Montecito Groundwater Basin
Groundwater Sustainability Agency

Montecito Groundwater Basin Groundwater Sustainability Plan

Final Draft - May 19, 2023



FOREWORD

May 2023

Dear Community Members and Montecito Groundwater Basin Stakeholders,

On behalf of the Montecito Groundwater Basin Groundwater Sustainability Agency (Montecito GSA), it is with great pleasure that I present the Groundwater Sustainability Plan (Plan) for the Montecito Groundwater Basin pursuant to the Sustainable Groundwater Management Act (SGMA). This Plan was developed over the past several years and involved the hard work and dedication of many. We are grateful to the Agency's Board of Directors and Staff, our expert consultant Dudek, the members of our Advisory Committees, and engaged community members for their critical contributions and commitment to the development of this Plan.

Groundwater is an important local source of water that is heavily relied upon by our entire community, particularly during drought. To that end, our sustainability goal is *to prevent undesirable results and optimize long-term use of the groundwater basin for the benefit of all stakeholders. This will be achieved through a collaborative, knowledge-based process informed by locally defined quantitative criteria, ongoing monitoring and modeling, and incremental, data-supported management actions as needed to prevent seawater intrusion and ensure sustainable groundwater levels, storage, and quality.*

Plan implementation will begin from a good place in seeking to achieve this sustainability goal. After extensive data gathering, analysis, and modeling, we have determined that the Basin is in relatively good health. Based on all available information and our locally defined Sustainable Management Criteria, the basin is currently not experiencing undesirable results as defined by SGMA.

Nonetheless, Plan development revealed areas where we would benefit from additional information about the Basin. The Agency is committed to filling these data gaps during the initial phase of Plan Implementation to gain an even better understanding of the Basin and to assist in its monitoring and management. Numerous projects and management actions aimed at filling these data gaps are planned over the next five years. The Montecito GSA will continue to aggressively pursue grant funding as it has done in the past to minimize the financial burden of SGMA compliance on all stakeholders.

This is a Plan that our Agency and entire community can be proud of. We continue to encourage stakeholder involvement as we complete the plan development phase of this process and embark on its implementation.

I am honored to be submitting this Plan to the California Department of Water Resources on behalf of our community and the Montecito GSA.

Sincerely,

Brian Goebel
Montecito GSA Board President

SIGNATURE PAGE

This Groundwater Sustainability Plan for the Montecito Groundwater Basin has been prepared under the direction of a professional geologist licensed in the State of California as required by the California Code of Regulations, Title 23, Section 354.12, consistent with professional standards of practice.



Matt Naftaly
P.G. No. 9839

Acknowledgements

The Montecito GSA gratefully acknowledges all those that have contributed to the development of the Groundwater Sustainability Plan for the Montecito Groundwater Basin and for the funding contribution of the California Department of Water Resources. Funding for this GSP has been provided in part from Proposition 68 (Round 3) grant from the Sustainable Groundwater Management Grant Program

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TABLE OF CONTENTS

Section **Page No.**

ACRONYMS AND ABBREVIATIONS ..... ACR-i

EXECUTIVE SUMMARY ES-1

1 INTRODUCTION 1-1
- 1.1 Purpose of the Groundwater Sustainability Plan 1-1
- 1.2 Sustainability Goal 1-2
- 1.3 Agency Information 1-2
  - 1.3.1 Organization and Management Structure of the Groundwater Sustainability Agency 1-3
  - 1.3.2 Legal Authority of the Groundwater Sustainability Agency 1-3
  - 1.3.3 Estimated Cost of Implementing the GSP and the Montecito GSA's Approach to Meeting Costs 1-4
- 1.4 Groundwater Sustainability Plan Organization 1-4
- 1.5 References Cited 1-5

2 PLAN AREA AND BASIN SETTING 2-1
- 2.1 Description of the Plan Area 2-1
  - 2.1.1 Summary of Jurisdictional Areas and Other Features 2-3
  - 2.1.2 Existing Monitoring Programs 2-6
  - 2.1.3 Existing Management Plans 2-13
  - 2.1.4 Existing Groundwater Regulatory Programs 2-17
  - 2.1.5 Land Use Elements or Topic Categories of Applicable General Plans 2-24
  - 2.1.6 Additional GSP Elements 2-43
  - 2.1.7 Notice and Communication 2-43
- 2.2 Basin Setting 2-48
  - 2.2.1 Historical, Current, Projected Climate 2-48
  - 2.2.2 Hydrogeologic Conceptual Model 2-52
  - 2.2.3 Principal Aquifers and Aquitards 2-57
  - 2.2.4 Historical and Current Groundwater Conditions 2-59
- 2.3 Water Budget 2-82
  - 2.3.1 Surface Water and Groundwater Model 2-83
  - 2.3.2 Inflow to Groundwater System 2-86
  - 2.3.3 Outflow from Groundwater System 2-90
  - 2.3.4 Change in Annual Volume of Groundwater in Storage 2-94
  - 2.3.5 Quantification of Historical, Current, and Future Water Budget 2-95
  - 2.3.6 Discussion of Model Calibration and Uncertainties 2-104
  - 2.3.7 Quantification of Overdraft 2-106
  - 2.3.8 Estimate of Sustainable Yield 2-106

2.3.9 Surface Water Available for Groundwater Recharge or In-Lieu Use 2-107
2.4 Management Areas 2-109
2.5 References Cited 2-109

3 SUSTAINABLE MANAGEMENT CRITERIA 3-1
3.1 Sustainability Goal 3-1
3.1.1 Achieving and Maintaining Sustainability 3-2
3.1.2 Monitoring and Evaluating Sustainability in the Montecito Groundwater Basin 3-4
3.2 Undesirable Results 3-6
3.2.1 Chronic Lowering of Groundwater Levels – Undesirable Results 3-6
3.2.2 Reduction of Groundwater in Storage – Undesirable Results 3-10
3.2.3 Seawater Intrusion – Undesirable Results 3-11
3.2.4 Degradation of Water Quality – Undesirable Results 3-12
3.2.5 Land Subsidence – Undesirable Results 3-14
3.2.6 Depletions of Interconnected Surface and Groundwater – Undesirable Results 3-14
3.2.7 Identifying the Occurrence of Undesirable Results in the Montecito Groundwater Basin 3-15
3.3 Minimum Thresholds 3-19
3.3.1 Chronic Lowering of Groundwater Levels – Minimum Thresholds 3-19
3.3.2 Reduction of Groundwater in Storage – Minimum Thresholds 3-23
3.3.3 Degraded Water Quality – Minimum Thresholds 3-24
3.3.4 Seawater Intrusion – Minimum Thresholds 3-29
3.3.5 Land Subsidence – Minimum Thresholds 3-31
3.3.6 Depletions of Interconnected Surface and Groundwater – Minimum Thresholds 3-31
3.4 Measurable Objectives 3-31
3.4.1 Chronic Lowering of Groundwater Levels – Measurable Objectives 3-31
3.4.2 Reduction of Groundwater Storage – Measurable Objectives 3-32
3.4.3 Seawater Intrusion – Measurable Objectives 3-32
3.4.4 Degraded Water Quality – Measurable Objectives 3-32
3.4.5 Land Subsidence – Measurable Objectives 3-33
3.4.6 Depletions of Interconnected Surface Water and Groundwater – Measurable Objectives 3-33
3.5 Monitoring Network 3-33
3.5.1 Monitoring Network Objectives 3-33
3.5.2 Description of Monitoring Network 3-33
3.5.3 Monitoring Network and Sustainability Indicators 3-39
3.5.4 Monitoring Network Implementation 3-42
3.5.5 Monitoring and Reporting Protocols 3-43
3.5.6 Representative Monitoring 3-44

