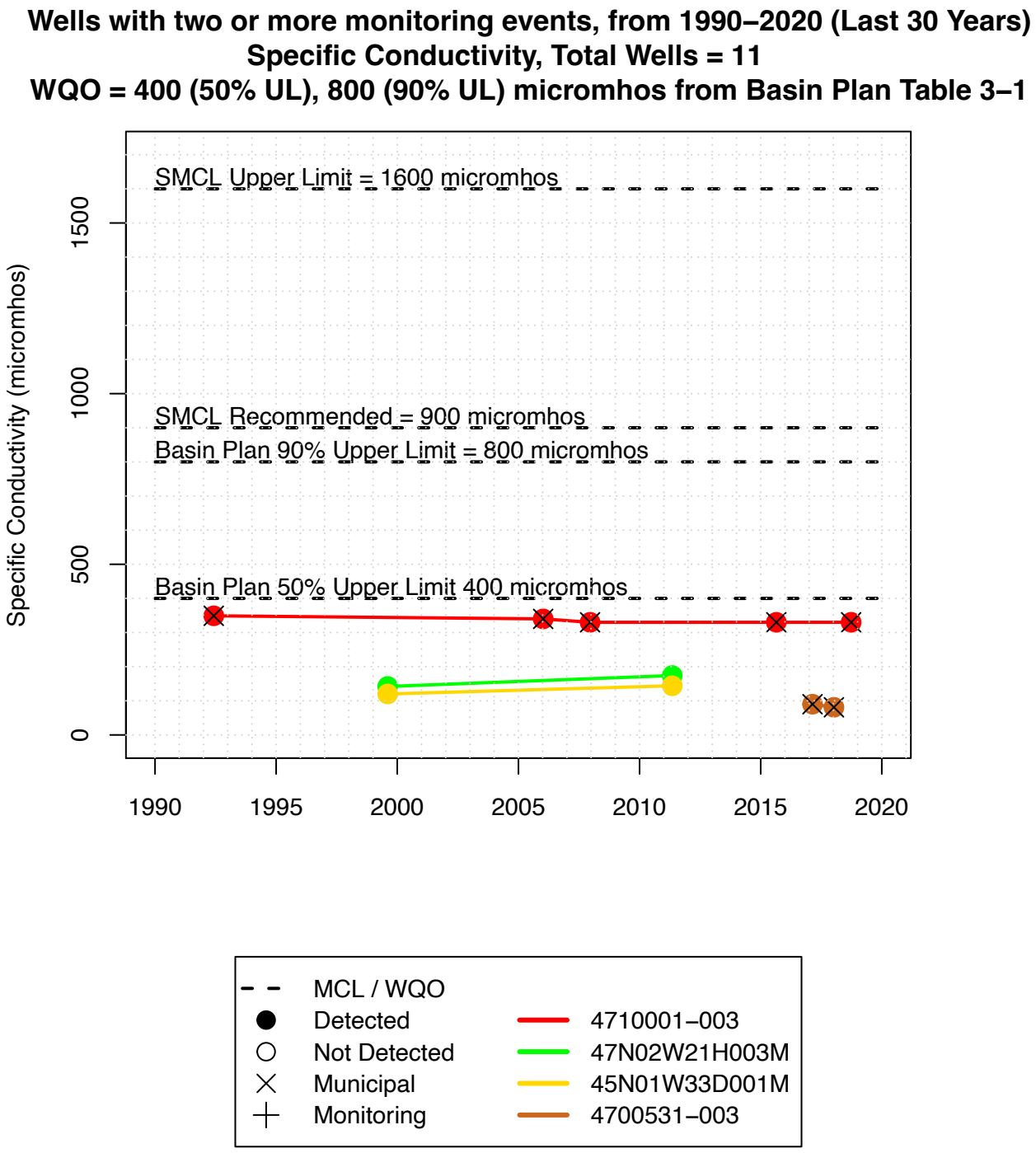


Figure 24: Filtered Groundwater Quality Observations of the Constituent Short List

References

California North Coast Regional Water Quality Control Board. 2018. “North Coast Basin Plan Chapter 2: Beneficial Uses.” June.

Appendix 2-C. Groundwater Dependent Ecosystem Assessment

Contents

Additional Tables and Figures for the Identification of Groundwater Dependent Ecosystems

The following section provides additional tables and figures that are mentioned in the main text of Section 2.2.2.7.

GDE Analysis Results

Results of this grid-based analysis of mapped potential vegetative GDEs and their classification as connected or disconnected to groundwater for each of the 16 periods is presented below.

[*Work in Progress - One GDE map per period*]

Tables

The union of the NCCAG vegetation and wetland layers and adapted 2016 Siskiyou County LU/LC dataset created several tables.

- New fields created by combining or concatenating the relevant fields in each dataset is identified in Table 1.
- Descriptions of classes in the NCCAG Wetland Dataset is shown in Table 2.
- Siskiyou County LU/LC classes are presented in Table 3.
- A summary of relationships between combined fields and assumed actions is presented in Table 4.

Table 1: Field Used to Create a Combined Representation of Mapped Potential GDE Coverage.

Dataset	Field Used
NCCAG Vegetation	Vegetation
NCCAG Wetland	ORIGINAL_C
DWR Siskiyou County	LABEL

Table 2: NCCAG Wetland Dataset Field Descriptions.

Class	Classification Description
PEM1C	Palustrine, Emergent, Persistent, Seasonally Flooded
PSSC	Palustrine, Scrub-Shrub, Seasonally Flooded

Table 2: NCCAG Wetland Dataset Field Descriptions. *(continued)*

Class	Classification Description
R5UBF	Riverine, Unknown Perennial, Unconsolidated Bottom, Semipermanently Flooded
PFOC	Palustrine, Forested, Seasonally Flooded
PUSC	Palustrine, Unconsolidated Shore, Seasonally Flooded
R2UBH	Riverine, Lower Perennial, Unconsolidated Bottom, Permanently Flooded
R3UBH	Riverine, Upper Perennial, Unconsolidated Bottom, Permanently Flooded
PEM1F	Palustrine, Emergent, Persistent, Semipermanently Flooded
45800	Seep or Spring

Table 3: Siskiyou County Land Use and Land Cover Field Descriptions.

Land Use/Land Cover Class	Description
G	Grain and Hay Crops
G1	Barley
G2	Wheat
G3	Oats
G3-H	Oats - harvested crop
G6	Miscellaneous grain and hay
G6-H	Miscellaneous grain and hay - harvested crop
G6-X	Miscellaneous grain and hay - partially irrigated
G-T	Grain and Hay Crops - tilled
I1	Idle but cropped within the past three years
I1-T	Idle but cropped within the past three years - tilled
I2	New land being prepared for crop production
NB	Barren and wasteland
NR4	Riparian vegetation - seasonal duck marsh
NR4-X	Riparian vegetation - seasonal duck marsh - partially irrigated
NR5	Riparian vegetation - permanent duck marsh
NV	Native vegetation
NW1	Water surface - river or stream (natural fresh water channels)

Table 3: Siskiyou County Land Use and Land Cover Field Descriptions. *(continued)*

Land Use/Land Cover Class	Description
NW2	Water surface - water channel for delivering water for irrigation and urban use
NW3	Water surface - water channel for removing on-farm drainage water
NW4	Water surface - freshwater lake, reservoir, or pond
P	Pasture
P1	Pasture - alfalfa & alfalfa mixtures
P3	Mixed pasture
P3-X	Mixed pasture - partially irrigated
P4	Native pasture
P4-X	Native pasture - partially irrigated
P6	Pasture - miscellaneous grasses
S1	Semiagricultural & incidental to agriculture - farmsteads (with farm residence)
S5	Semiagricultural & incidental to agriculture - farmsteads (with no farm residence)
S6	Semiagricultural & incidental to agriculture - miscellaneous semi-ag
T10	Onions and garlic
T12	Potatoes
T18	Miscellanous truck crops
T20	Strawberries
UC	Commercial
UC1	Offices, retailers, etc.
UC4	Recreation vehicle parking and camp sites
UC5	Commercial institutions
UC6	Schools
UC7	Municipal auditoriums, theaters, churches, buildings and stands
UI	Industrial
UI1	Manufacturing, assembling, and general processing
UI14	Waste accumulation sites
UI2	Extractive industries
UI3	Storage and distribution
UI6	Saw mills
UL1	Law area - irrigated
UR	Residential
UR1	Single family dwellings with lot sizes greater than 1 acre up to 5 acres
UV	Vacant

Table 3: Siskiyou County Land Use and Land Cover Field Descriptions. *(continued)*

Land Use/Land Cover Class	Description
UV1	Vacant unpaved areas
UV3	Railroad right of way
UV4	Paved areas
UV6	Airport runways

Table 4: Master Vegetation Lookup Summary.

VEGETATION	ORIGINAL_C	LABEL	join_field	Possible_Action
	45800	NV	_45800_NV	Retain_Natural
	PEM1C	S5	_PEM1C_S5	Retain_Check
	PEM1C	NW2	_PEM1C_NW2	Retain_Check
	PEM1C	NW4	_PEM1C_NW4	Retain_Check
	PEM1C	NR4	_PEM1C_NR4	Retain_Natural
	PEM1C	P3	_PEM1C_P3	Retain_Check
	PEM1C	NV	_PEM1C_NV	Retain_Natural
	PEM1C	P4-X	_PEM1C_P4-X	Retain_Natural
	PEM1C	S1	_PEM1C_S1	Retain_Check
	PEM1C	P3-X	_PEM1C_P3-X	Retain_Check
	PEM1C	NR5	_PEM1C_NR5	Retain_Natural
	PEM1C	UR	_PEM1C_UR	Remove Ag.
	PEM1C	P1	_PEM1C_P1	Retain_Check
	PEM1C	P4	_PEM1C_P4	Retain_Natural
	PEM1C	UV1	_PEM1C_UV1	Retain_Check
	PEM1C	G6	_PEM1C_G6	Remove Ag.
	PEM1C	G	_PEM1C_G	Remove Ag.
	PEM1C	I1	_PEM1C_I1	Retain_Check
	PEM1C	UV4	_PEM1C_UV4	Remove Ag.
	PEM1C	P	_PEM1C_P	Retain_Check
	PEM1F	NV	_PEM1F_NV	Retain_Natural
	PFOC	NV	_PFOC_NV	Retain_Natural
	PFOC	P4-X	_PFOC_P4-X	Retain_Natural
	PSSC	NW2	_PSSC_NW2	Retain_Check
	PSSC	NV	_PSSC_NV	Retain_Natural
	PSSC	NW4	_PSSC_NW4	Retain_Check
	PSSC	P4-X	_PSSC_P4-X	Retain_Natural
	PSSC	UV1	_PSSC_UV1	Retain_Check
	PSSC	UV4	_PSSC_UV4	Remove Ag.
	PUSC	NV	_PUSC_NV	Retain_Natural
	R2UBH	NR4	_R2UBH_NR4	Retain_Natural
	R2UBH	NW2	_R2UBH_NW2	Retain_Check
	R2UBH	NV	_R2UBH_NV	Retain_Natural
	R3UBH	NV	_R3UBH_NV	Retain_Natural
	R3UBH	NW2	_R3UBH_NW2	Retain_Check
	R3UBH	UV4	_R3UBH_UV4	Remove Ag.
	R5UBF	NW2	_R5UBF_NW2	Retain_Check
	R5UBF	NV	_R5UBF_NV	Retain_Natural
	R5UBF	NR4	_R5UBF_NR4	Retain_Natural
	R5UBF	NW4	_R5UBF_NW4	Retain_Check
	R5UBF	P4-X	_R5UBF_P4-X	Retain_Natural

Table 4: Master Vegetation Lookup Summary. *(continued)*

VEGETATION	ORIGINAL_C	LABEL	join_field	Possible_Action
	R5UBF	UV1	_R5UBF_UV1	Retain_Check
	R5UBF	P4	_R5UBF_P4	Retain_Natural
	R5UBF	I1	_R5UBF_I1	Retain_Check
	R5UBF	UV4	_R5UBF_UV4	Remove Ag.
Wet Meadows		NV	Wet Meadows_ _NV	Retain_Natural
Wet Meadows		NR4	Wet Meadows_ _NR4	Retain_Natural
Wet Meadows		NW2	Wet Meadows_ _NW2	Retain_Check
Wet Meadows		P4-X	Wet Meadows_ _P4-X	Retain_Natural
Wet Meadows		NW4	Wet Meadows_ _NW4	Retain_Check
Wet Meadows		P3-X	Wet Meadows_ _P3-X	Retain_Check
Wet Meadows		UR	Wet Meadows_ _UR	Remove Ag.
Wet Meadows		UV4	Wet Meadows_ _UV4	Remove Ag.
Wet Meadows		G6	Wet Meadows_ _G6	Remove Ag.
Wet Meadows		UV1	Wet Meadows_ _UV1	Retain_Check
Wet Meadows	PEM1C	NW2	Wet Meadows_PEM1C_NW2	Retain_Check
Wet Meadows	PEM1C	NR4	Wet Meadows_PEM1C_NR4	Retain_Natural
Wet Meadows	PEM1C	P4-X	Wet Meadows_PEM1C_P4-X	Retain_Natural
Wet Meadows	PEM1C	UR	Wet Meadows_PEM1C_UR	Remove Ag.
Wet Meadows	PEM1C	UV4	Wet Meadows_PEM1C_UV4	Remove Ag.
Wet Meadows	PEM1C	NV	Wet Meadows_PEM1C_NV	Retain_Natural
Wet Meadows	PSSC	P4-X	Wet Meadows_PSSC_P4-X	Retain_Natural
Wet Meadows	R5UBF	NR4	Wet Meadows_R5UBF_NR4	Retain_Natural

Table 4: Master Vegetation Lookup Summary. *(continued)*

VEGETATION	ORIGINAL_C	LABEL	join_field	Possible_Action
Wet Meadows	R5UBF	P4-X	Wet Meadows_R5UBF_P4-X	Retain_Natural
Willow (Shrub)		NW2	Willow (Shrub)_ _NW2	Retain_Check
Willow (Shrub)		NV	Willow (Shrub)_ _NV	Retain_Natural
Willow (Shrub)		NR4	Willow (Shrub)_ _NR4	Retain_Natural
Willow (Shrub)		UV4	Willow (Shrub)_ _UV4	Remove Ag.
Willow (Shrub)		G6	Willow (Shrub)_ _G6	Remove Ag.
Willow (Shrub)		UV1	Willow (Shrub)_ _UV1	Retain_Check
Willow (Shrub)		I2	Willow (Shrub)_ _I2	Retain_Check
Willow (Shrub)	PEM1C	NW2	Willow (Shrub)_PEM1C_NW2	Retain_Check
Willow (Shrub)	PEM1C	G6	Willow (Shrub)_PEM1C_G6	Remove Ag.
Willow (Shrub)	PEM1C	NR4	Willow (Shrub)_PEM1C_NR4	Retain_Natural
Willow (Shrub)	R3UBH	NV	Willow (Shrub)_R3UBH_NV	Retain_Natural
		NR4	_ _NR4	Retain_Natural
		NR4-X	_ _NR4-X	Retain_Natural
		NR5	_ _NR5	Retain_Natural
		NW1	_ _NW1	Retain_Natural
		NW2	_ _NW2	Retain_Check

Depth to Groundwater

Representations of depth to groundwater for each of the 23 representation of depth to groundwater are presented from Figure 1 to Figure 23.

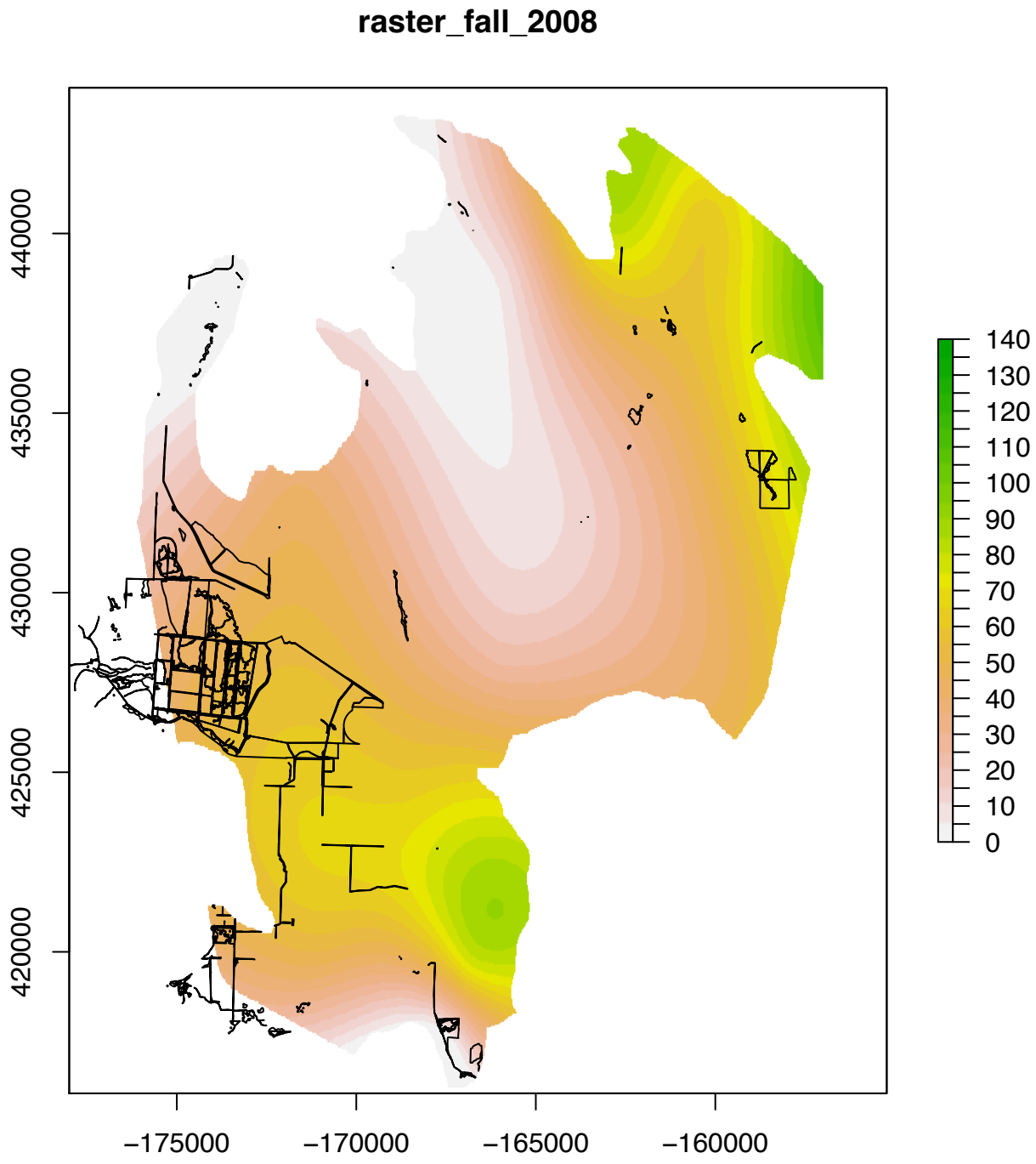


Figure 1: Depth to water, in feet below ground surface.

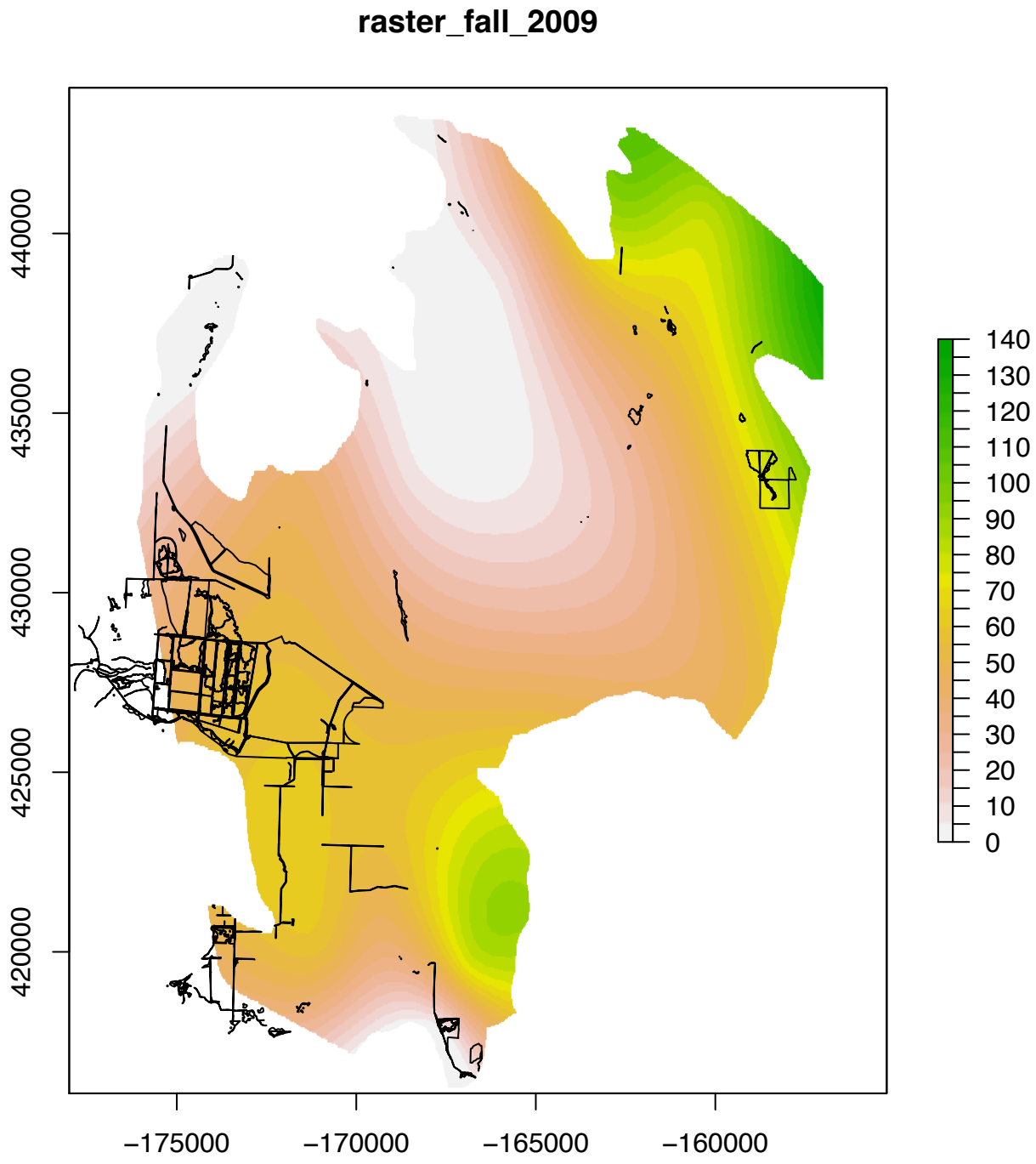


Figure 2: Depth to water, in feet below ground surface.

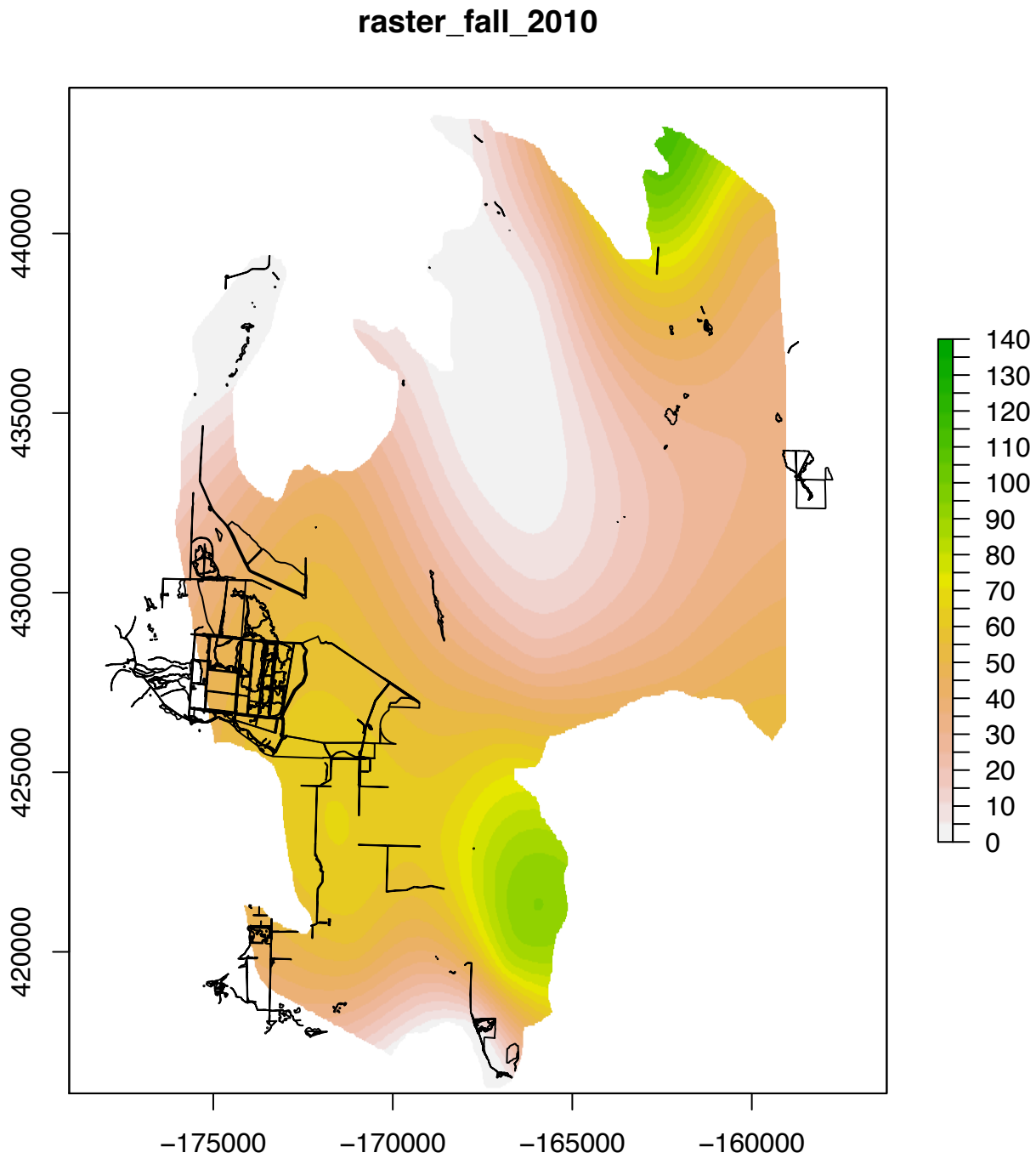


Figure 3: Depth to water, in feet below ground surface.