3.5.7 Assessment and Improvement of Monitoring Network 3-44
3.6 References Cited 3-46

4 PROJECTS AND MANAGEMENT ACTIONS 4-1
4.1 Baseline Projects and Management Actions 4-3
4.1.1 Expand Groundwater Level and Quality Monitoring 4-3
4.1.2 Expand Seawater Intrusion Monitoring Network 4-4
4.1.3 Evaluate Groundwater–Surface Water Interactions 4-6
4.1.4 Develop Stakeholder Incentive Programs 4-7
4.1.5 Update Basin Numerical Model 4-9
4.1.6 Enhance Groundwater Well Database 4-10
4.2 Possible Future Projects and Management Actions 4-12
4.2.1 Develop/Acquire Supplemental Water for Well Owners 4-12
4.2.2 Require Well Metering 4-13
4.2.3 Develop/Impose Pumping Allocations 4-14
4.2.4 Develop/Implement Recharge Projects 4-15

5 PLAN IMPLEMENTATION 5-1
5.1 Implementation of the GSP 5-1
5.1.1 Baseline Projects and Management Actions 5-1
5.1.2 Data Collection, Analysis, and Reporting 5-1
5.1.3 Annual Report Preparation 5-2
5.1.4 Preparation of the 5-Year Evaluation 5-2
5.2 GSP Implementation Schedule 5-2
5.3 Estimated Costs for GSP Implementation 5-2
5.3.1 Funding Sources 5-5
5.4 Annual Reporting 5-5
5.5 Periodic Evaluations 5-6
5.6 References Cited 5-7

FIGURES

1-1 The Montecito Groundwater Basin and Water District Boundaries 1-7
2-1 Plan Area and Contributing Watersheds 2-117
2-2 Water Purveyors within and Adjacent to the Groundwater Sustainability Agency Boundary 2-119
2-3 Jurisdictional Boundaries 2-121
2-4 Water Infrastructure Map 2-123
2-5 Existing Groundwater Monitoring Network 2-125
2-6 Weather Stations and Average Annual Precipitation in the Plan Area (1981–2010) 2-127
2-7 Existing Grant-Funded Monitoring Programs 2-129
2-8 Current Land Use 2-131
2-9 Census-Designated Places and Population 2-133
2-10 Water Year Precipitation 2-135

2-11 Hydrogeologic Conceptual Model 2-137
2-12a Dibblee Geologic Map 2-139
2-12b Dibblee Geologic Map Legend 2-141
2-13 A–A′ Geologic Cross Section 2-143
2-14 B–B′ Geologic Cross Section 2-145
2-15 C-C′ Geologic Cross Section 2-147
2-16 Geologic Cross Sections Legend 2-149
2-17 Groundwater Elevation Contours Spring 1995 2-151
2-18 Groundwater Elevation Contours Fall 2015 2-153
2-19 Groundwater Elevation Contours Spring 2019 2-155
2-20 Groundwater Elevation Contours Fall 2019 2-157
2-21 Groundwater Levels in Key Indicator Wells 2-159
2-22 Groundwater Wells with Elevated Chloride Concentrations 2-161
2-23 Seawater Intrusion Monitoring Wells Water Quality Composition Pie Charts 2-163
2-24 Seawater Intrusion Monitoring Wells Water Quality Piper Plots 2-165
2-25 Seawater Intrusion Monitoring Wells: Ratio of Chloride (Cl^-) to Bicarbonate (HCO_3^-) 2 Concentrations in Groundwater 2-167
2-26 Seawater Intrusion Monitoring Wells: Ratio of Sodium (Na^+) to Chloride (Cl^-) Concentrations in Groundwater 2-169
2-27 Regulatory Cleanup Program Sites 2-171
2-28 Land Subsidence 2-173
2-29 Potential Groundwater-Dependent Ecosystems 2-175
2-30 Measured and Estimated Depth to Bedrock in the Montecito Groundwater Basin 2-177
2-31 BNM Active Model Domain and Primary Watershed Features 2-179
2-32 Climate Measurement Stations and Corresponding Reference Stations Used in the BNM 2-181
2-33 Soils and Recharge Areas Map 2-183
2-34 Parcels with Septic System 2-185
2-35 Groundwater Wells Drilled Pre- vs. Post-2015 2-187
2-36 Groundwater Well Locations and Well Density per Square Mile 2-189
2-37 Change in Groundwater in Storage and Annual Groundwater Extractions (WY 1970-2019) in the MGB 2-191
2-38 Groundwater Budget (WY 1970-2019) for the MGB 2-193
2-39 Historical, Current, and Projected Change in Groundwater in Storage (WY 1970-2069) in the MGB 2-195
3-1 Historical and Current Groundwater Elevations in Storage Unit 1 of the MGB 3-49
3-2 Historical Estimated Groundwater in Storage and Well Aeration in Storage Unit 1 of the MGB 3-51
3-3 Historical Estimated Groundwater in Storage and Well Aeration in Storage Unit 2 of the MGB 3-53
3-4 Historical and Current Groundwater Elevations in Storage Unit 3 of the MGB 3-55