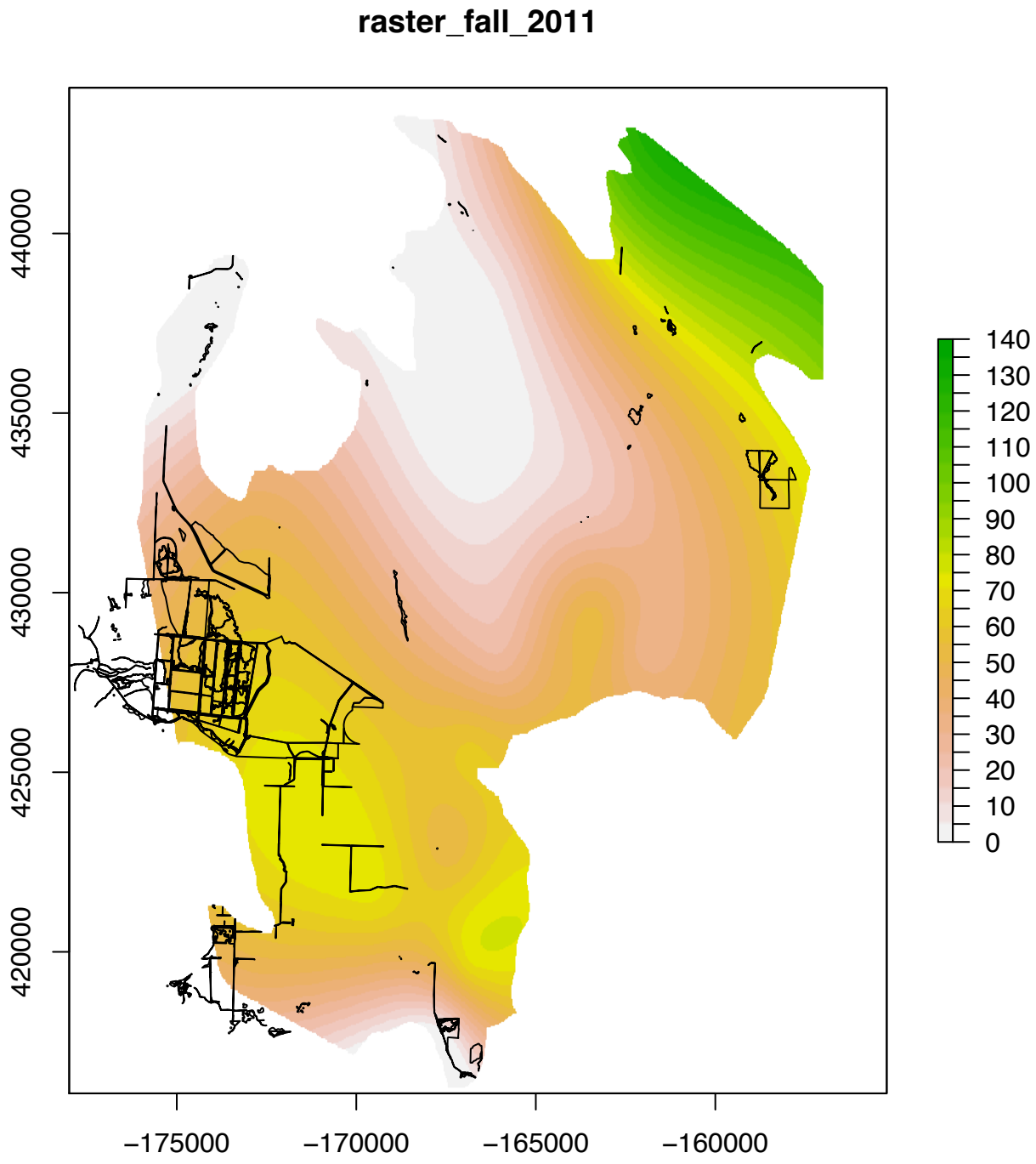


Figure 4: Depth to water, in feet below ground surface.

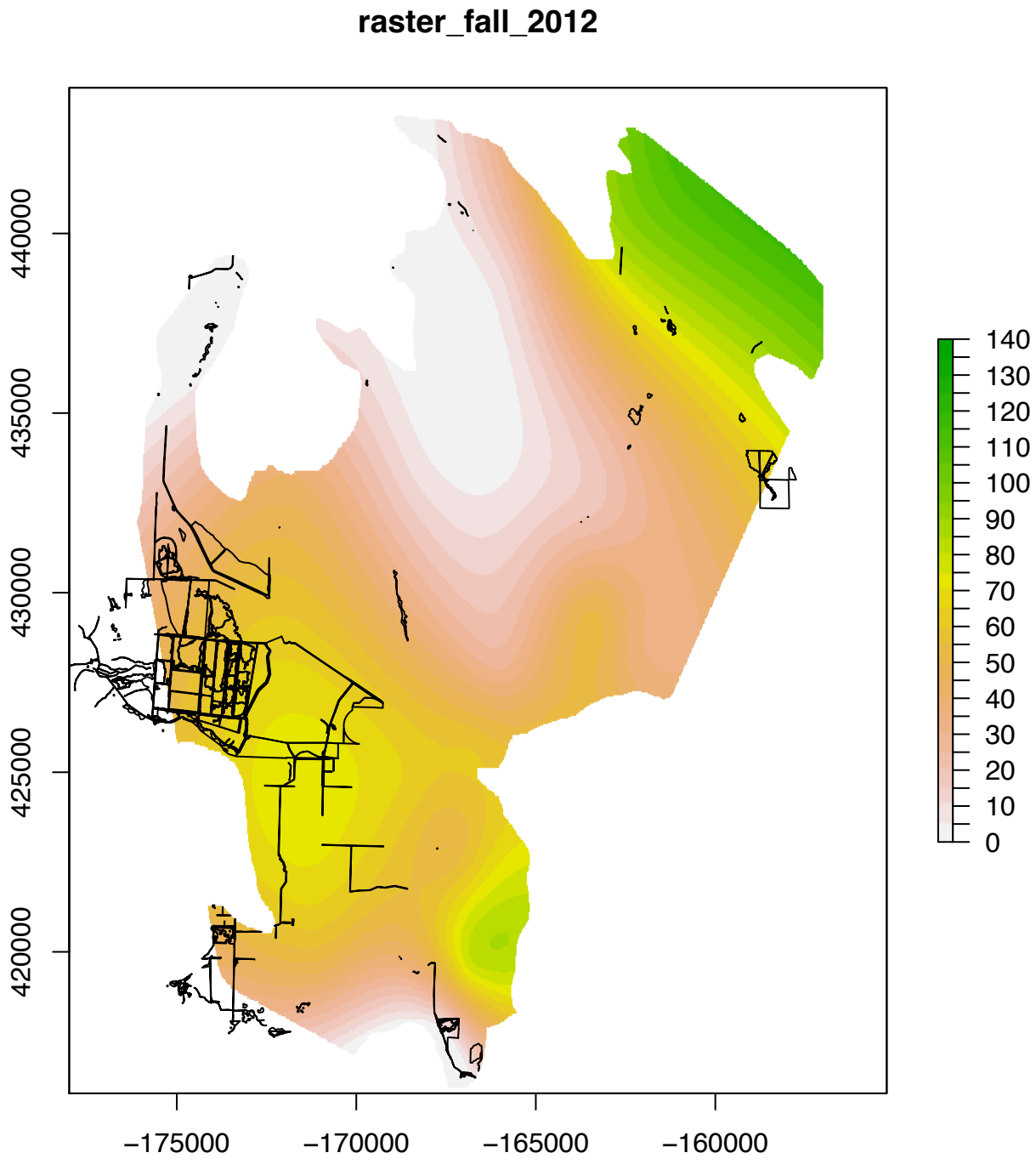


Figure 5: Depth to water, in feet below ground surface.

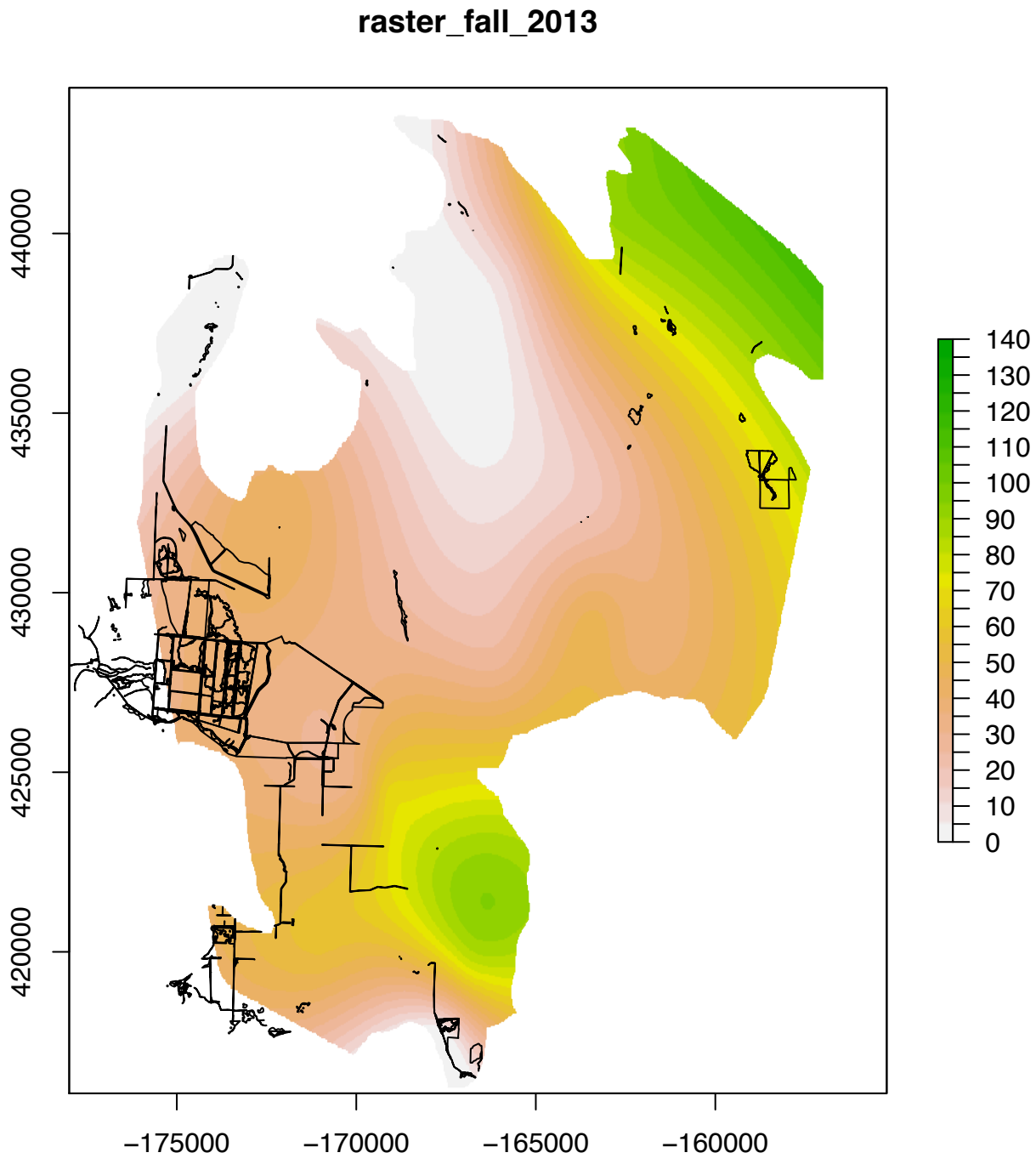


Figure 6: Depth to water, in feet below ground surface.

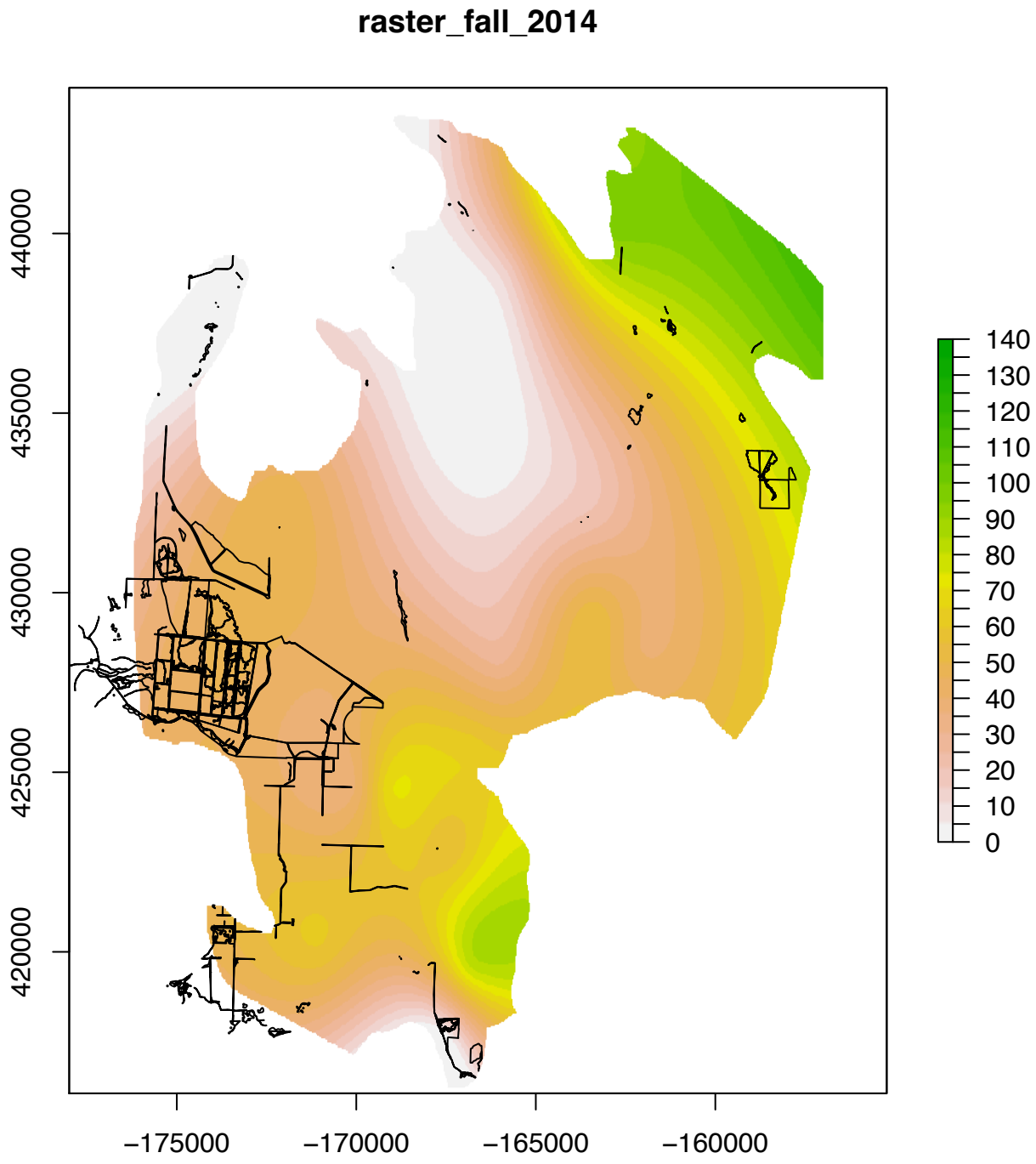


Figure 7: Depth to water, in feet below ground surface.