3-5 Historical and Current Chloride Concentrations Measured Along the Coastline of the MGB 3-57
3-6 Wells with Chloride Concentration Measurements Used to Evaluate Sustainable Management Criteria for the MGB 3-59
3-7 Historical and Current Chloride Concentrations Measured in the Inland Portions of Storage Unit 3 in the MGB 3-61
3-8 Current Groundwater Quality Monitoring Wells in the MGB 3-63
3-9 Historical and Current Total Dissolved Solids (TDS) Concentrations Measured in Groundwater in the MGB 3-65
3-10 Historical and Current Nitrate Concentrations Measured in Groundwater in the MGB 3-67
3-11 Historical and Current Manganese Concentrations Measured in Groundwater in the MGB 3-69
3-12 Historical and Current Iron Concentrations Measured in Groundwater in the MGB 3-71
3-13 Representative Monitoring Points 3-73
3-14 Storage Unit 1 Representative Monitoring Points: Historical and Projected Water Levels, Minimum Thresholds, Measurable Objectives 3-75
3-15 Storage Unit 3 Representative Monitoring Points: Historical and Projected Water Levels, Minimum Thresholds, Measurable Objectives 3-77
3-16 Toro Canyon Representative Monitoring Points: Historical and Projected Water Levels, Minimum Thresholds, Measurable Objectives 3-79
3-17 Total Dissolved Solids (TDS): Measured Concentrations, Minimum Thresholds, and Measurable Objectives 3-81
3-18 Nitrate: Measured Concentrations, Minimum Thresholds, and Measurable Objectives 3-83
3-19 Manganese: Measured Concentrations, Minimum Thresholds, and Measurable Objectives 3-85
3-20 Iron: Measured Concentrations, Minimum Thresholds, and Measurable Objectives 3-87
3-21 Chloride: Measured Concentrations, Minimum Thresholds, and Measurable Objectives 3-89
3-22 GSP Groundwater Monitoring Network 3-91
5-1 GSP Implementation Schedule 5-9

TABLES

2-1. Summary of the Montecito Groundwater Basin, Adjacent Basins, and Contributing Watershed Area 2-3
2-2 Existing Groundwater Monitoring Network 2-7
2-3 Weather Stations and Stream Gauges in the Vicinity of the Plan Area 2-11
2-4 Produced Water Supply Portfolio (1995–2015) for the Montecito Water District Service Area 2-15
2-5 Summary of Land Use in the Plan Area 2-25
2-6 Population of the Plan Area 2-26
2-7 Summary of General Plan and Community Plan Land Use Policies Relevant to Groundwater Sustainability in the Plan Area 2-28

2-8 Stakeholders in the Plan Area 2-45
2-9 Average Water Year Precipitation from 2000 to 2019 for Select Rain Gauges in the Vicinity of the Montecito Groundwater Basin 2-49
2-10 Montecito Groundwater Basin Water Year Types 2-50
2-11 Monthly and Yearly Reference Evapotranspiration Totals for CIMIS Station No. 107 from 2010 to 2019 (Inches) 2-51
2-12 Aquifer Properties 2-57
2-13 Historical Estimates of Groundwater in Storage 2-58
2-14 Previous Estimates of Sustainable Yield 2-58
2-15 Regulatory Cleanup Site Database Review 2-68
2-16 GAMA Groundwater Quality Monitoring Summary by Constituent (All Years) 2-74
2-17 Summary of NCCAG Dataset within the MGB 2-81
2-18 Previous Estimates of Groundwater Extraction 2-93
3-1 Defining Long-Term Sustainability 3-5
3-2 Undesirable Results Associated with the Degradation of Water Quality 3-13
3-3 Representative Monitoring Points in the MGB 3-16
3-4 Water Level Minimum Thresholds and Measurable Objectives 3-22
3-5 Water Quality Minimum Thresholds and Measurable Objectives 3-27
3-6 Seawater Intrusion Minimum Thresholds and Measurable Objectives 3-30
3-7 GSP Groundwater Monitoring Network 3-34
4-1 Summary of Projects and Management Actions 4-2
5-1 GSP Implementation Planning-Level Cost Estimates (2023–2028) 5-3
5-2 GSP Implementation Planning-Level Cost Estimates Detail (2023–2028) 5-4
5-3 GSP Implementation Planning-Level Cost Estimates and Funding Sources (2023–2028) 5-5

APPENDICES

A Preparation Checklist for GSP Submittal
B Montecito GSA Governance Documents
C Communication and Engagement Plan
D Response to Comments
E Groundwater Elevation Hydrographs
F Groundwater-Dependent Ecosystem Data
G Water Budget Tables

ACRONYMS AND ABBREVIATIONS

Acronym/Abbreviation	Definition
AB	Assembly Bill
AF	acre-feet
AFY	acre-feet per year
bgs	below ground surface
BNM	Basin Numerical Model
Board	Montecito Groundwater Basin Groundwater Sustainability Agency Board of Directors
Caltrans	California Department of Transportation
CASGEM	California Statewide Groundwater Elevation Monitoring
CCR	California Code of Regulations
CCWA	Central Coast Water Authority
CDP	Coastal Development Permit
Central Coast Basin Plan	Water Quality Control Plan for the Central Coastal Basin
CEP	Communications and Engagement Plan
CEQA	California Environmental Quality Act
CIMIS	California Irrigation Management Information System
CLUP	Coastal Land Use Plan
Commission	California Coastal Commission
COPC	constituent of potential concern
County	Count of Santa Barbara
CWC	California Water Code
DDW	Division of Drinking Water
DWR	Department of Water Resources
ET	evapotranspiration
ETo	reference evapotranspiration
GAMA	Groundwater Ambient Monitoring and Assessment
GDE	groundwater-dependent ecosystem
GSA	Groundwater Sustainability Agency
GSP	Groundwater Sustainability Plan
GTC	Geotechnical Consultants Inc.
GWMP	groundwater management plan
ILRP	Irrigated Lands Regulatory Program
InSAR	interferometric synthetic aperture radar
IRWM	Integrated Regional Water Management
LCP	Local Coastal Program
MCL	maximum contaminant level
MGB	Montecito Groundwater Basin
mg/L	milligrams per liter
MGMO	Montecito Growth Management Ordinance
MNW2	Multi-Node Well
Montecito GSA	Montecito Groundwater Basin Groundwater Sustainability Agency
MSL	mean sea level

Acronym/Abbreviation	Definition
MWD	Montecito Water District
NCCAG	Natural Communities Commonly Associated with Groundwater
NDMI	Normalized Derived Moisture Index
NDVI	Normalized Derived Vegetation Index
NHD	National Hydrography Dataset
NPDES	National Pollutant Discharge Elimination System
Ocean Plan	Water Quality Control Plan for Ocean Waters of California
OWTS	on-site wastewater treatment system
PET	potential evapotranspiration
Porter–Cologne Act	Porter–Cologne Water Quality Control Act of 1969
PRMS	Precipitation Runoff Modeling System
RMP	representative monitoring point
RWQCB	Regional Water Quality Control Board
SAC	Stakeholder Advisory Committee
SB	Senate Bill
SFR	streamflow routing
SGMA	Sustainable Groundwater Management Act
SMCL	secondary maximum contaminant level
SWP	State Water Project
SWRCB	State Water Resources Control Board
TAC	Technical Advisory Committee
TDS	total dissolved solids
TNC	The Nature Conservancy
USGS	U.S. Geological Survey
UWMP	Urban Water Management Plan
WDR	waste discharge requirement

Executive Summary



MISSION

To ensure a reliable and sustainable groundwater supply for the community through effective basin management pursuant to the Sustainable Groundwater Management Act.

SUSTAINABILITY GOAL

To prevent undesirable results and optimize long-term use of the groundwater basin for the benefit of all stakeholders. This will be achieved through a collaborative, knowledge-based process informed by locally-defined quantitative criteria, ongoing monitoring and modeling, and incremental, data-supported management actions as needed to prevent seawater intrusion and ensure sustainable groundwater levels, storage, and quality.

SGMA & the Montecito GSA

The Sustainable Groundwater Management Act (SGMA) was signed into law by Governor Jerry Brown on September 16, 2014, and created a framework for statewide groundwater management in California with an emphasis on local control. Compliance with the SGMA, including Groundwater Sustainability Agency (GSA) formation and Groundwater Sustainability Plan (GSP) development and implementation is required for the Montecito Groundwater Basin (MGB) because it is categorized as a "medium priority" basin by the California Department of Water Resources (DWR). This priority categorization by DWR was based on several factors, including population, groundwater well density, groundwater reliance, and irrigated acreage.

In November 2018, a single-agency GSA formed by the Montecito Water District (MWD) was recognized by DWR following a 2-year process involving extensive public outreach. In April 2019, the Montecito Groundwater Basin Groundwater Sustainability Agency (Montecito GSA) held its inaugural meeting. Since that time, the Montecito GSA has worked diligently with public involvement to develop this GSP for timely submission in mid-2023.

This intensive 5-year effort has resulted in a substantially increased understanding of the Montecito Groundwater Basin. Based on available data and analysis, the Montecito GSA has determined that the Montecito Groundwater Basin is not currently experiencing undesirable results.

Therefore, Montecito GSA will continue to focus its efforts on knowledge acquisition, data gathering and analysis, and vigilant monitoring. Incremental management actions will be taken only if Sustainable Management Criteria (SMCs) demonstrate they are necessary. These findings and anticipated future projects are detailed in the Groundwater Sustainability Plan.

Groundwater is an important local source of water that is heavily relied upon, particularly during drought. Numerous wells, public and private, draw from the Montecito Groundwater Basin. Maintaining long-term sustainability of this water supply for all stakeholders, by granting local authority for planning and management, is the core goal of the SGMA.



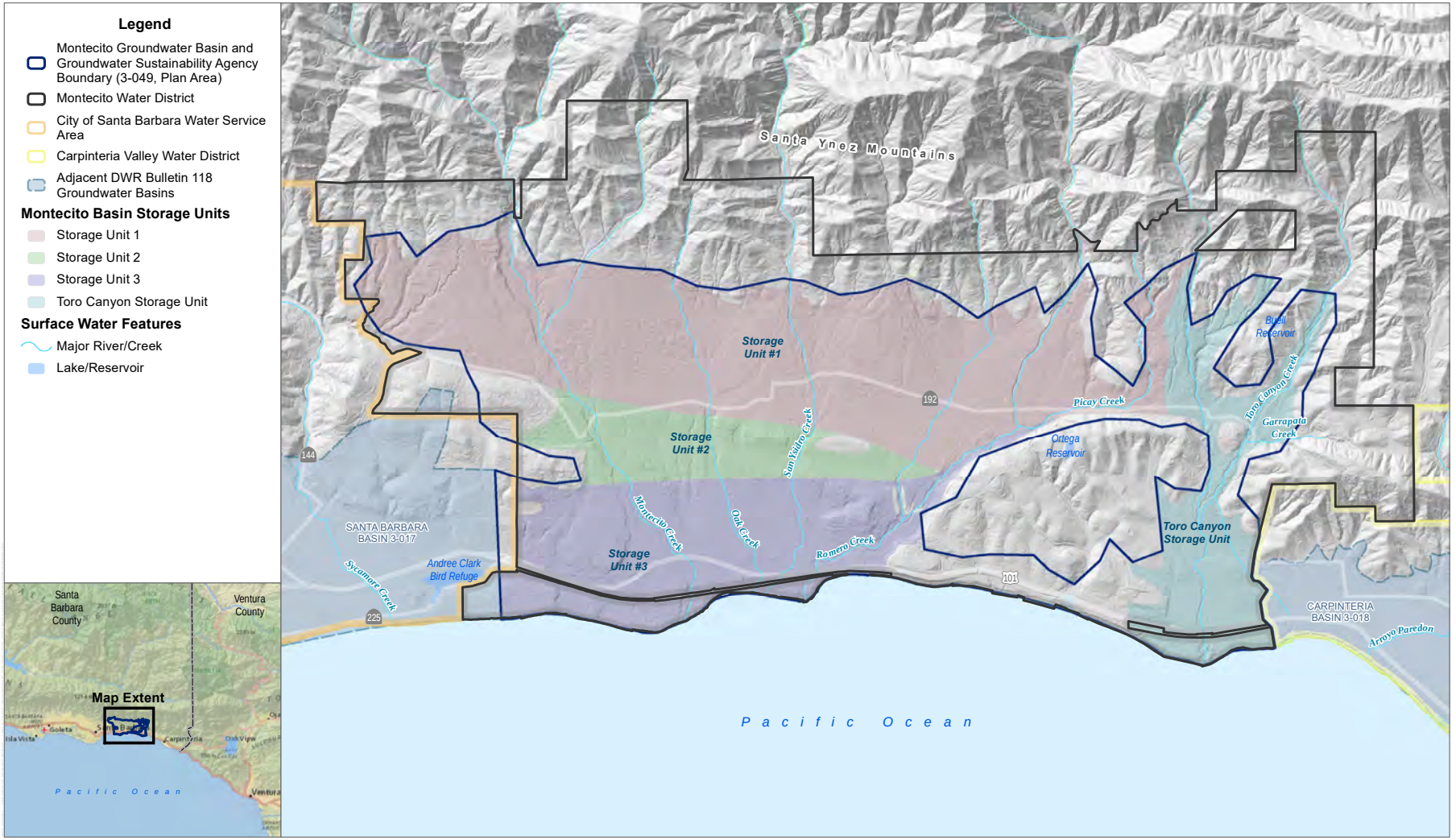
About The Montecito Groundwater Basin

The Montecito Groundwater Basin(MGB) encompasses about 9.6 square miles on the south coast of Santa Barbara County. The MGB underlies the unincorporated communities of Montecito, Summerland, the eastern edge of the City of Santa Barbara, and the western edge of the Carpinteria Valley. (Figure ES-1). The MGB is bounded to the north by the Santa Ynez Mountains, to the east by Carpinteria Groundwater Basin, to the west by Santa Barbara Groundwater Basin, and to the south by the Pacific Ocean. There is at least partial physical continuity between the MGB and adjacent groundwater basins. The Montecito GSA is coordinating groundwater management with both the Carpinteria Groundwater Sustainability Agency and City of Santa Barbara through Memoranda of Understanding. Land surface elevations overlying the MGB range from approximately 1,100 feet above sea level abutting the northernmost slopes of the Santa Ynez Mountains to sea level along the coast. MWD is the primary water service provider in the communities that overlie the MGB (Figure ES-1).