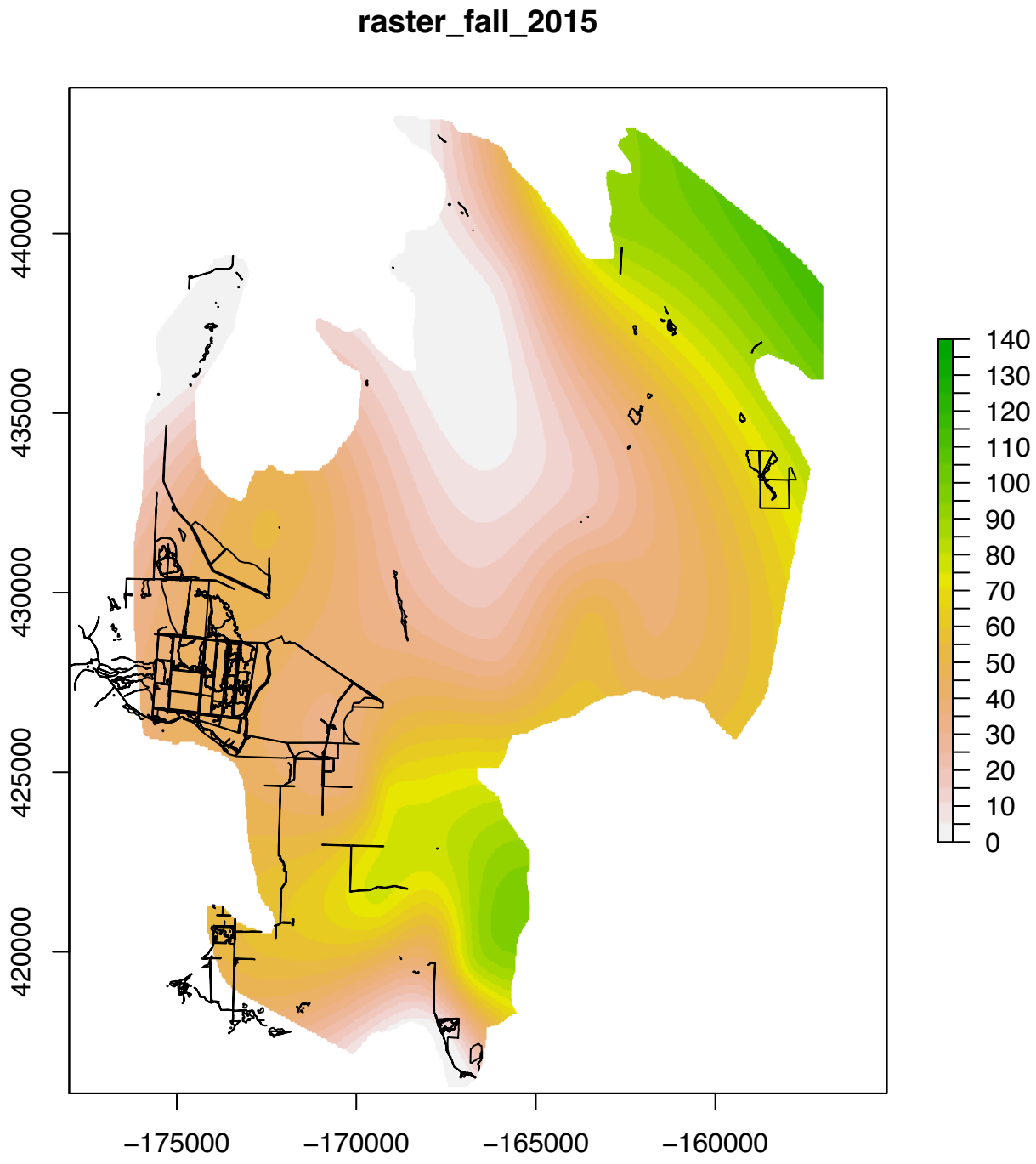


Figure 8: Depth to water, in feet below ground surface.

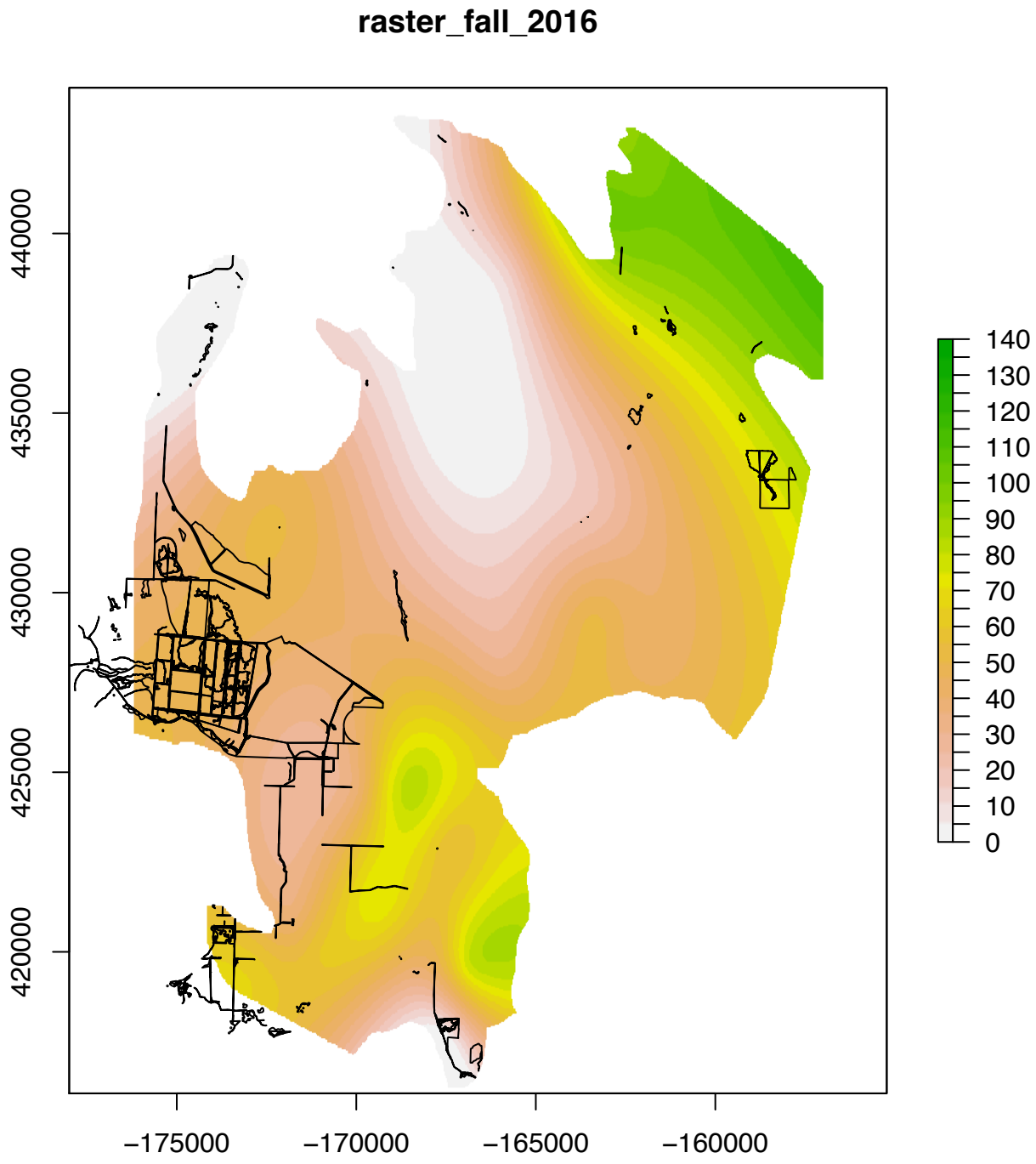


Figure 9: Depth to water, in feet below ground surface.

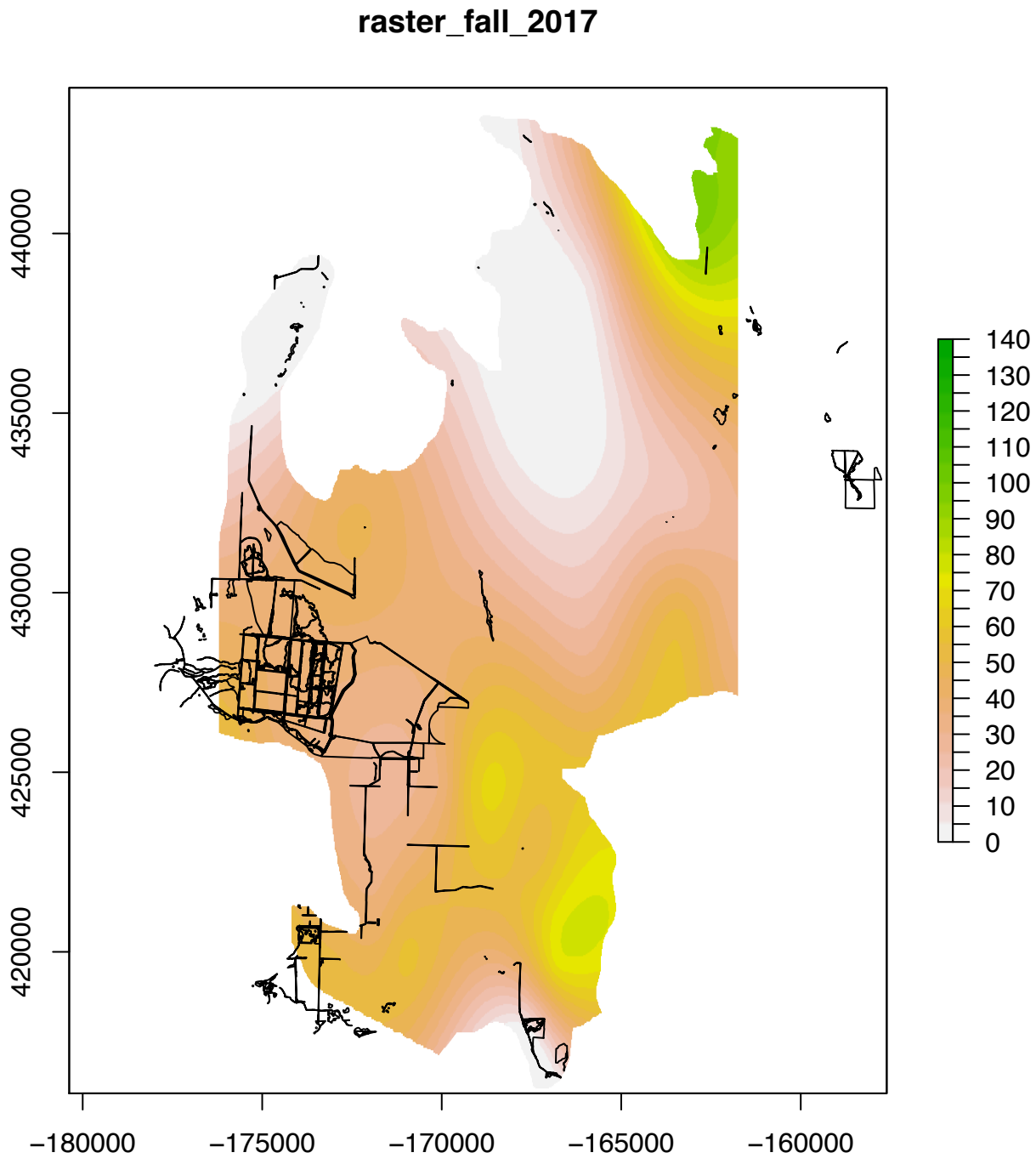


Figure 10: Depth to water, in feet below ground surface.

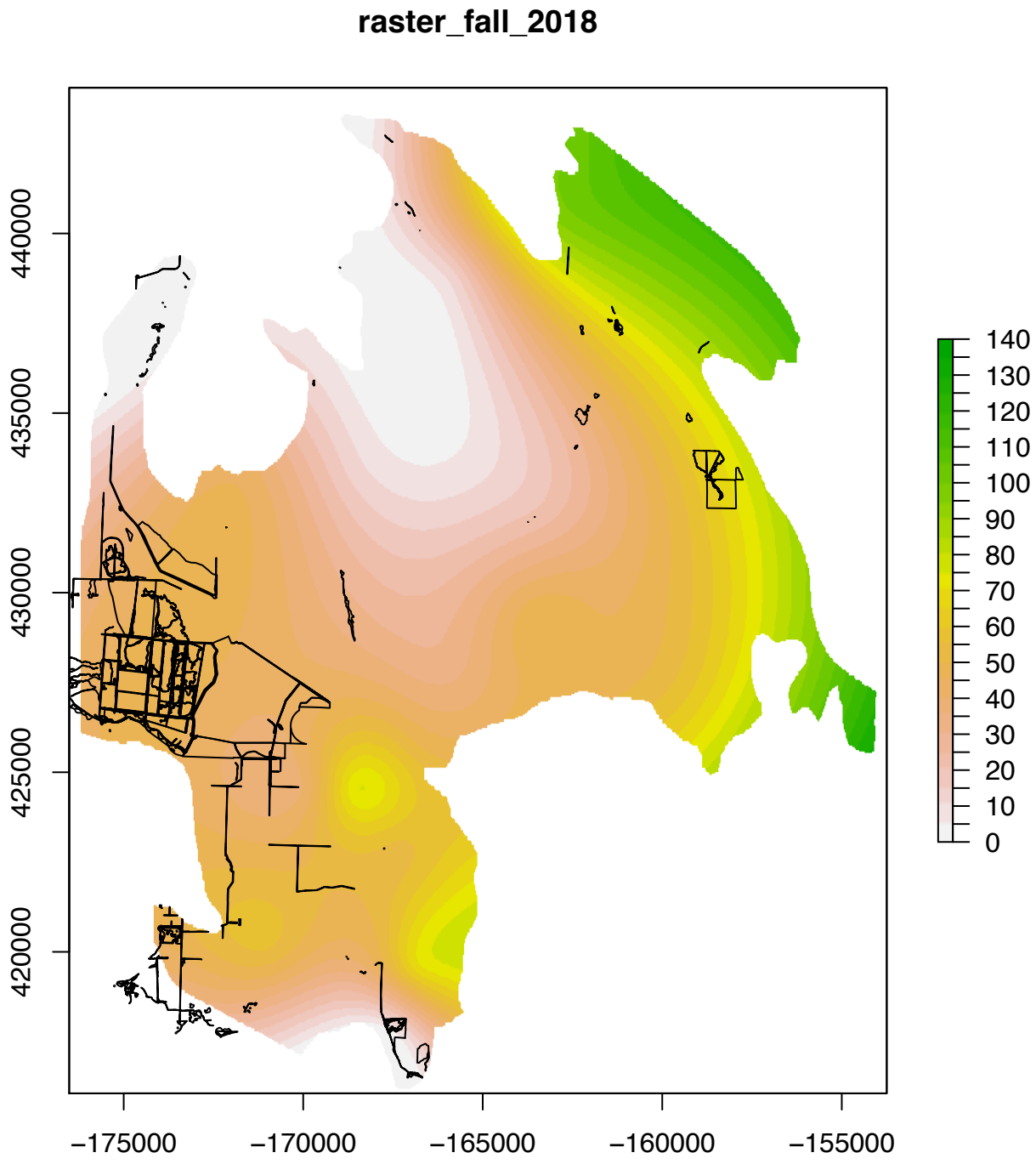


Figure 11: Depth to water, in feet below ground surface.

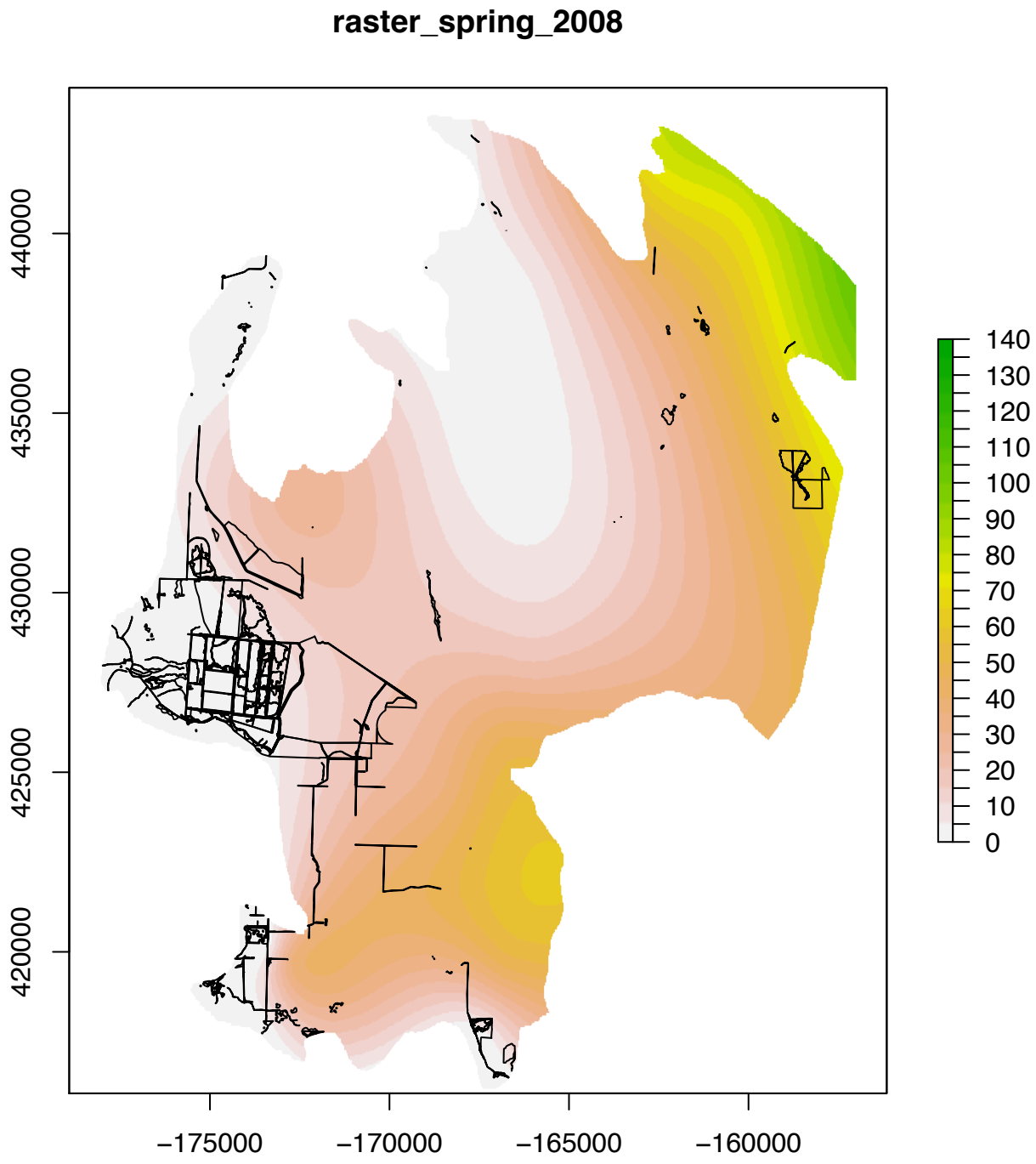


Figure 12: Depth to water, in feet below ground surface.

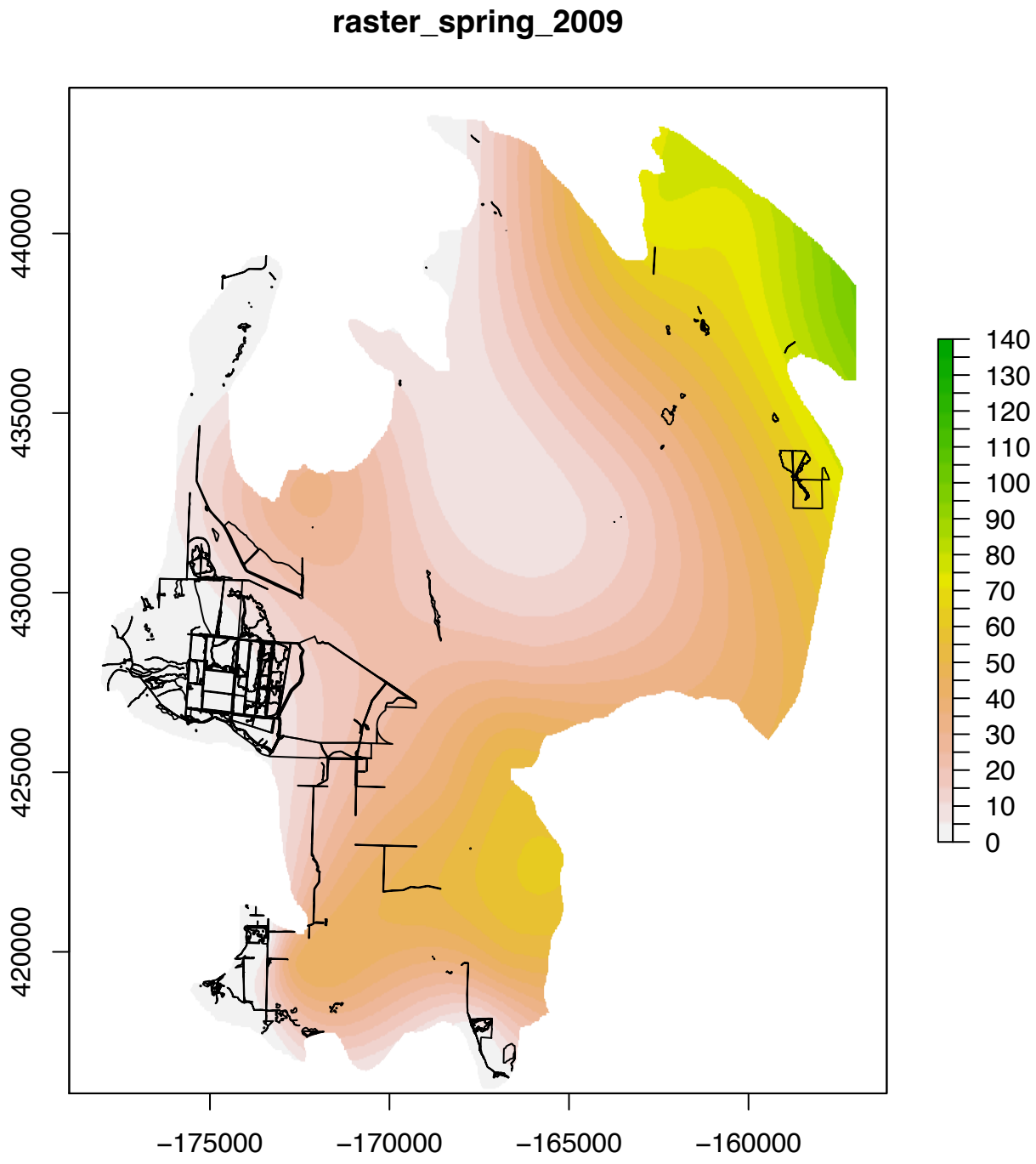


Figure 13: Depth to water, in feet below ground surface.

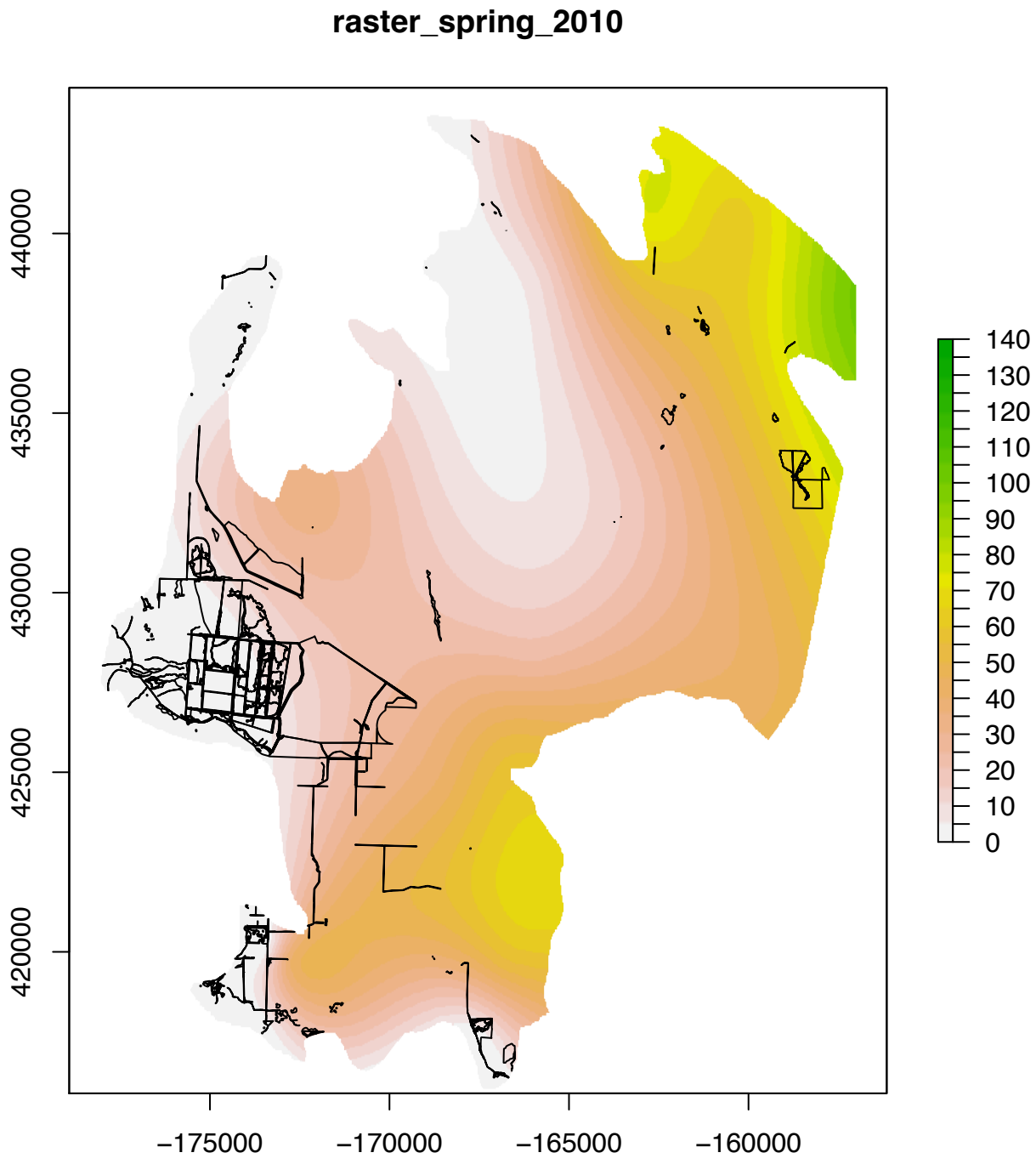


Figure 14: Depth to water, in feet below ground surface.

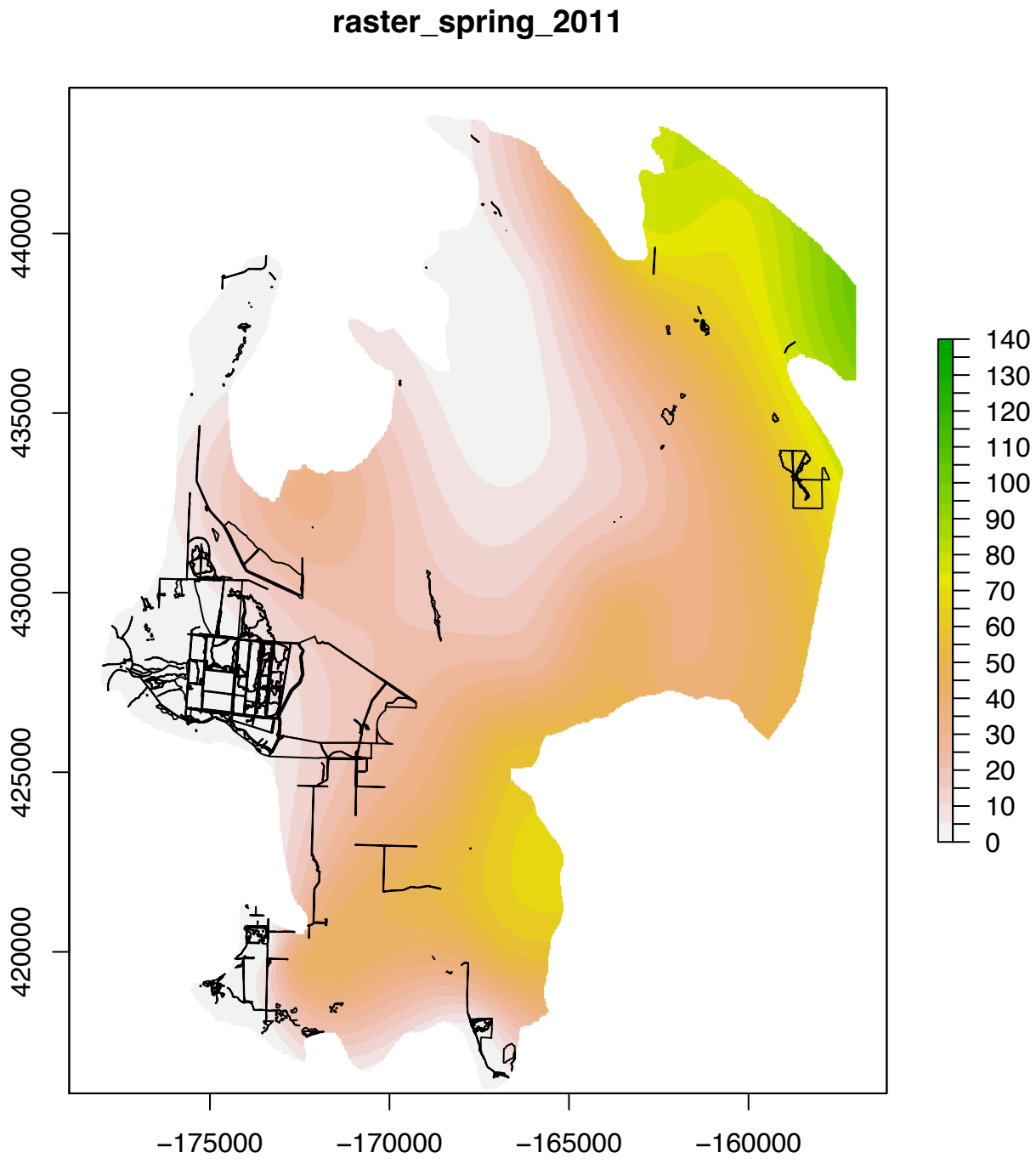


Figure 15: Depth to water, in feet below ground surface.