During development of this GSP, the Montecito GSA conducted extensive data collection from all publicly available sources and existing monitoring networks overlying the MGB. This data was used to inform and assist the development of the GSP. Specifically, the data was used to develop an understanding of the MGB geology and hydrogeology by modeling how groundwater conditions have changed over time and are projected to change. The Montecito GSA used this data to guide the development of elements of the GSP such as sustainable management criteria and identify projects and management actions.



Figure ES-1. The Montecito Groundwater Basin and Water District Boundaries



Data Sources and Tools

The SGMA requires preparation of a hydrogeologic conceptual model, which is defined as "a description of the hydrogeologic framework governing the occurrence of groundwater and its flow through and across the boundaries of a basin and the general groundwater conditions in a basin or subbasin. The hydrogeologic conceptual model prepared for the MGB is depicted in Figure ES-2. The figure shows that the general structure of the MGB consists of the unconsolidated alluvial sediments of the central coastal plain overlying the uptilted bedrock of the Transverse Ranges of which the Santa Ynez Mountains are part. The water-bearing units include the Santa Barbara Formation, the Casitas Formation, and the alluvium and terrace deposits.

Within the MGB, there are several east–west trending faults that act to varying degrees as barriers to the migration of groundwater. For this reason and because of the differences in land use, groundwater extractions, and data availability between these zones, the MGB has historically been divided into storage units.

- **Storage Unit 1** extends from the Arroyo Parida Fault to the northern boundary of the MGB.
- **Storage Unit 2** resides between the Arroyo Parida Fault (north) and the Montecito Fault (south).
- **Storage Unit 3** extends from the Montecito Fault to the Pacific Ocean (the MGB's southern boundary).
- **The Toro Canyon Storage Unit** makes up the eastern boundary of the MGB and is separated from the other storage units by outcropping bedrock that exists on Ortega Ridge north of Summerland.

The direction of groundwater flow is generally from north to south, from the Santa Ynez Mountains to the Pacific Ocean, and there is limited exchange of groundwater with the adjacent groundwater basins. Sources of MGB recharge include mountain-front recharge from the Santa Ynez Mountains, areal infiltration of precipitation, infiltration of creek flow, and inflow from adjacent groundwater basins. Sources of MGB groundwater loss include extractions through groundwater wells, evapotranspiration, and underflow out to the Pacific Ocean or adjacent groundwater basins. There are several data gaps regarding different components of the MGB hydrogeologic conceptual model. These gaps include extractions from private wells, infiltration from creek flow, and the influence of faults on groundwater flow and storage. Nonetheless the Montecito GSA has a much improved understanding of the MGB. The Montecito GSA monitoring program, grant projects, and planned projects and management actions will provide additional data to reduce these gaps through GSP implementation.