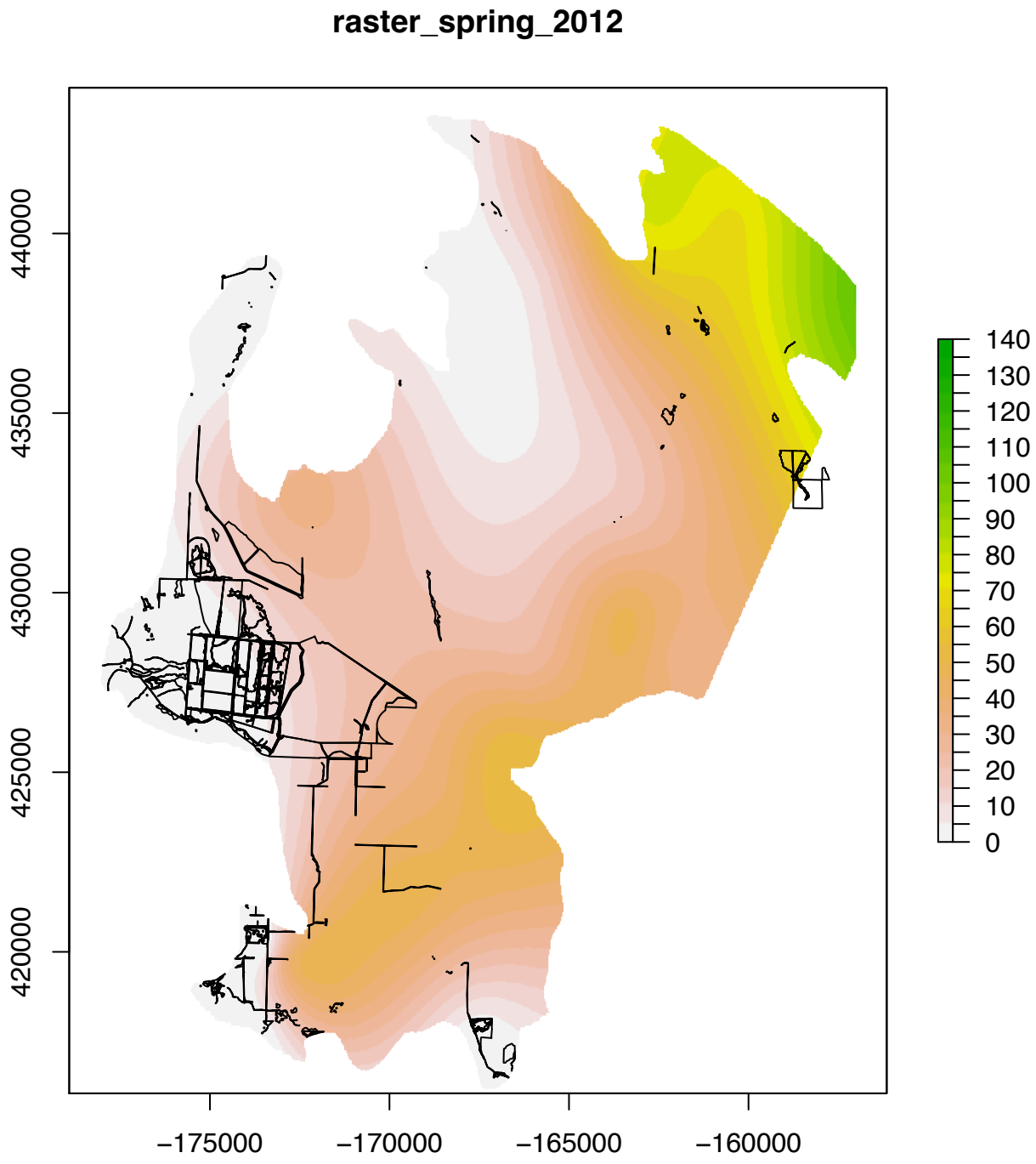


Figure 16: Depth to water, in feet below ground surface.

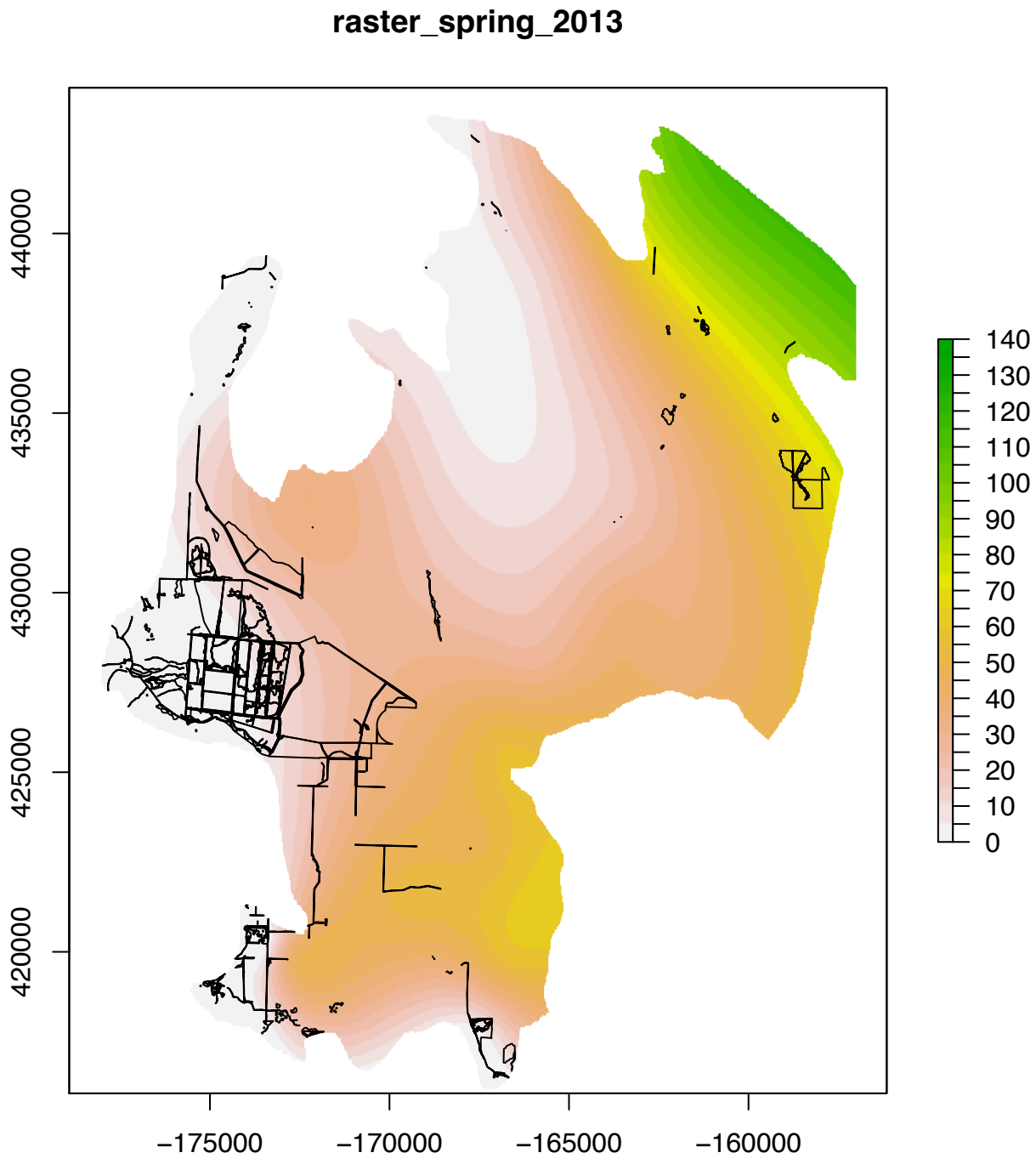


Figure 17: Depth to water, in feet below ground surface.

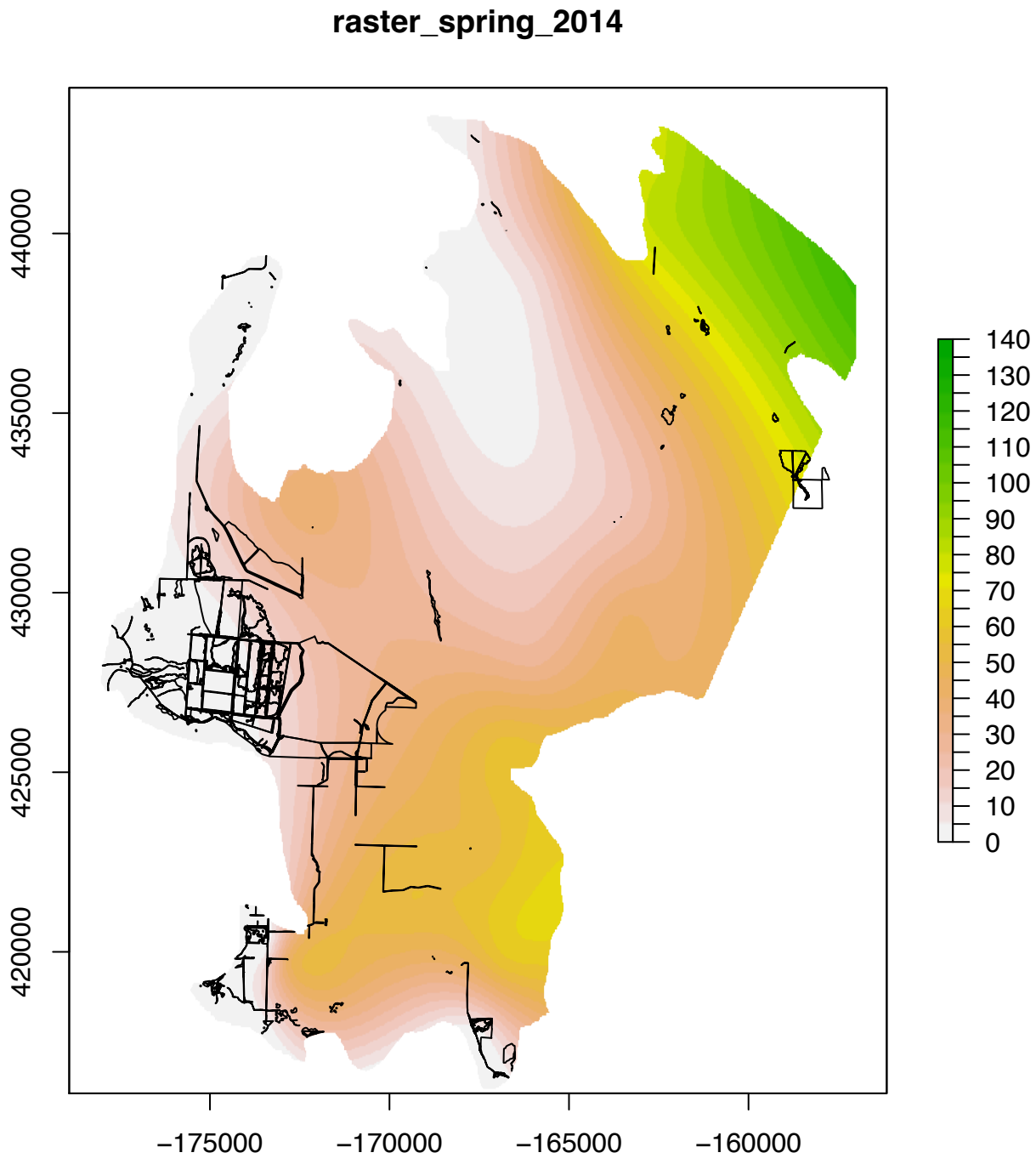


Figure 18: Depth to water, in feet below ground surface.