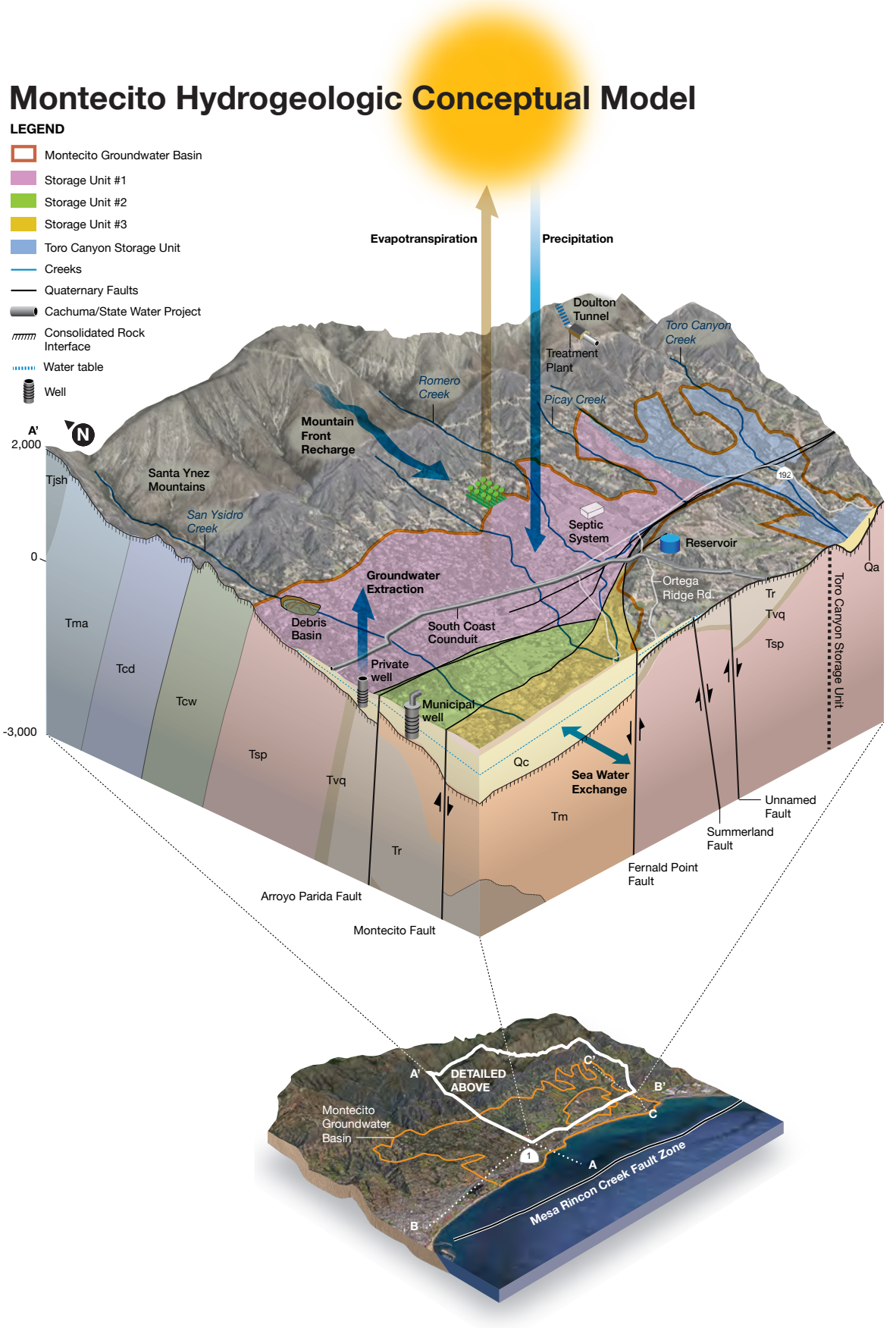
MONITORING NETWORKS

To understand conditions in and effectively manage a groundwater basin, data is collected periodically at groundwater wells and other sites within a groundwater basin. Multiple monitoring networks have been implemented within the MGB by the Montecito GSA, MWD, and other entities. These include groundwater monitoring in accordance with the California Statewide Groundwater Elevation Monitoring Program and an MWD groundwater elevation monitoring program including both public and private wells since 1983. Constituents indicative of seawater intrusion have been monitored sporadically in coastal wells, and local and regional rainfall has been actively monitored by the County of Santa Barbara. There is a paucity of historical stream flow data relevant to the MGB, and this is one of the data gaps that the Montecito GSA is addressing through recent implementation of additional monitoring programs and planned projects and management actions as part of implementation of this GSP. Beginning in 2020, Montecito GSA has implemented additional grant funded programs including enhanced seawater intrusion monitoring, voluntary private well metering, surface water flow monitoring, and construction of additional monitoring wells.

BASIN NUMERICAL MODEL

Montecito GSA developed a basin numerical model to help understand the geology and hydrogeology of the MGB and to simulate future groundwater conditions for GSP planning purposes. The numerical model provides an annual accounting of total groundwater recharge, demands, and corresponding changes in the volume of groundwater in storage. The numerical model incorporates the best publicly available data over the basin to create a surface water and groundwater model to simulate both hydrogeologic and hydrologic conditions within the MGB. The surface water and groundwater portions of the model simulate watershed and subsurface flows respectively. This model was used to analyze the MGB's hydrogeologic and hydrologic properties to understand historical, current,

Figure ES-2. Montecito Hydrogeologic Conceptual Model



and future conditions and develop a water budget for the MGB. A sensitivity analysis was conducted on the model to provide insight on data gaps that exist within the MGB and their impact on the model. This analysis assisted the Montecito GSA in identifying the projects and management actions needed in the first 5 years of GSP implementation.

WATER BUDGET

A water budget identifies and quantifies various components of the hydrologic cycle within a defined area. The water budget prepared for this GSP is designed to provide an accounting and assessment of the total annual volume of groundwater and surface water entering and leaving the MGB, including historical, current, and projected water budget conditions, and the change in volume of water stored. The water budgets for the MGB were developed using the Basin Numerical Model.

The **primary** components of the groundwater budget for the MGB are:

INFLOWS

- Infiltration from rainfall
- Creek seepage
- Recharge from irrigation/septic
- Mountain front and bedrock recharge
- Subsurface inflows from adjacent basins

OUTFLOWS

- Subsurface discharges to the Pacific Ocean
- Creek discharges
- Saturation-excess runoff
- Groundwater production
- Discharges to bedrock and mountain front
- Subsurface outflows to adjacent basins

Figure ES-3, Water Budget (WY 1970-2019) for the MGB, illustrates the modeled and measured fluctuations in components over time along with the resulting cumulative change in groundwater storage.

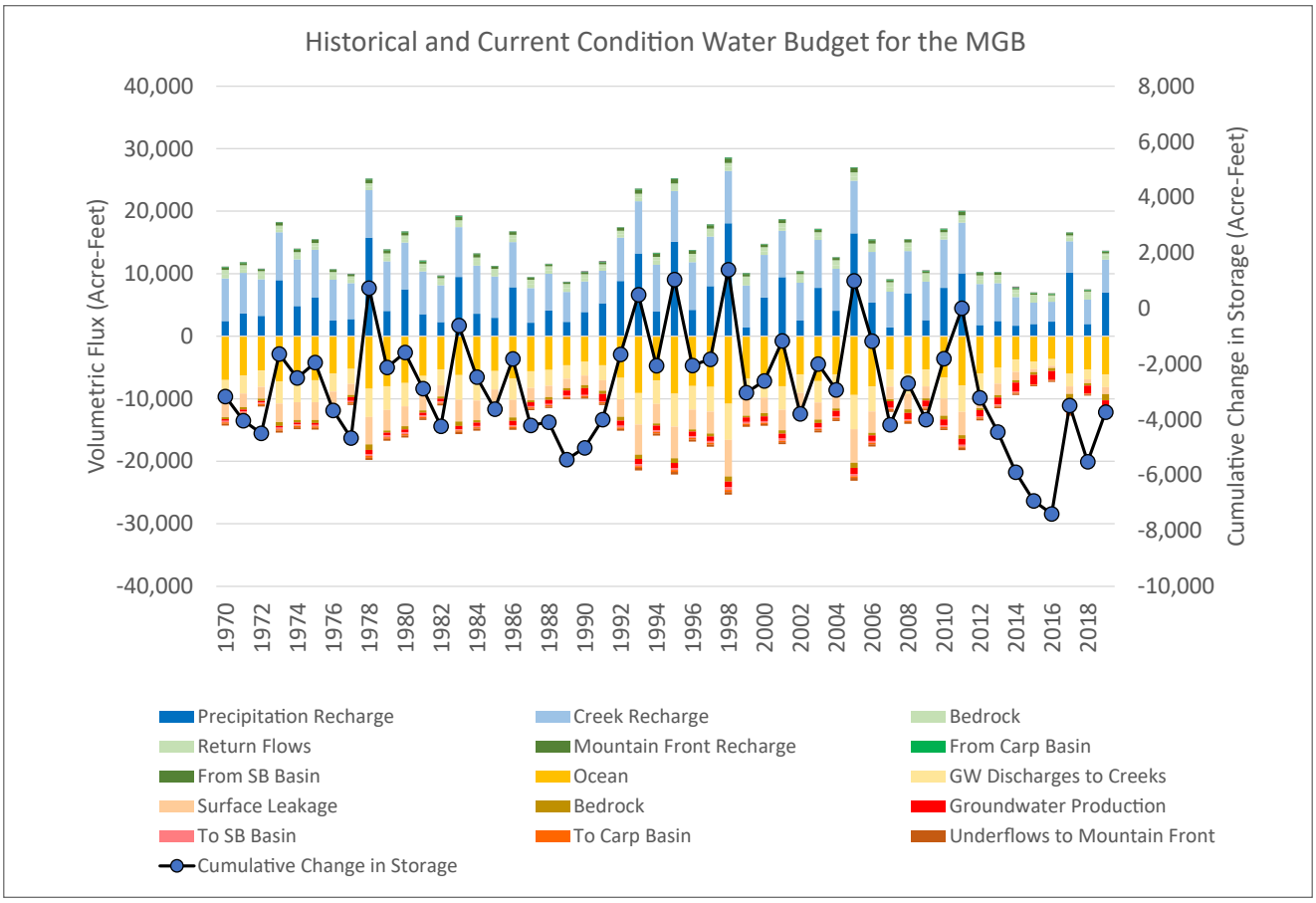
The three most significant findings of the water budget analysis with respect to the preparation of the GSP are the following:

1. Groundwater levels in the MGB are heavily influenced by climatic conditions (dry versus wet periods) and rebound quickly after wet years.