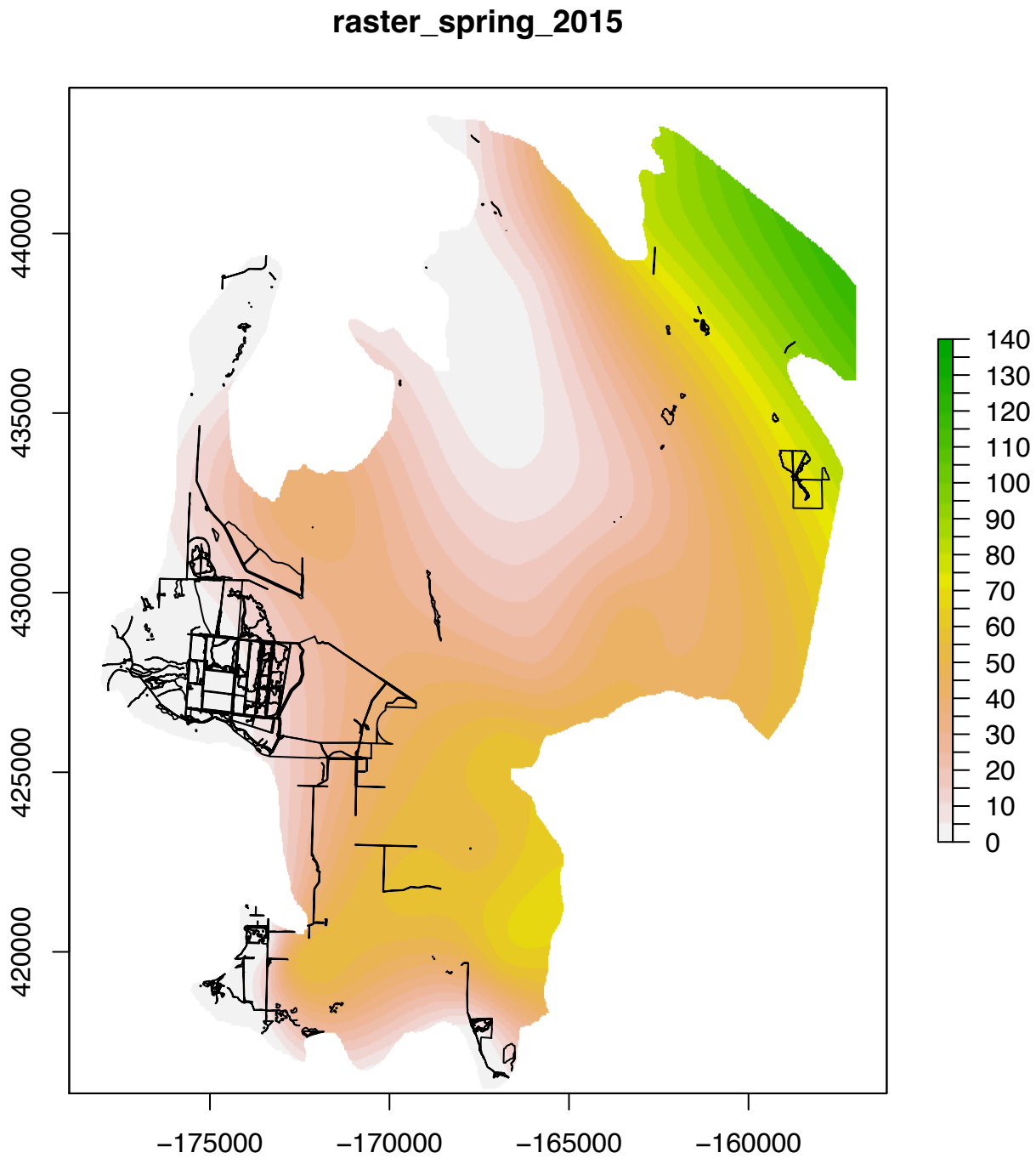


Figure 19: Depth to water, in feet below ground surface.

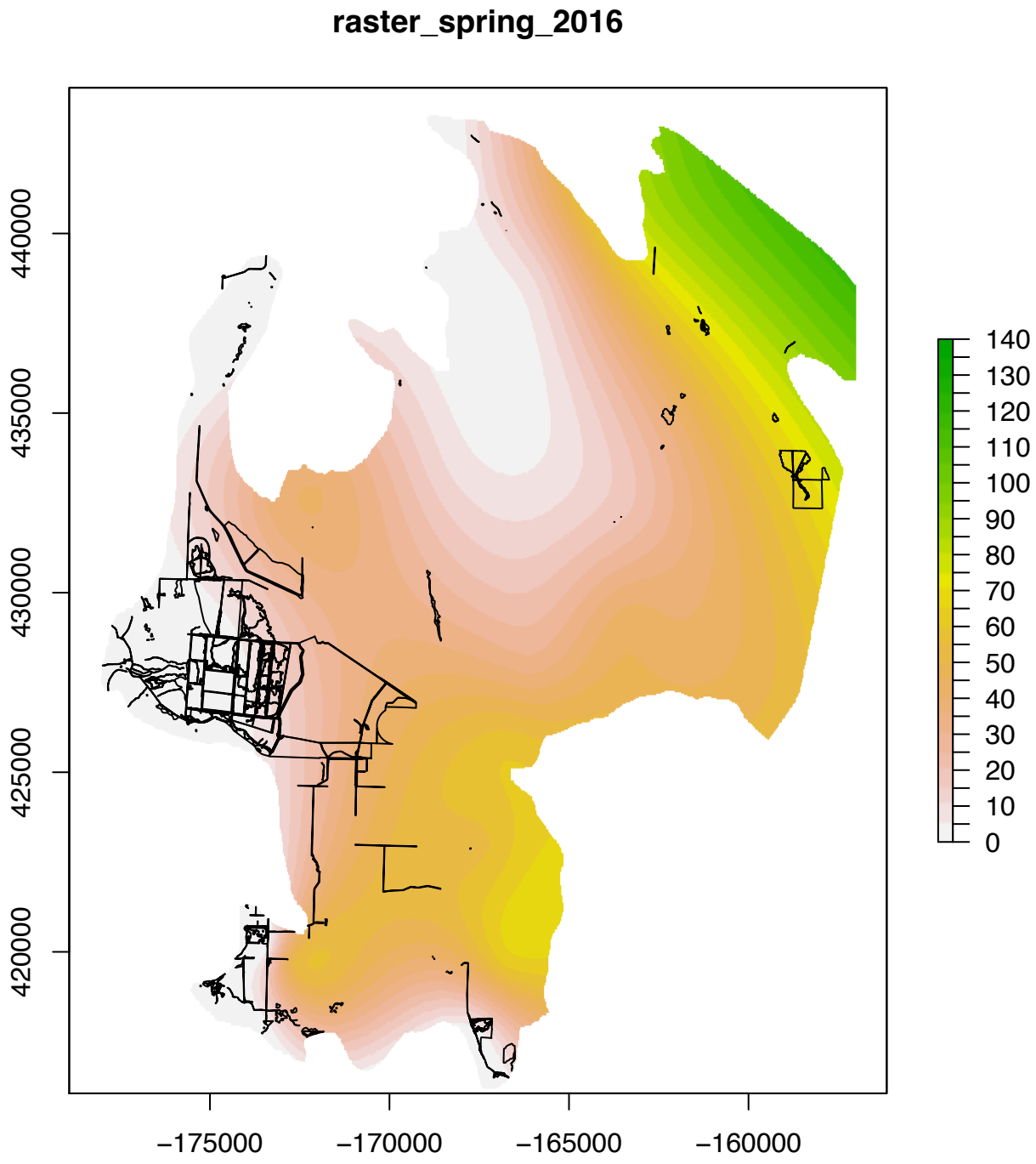


Figure 20: Depth to water, in feet below ground surface.

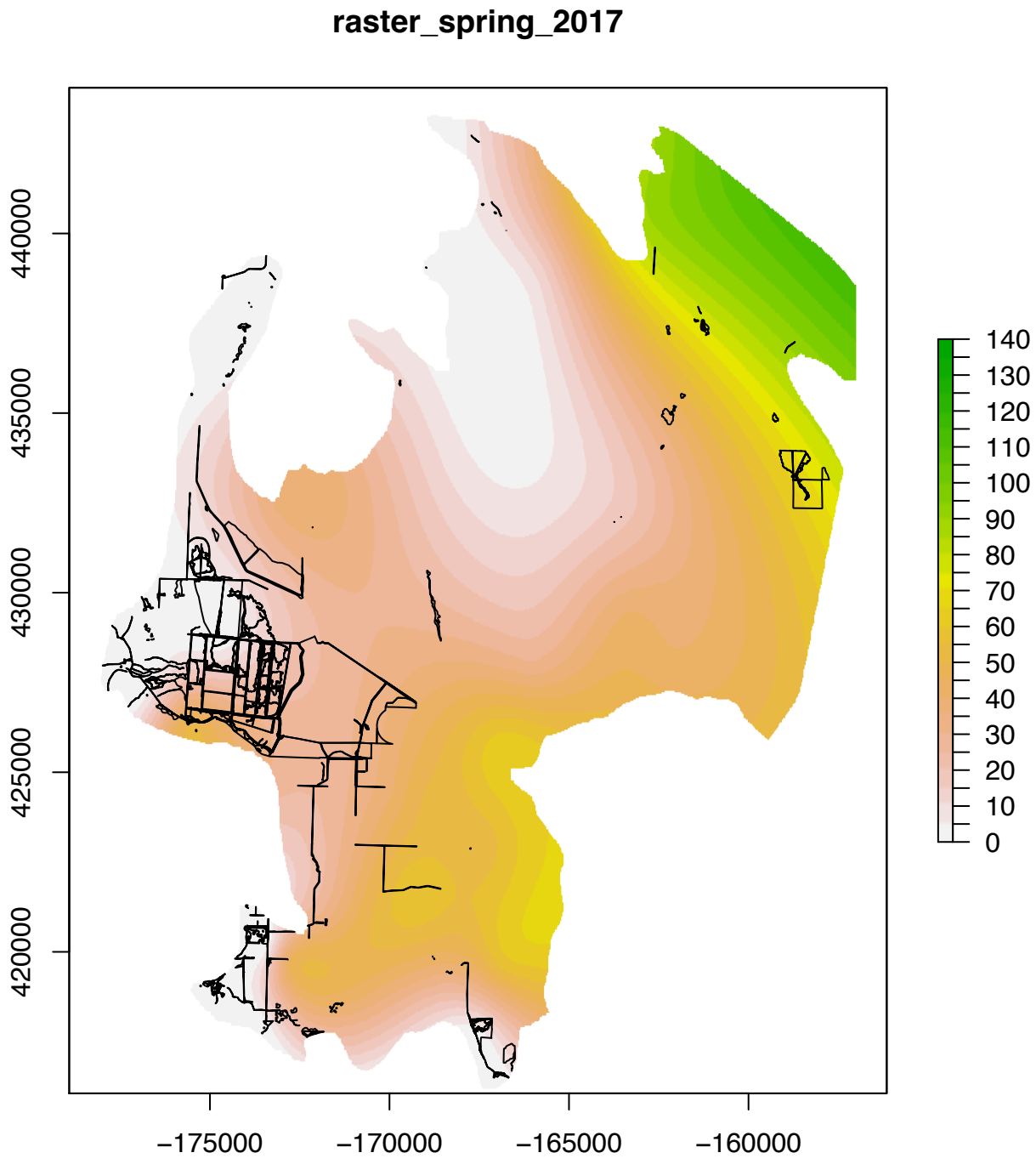


Figure 21: Depth to water, in feet below ground surface.

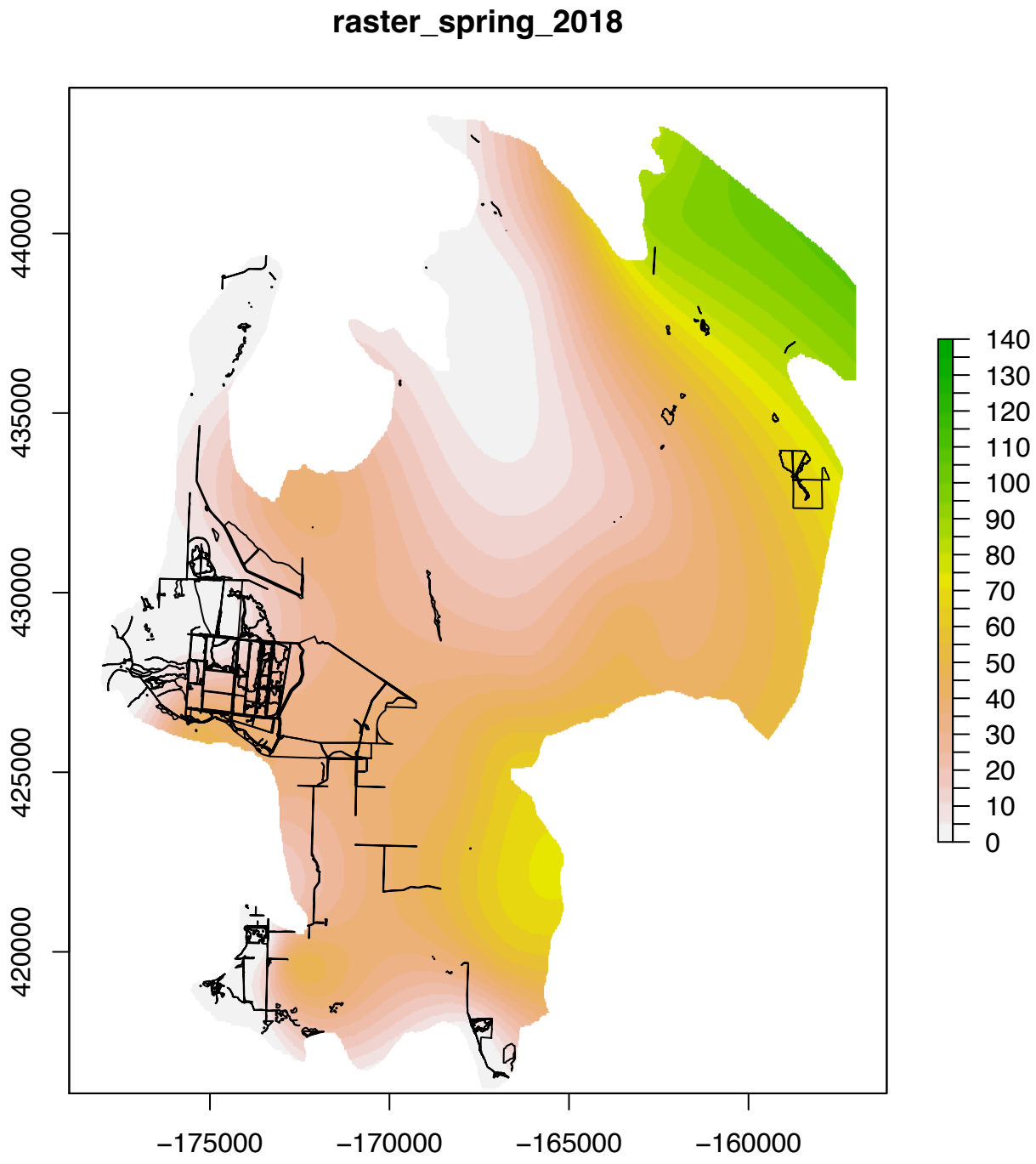


Figure 22: Depth to water, in feet below ground surface.