2. Groundwater demands have steadily increased throughout the historical period, peaking in the current period with the estimate annual extraction from groundwater wells ranging from 1,233 to 1,623 acre feet per year (AFY). Despite the construction of new wells along with the associated increase in groundwater demands, groundwater levels, storage, and quality conditions do not currently indicate long-term overdraft or undesirable results.

3. Modeling indicates that the MGB can sustain approximately 1,600 AFY of demand without experiencing undesirable results.

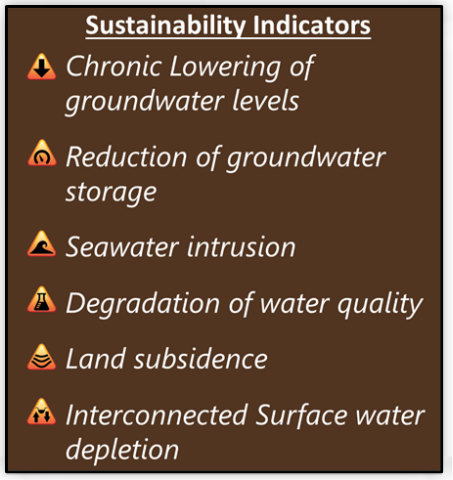
Figure ES-3. Water Budget (WY 1970-2019) for the MGB



Sustainable Management Criteria

The SGMA requires the establishment of sustainable management criteria (SMCs) for six sustainability indicators. SMC are locally defined mechanisms used to determine the sustainability of a groundwater basin. The six sustainability indicators include chronic lowering of groundwater, reduction of groundwater storage, seawater intrusion, degradation of water quality, land subsidence, and interconnected surface water depletion.

Undesirable results occur when the effects caused by groundwater conditions occurring throughout a groundwater basin cause **significant and unreasonable** impacts to any of six sustainability indicators.



The Montecito GSA must define "significant and unreasonable" conditions within the MGB related to each sustainability indicator.

Defining the SMCs for the MGB included the establishment of minimum thresholds and measurable objectives. A minimum threshold is the quantitative value that represents the groundwater conditions at a particular location, also referred to as a representative monitoring point (RMP) that, when exceeded individually or in combination with minimum thresholds at other RMPs, may cause an undesirable result(s). A measurable objective is a quantitative goal that reflects the MGB's desired groundwater conditions and allow the Montecito GSA to achieve the sustainability goal within 20 years. The minimum thresholds and measurable objectives established for each sustainability indicator is provided in Table ES-1.

Defining Undesirable Results for the MGB

The definition of significant and unreasonable for each of the six indicators was determined using the processes and criteria described in this GSP. Undesirable results are defined using RMPs selected from the broader groundwater monitoring well network in the MGB where minimum thresholds and measurable objectives are defined and monitored for the purpose of managing the MGB. There are 19 wells identified as RMPs, and SMCs have been established for the relevant sustainability indicators at each RMP (Figure ES-4). These points will be used to monitor criteria for groundwater levels, storage, and quality including seawater intrusion.

The RMP monitoring network has been configured to adequately measure developing groundwater conditions to accomplish the following monitoring objectives:

- Fill in the data gaps needed to further evaluate sustainability indicators.
- Monitor changes in groundwater conditions and compare with defined SMCs for sustainability indicators.
- Assist in calculating annual changes in MGB water budget.
- Monitor impacts to the beneficial uses and users of groundwater.

The RMPs were selected based on well characteristics including location, depth, length of historical record, access, and other criteria. The selected RMPs provide appropriate coverage to monitor changes in groundwater conditions relative to the SMCs and will allow for quantification of annual changes in groundwater storage.

Additional RMPs are intended to be added in the first 5 years of GSP implementation. These additional locations will target areas of the MGB that have identified gaps in groundwater monitoring. Most baseline projects defined in Chapter 4 of this GSP are designed to fill identified data gaps in the existing monitoring networks.

Based on available data and analyses performed to support the development of minimum thresholds and measurable objectives for the MGB, it is anticipated that undesirable results in the MGB would occur when minimum thresholds

at the majority of RMPs in a storage unit for a particular sustainability indicator (e.g., three out of four groundwater level RMPs) are exceeded for three consecutive spring monitoring events.

The SMCs defined in this GSP will be periodically re-evaluated through the SGMA-required annual reports and GSP evaluations and adjusted as needed to ensure MGB sustainability.

Of the six sustainability indicators defined by the SGMA, all are relevant to the MGB except for land subsidence. This GSP does not include SMCs for the land subsidence indicator because the MGB is not geologically susceptible to subsidence nor has groundwater extraction–related subsidence been detected historically. The Montecito GSA will monitor data associated with this indicator and update SMCs if conditions warrant in the future. As part of this GSP, SMCs have been developed for each storage unit for four of the sustainability indicators. Due to significant data gaps relating to interconnected surface water depletion, SMC development for this sustainability indicator was postponed pending the collection of additional surface flow and shallow groundwater data anticipated to take place over the next 5 years.