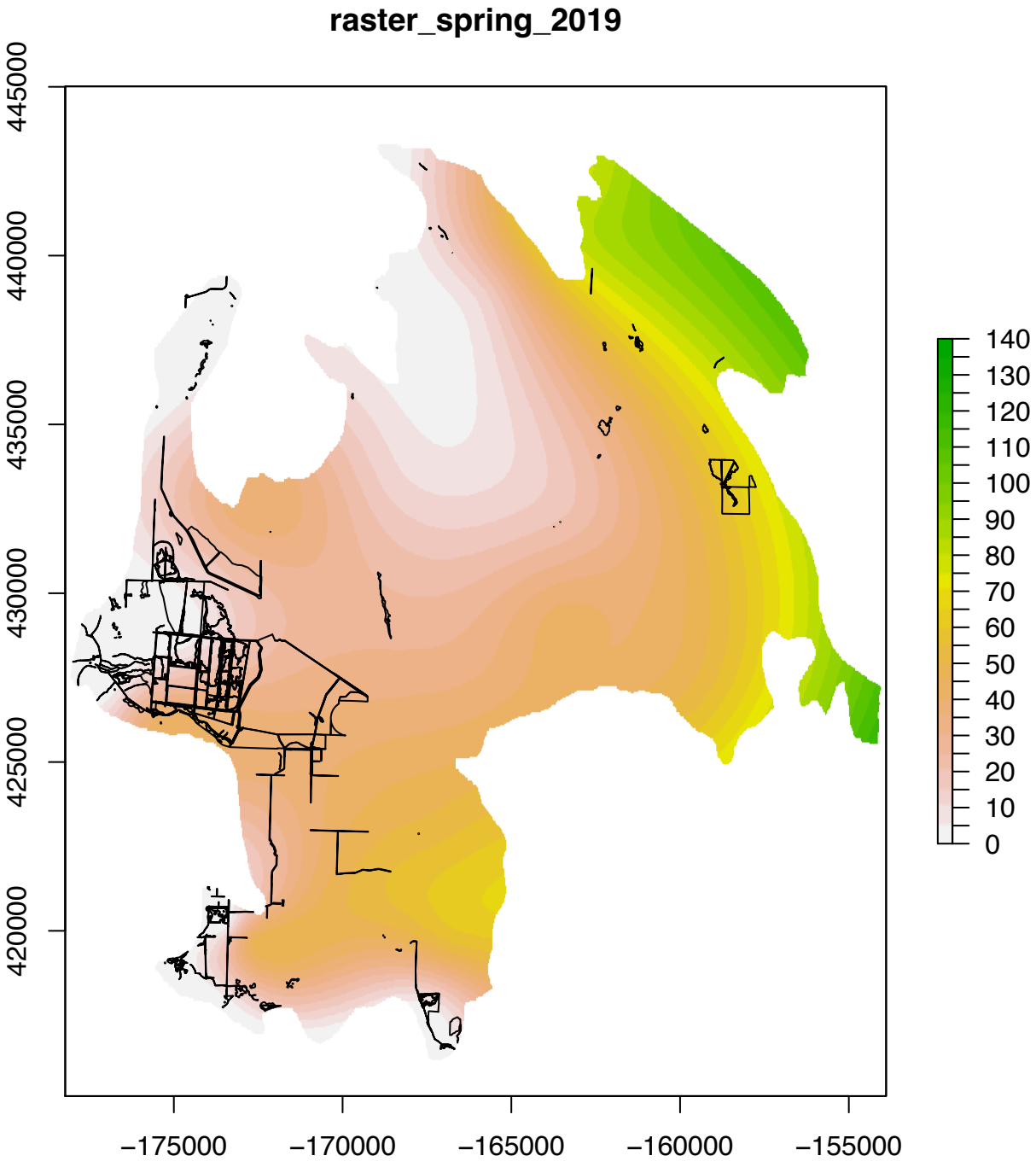


Figure 23: Depth to water, in feet below ground surface.

References

Appendix 2-D Butte Valley Integrated Hydrologic Model (BVIHM) Documentation (2024 Revision)

Larry Walker Associates, Inc

2024-06-24

Contents

List of Tables

List of Figures

Appendix 2-D - Butte Valley Integrated Hydrologic Model (BVIHM) Documentation

1 Introduction and Background

This document is Appendix 2-D, supplemental to Chapter 2 of the Butte Valley Groundwater Sus-

tainability Plan (GSP). The purpose of this appendix is to provide additional documentation on the Butte Valley Integrated Hydrologic Model (BVIHM), which was used to estimate water budget components and predict potential future water use and hydrologic conditions, as required under the Sustainable Groundwater Management Act (Cal. Water Code, Division 6, Part 2.74). Specifically, objectives of this appendix are to:

1. Document the numerical model development
2. Document the calibration of the model
3. Publish the full tables and figures of annual water budget values, a subset of which have been included in Chapter 2 of the GSP.

The developed BVIHM calculates historical and projected water budgets. It improves understanding of long-term trends in groundwater levels, and evaluates the impact of climate change, projects, and management actions on groundwater conditions. The model extends over the southwestern area of the Upper Klamath Basin defined by Gannett et al., stretching from California into Oregon (Gannett et al. 2007) (Gannett, Wagner, and Lite 2012). The BVIHM area is bounded by the Klamath River to the north, and the Upper Klamath Basin boundary to the west and south. The eastern boundary of the area extends a few miles to the east of the Butte Valley watershed (see Butte Valley GSP Chapter 2.2.3 for further details on the area extent). The area includes not only the entire Butte Valley groundwater basin, but also the entire Butte Valley watershed. The area extent beyond the Butte Valley watershed honors the continuity of the volcanic groundwater system surrounding the basin with the larger Upper Klamath Basin, Oregon and California. Besides the basin, BVIHM includes two other Bulletin 118 groundwater basins (DWR 2016): Red Rock Valley (1-018) and Bray Town Area (1-017). The eastern boundary of the BVIHM partially falls within the southwestern most areas of the Lower Klamath groundwater basin (1-002.02)

The BVIHM is an integrated hydrologic model explicitly coupling models of the land/soil subsystem and of the groundwater subsystem. For BVIHM, the surface water subsystem is ignored due to the lack of dominant river systems within the area. Smaller creeks in the mountains surrounding the basin collect local runoff and baseflow. However, all creek runoff is recharged into the groundwater system upgradient of or near the upgradient boundary of the Basin. Within the basin, Meiss Lake is a prominent surface water feature, but its interaction with groundwater is handled through the land/soil subsystem modeling.

The BVIHM land/soil subsystem is divided into A) agricultural and developed lands, and B) the natural landscape. The agricultural and developed land/soil subsystem was simulated with the Davids Engineering Crop Root Zone Water Model (CRZWM) (Davids Engineering 2013), while the natural land/soil subsystem was simulated with the USGS PRMS model (Risley 2019). The land/soil subsystem models are driven by precipitation, evapotranspiration, and crop water demand. They generate spatially and temporally distributed groundwater pumping (CRZWM) and recharge (CRZWM, PRMS) used in the groundwater simulation. CRZWM and PRMS simulate the land/soil subsystem over the BVIHM area.

The BVIHM groundwater subsystem is simulated by the USGS MODFLOW-2005 software (Harbaugh 2005). The groundwater model encompasses the alluvial aquifer system within the Basin, the volcanic aquifer system within the basin, and the surrounding volcanic aquifer

system over the remainder of the model area, which is fully connected to the Basin groundwater system. Toward presenting all geological units and adjusting magnitudes of stresses within environment (i.e., aquifer) system temporally and spatially, the BVIHM is under further refinement and calibration.

2 Model Software Summary

2.1 Precipitation Runoff Modeling Software (PRMS)

BVIHM uses the USGS PRMS model for the Upper Klamath Watershed (Risley 2019). The recent updated Upper Klamath PRMS model includes calibrated surface water and land/soil subsystems based on publicly available and well documented software. The model was not only well suited to couple to the groundwater subsystem model, but its inputs could also be adjusted to account for the DWR projected climate scenarios. The main inputs for PRMS are climate data as is daily precipitation and temperature from 32 climate stations across the Upper Klamath basin. Of these, 4 climate stations are located within 20 miles of the BVIHM area boundary, but none are located within the area. PRMS utilizes the USGS "Draper" tool to extrapolate climate station data across the simulation domain (Risley 2019).

While the Upper Klamath PRMS model includes surface water features and is calibrated to measured stream flows at several gaging stations of the Klamath River basin, none of the simulated surface water features are within the BVIHM area. Results from the PRMS model define the spatially and temporally distributed recharge across the natural landscape in the BVIHM model area, resulting from rainfall and excess soil moisture, after accounting for evapotranspiration. The temporal discretization in PRMS is daily, the spatial is by hydrologic response units, discretized into raster pixels with a side length of 888 ft (270 m; also see Butte Valley GSP Chapter
2.2.3).

2.2 Crop Root Zone Water Model (CRZWM)

Davids Engineering developed a Crop Root Zone Water Model (CRZWM) (Appendix 2-E ET and Applied Water Estimates) that calculates the root zone water budget based on the water budget components in Figure 1. PRMS accounts for the root zone water balance parameters using soil type-specific information and crop information for years 2000, 2010, and 2014. Similar to PRMS, the CRZWM uses precipitation and reference evapotranspiration as the driving model inputs. In CRZWM, spatially interpolated rainfall data from Oregon State's PRISM tool[1] are employed. CRZWM also uses remotely sensed crop data (NDVI estimates using Landsat imagery) to complement crop and irrigation type information when computing crop evapotranspiration (Davids Engineering 2013). Importantly, CRZWM (unlike PRMS) estimates the water demand (*applied water*) needed to produce the crops imaged by the satellite, given the amount of precipitation, evapotranspiration, crop type, and irrigation system. All irrigation (*applied water*) in the basin is from groundwater pumping. Hence, *applied water* defines the spatially and temporally distributed amount of groundwater pumping. The model's simulation of "*deep percolation*" is assumed to become groundwater recharge.

CRZWM covers all agricultural and developed lands in the area including those within and adjacent to the basin, including smaller agricultural areas in Red Rock Valley and near the Bray- town area. The temporal discretization in CRZWM is daily, the spatial discretization is by individual field polygons (also see Butte Valley GSP Chapter 2.2.3). Daily water budget components were aggregated to monthly values for the BVIHM.

[1] PRISM website: http://prism.oregonstate.edu/

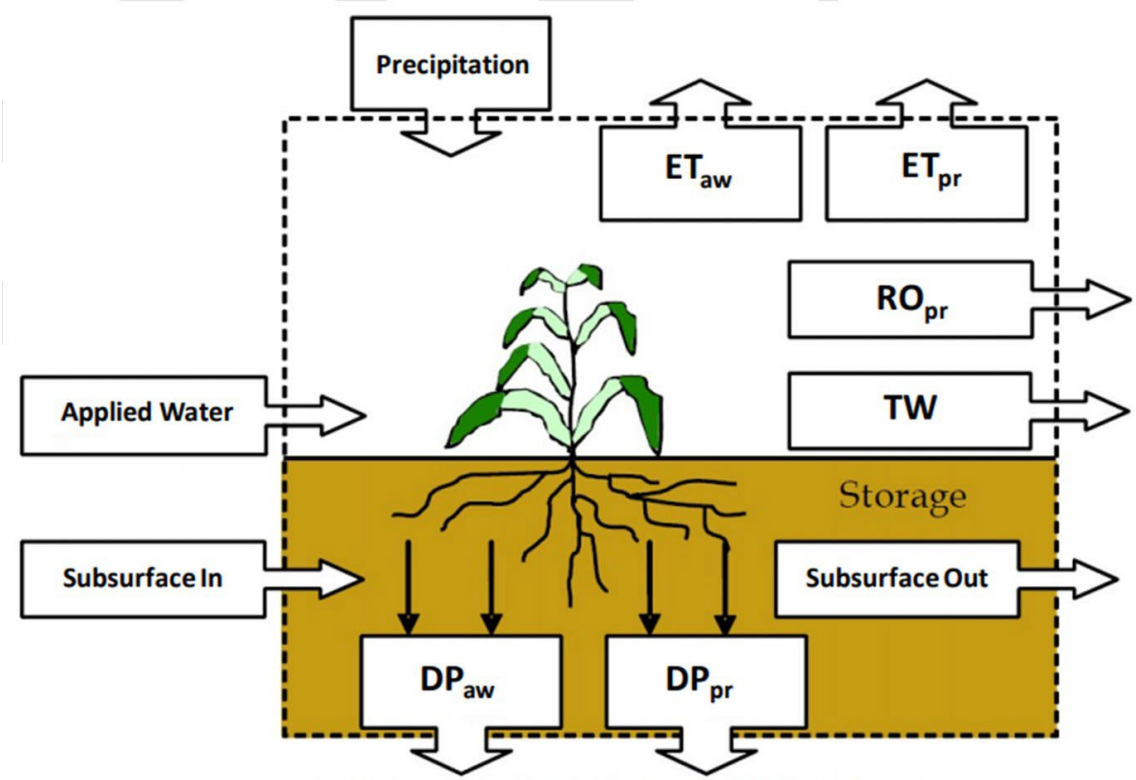


Figure 1: Conceptualization of Fluxes of Water Into and Out of the Crop Root Zone

2.3 MODFLOW

MODFLOW software uses a finite difference method to simulate groundwater flow numerical model via user-provided inputs of initial conditions, aquifer hydraulic parameters, and boundary conditions. MODFLOW simulates the spatially and temporally variable dynamics of groundwater fluxes and groundwater elevations. The data is used to characterize a water budget for the basin and evaluate changes in future water levels due to climate changes, projects, and water resources managements.

3 Model Construction

Development of the two land/soil subsystem models in BVIHM is documented extensively in the above-mentioned references. The following sections explain the development of the groundwater flow numerical model by using MODFLOW-2005.

3.1 Model Domain

The BVIHM domain encompasses the entire Butte Valley watershed which includes the Butte Valley alluvial aquifer that nearly covers the same area as the Bulletin 118 basin in Figure 2. The watershed that encompasses the alluvial aquifer has a volcanic subsurface. Details of the model domain boundary are described in the Butte Valley GSP Chapter 2.2.3.