Figure ES-4. Representative Monitoring Points

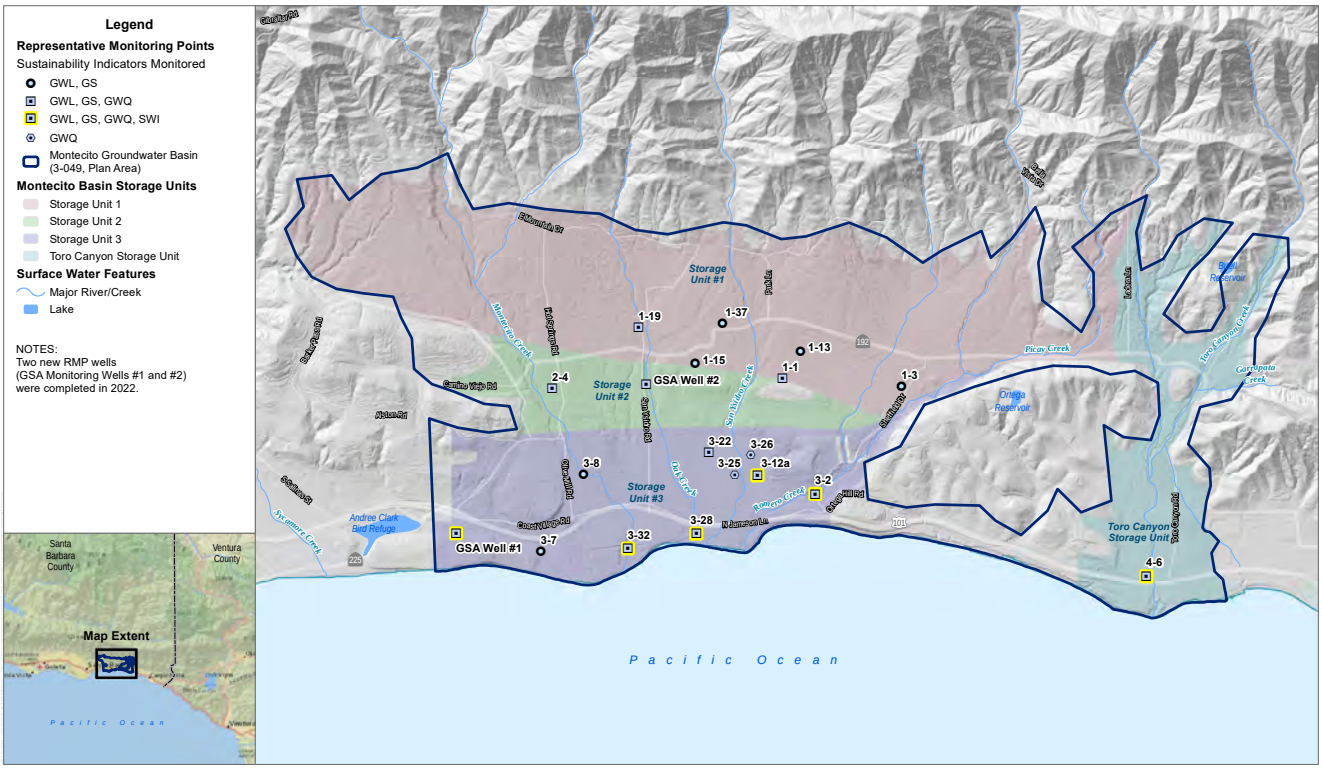


Table ES-1. Summary of Sustainable Management Criteria

SUSTAINABILITY INDICATOR	STORAGE UNIT	UNDESIRABLE RESULT	MONITORING METRIC	PROPOSED MINIMUM THRESHOLD	PROPOSED MEASURABLE OBJECTIVE	REPRESENTATIVE MONITORING POINTS
Chronic Lowering of Groundwater Levels	1	Long-term loss of well function due to well screen aeration	Groundwater elevations	Elevations 10' below historical low	Historical average groundwater elevations	6
	2			Elevations 20' below historical low		2*
	3	Groundwater levels that promote seawater intrusion		Historical low inland from coastline; mean sea level along coastline		8
	Toro Canyon			Historical low		1*
Reduction of Groundwater in Storage	1	Same as chronic lowering of groundwater levels	Groundwater elevations	Same as chronic lowering of groundwater levels		
	2					
	3					
	Toro Canyon					
Seawater Intrusion	3	Degradation of water quality	Chloride concentration	Chloride = 200 mg/L	Chloride = 100 mg/L	5
	Toro Canyon					1*
Degraded Water Quality	1	Water quality concentrations that exceed state and regional regulatory levels and objectives	Concentrations of: total dissolve solids, nitrate, iron, manganese, chloride	California Sate Drinking Water Standards/State Central Coast Basin Plan Objectives	California Sate Drinking Water Standards/State Central Coast Basin Plan Objectives	2
	2					2
	3					8
	Toro Canyon					1*
Land Subsidence	All	Determined not needed at this time due to MGB geology	Determined not needed at this time due to MGB geology			
Depletion of Interconnected Surface Water	All	Not defined at this time due to limited data	Not defined at this time due to limited data			

Notes: *Limited data exists, more RMPs to be added to Storage Unit during first 5 years of GSP implementation

Projects and Management Actions

The SGMA requires GSPs to define the projects and management actions determined to be necessary to achieve or maintain basin sustainability, including actions to respond to changing conditions, such as changes to land use and climate. **Since the MGB is not currently known to be experiencing any undesirable results, the baseline projects and management actions identified focus on data collection and analysis to reduce data gaps and expand monitoring efforts (Table ES-2).**

To sustainably manage the MGB, the Montecito GSA is committed to taking incremental actions as necessary, supported by the best available data. The identified baseline projects and management actions enhance the understanding of the MGB and allow for maintaining sustainable groundwater conditions. Additionally, the identified projects allow for the Montecito GSA to respond to changes in conditions so that undesirable results can be avoided. All the baseline projects are planned to be completed in the first 5 years of GSP implementation.

The projects and management actions defined in this GSP were developed and refined over numerous public meetings with input of the Technical and Stakeholder Advisory Committees and the Montecito GSA Board of Directors.

The projects and management actions are grouped into two categories:

- **Baseline projects and management actions:** Actions that are planned during the initial phase of GSP implementation.
- **Possible future projects and management actions:** Actions that are not anticipated at this time that the Montecito GSA may consider undertaking if MGB conditions warrant or if determined necessary to maintain sustainability. Conditions that could warrant implementation occur when monitoring and/or modeling indicate that undesirable results are occurring or are anticipated to occur.

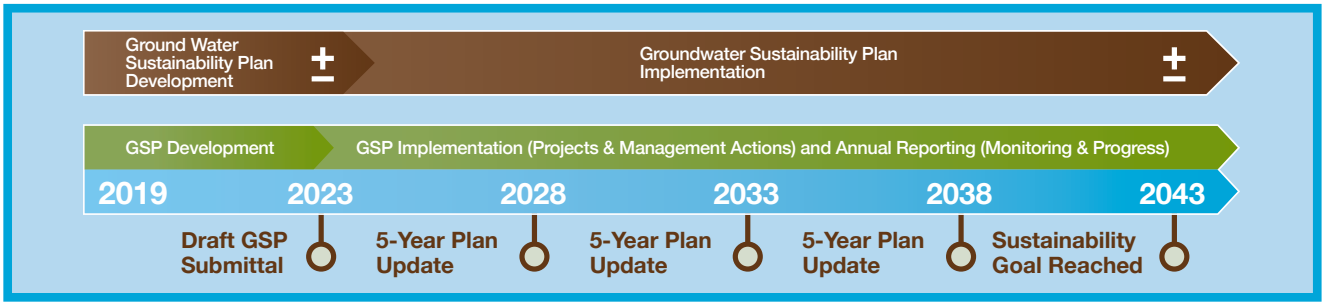


Table ES-2. Summary of Projects and Management Actions

PROJECT/MANAGEMENT ACTION	MEASURABLE OBJECTIVES BENEFITED	CIRCUMSTANCES FOR IMPLEMENTATION	SCHEDULE
Baseline Projects and Management Actions			
Expand Groundwater Level and Quality Monitoring	GL, GS, WQ, GW-SW*	GSP adoption and funding availability	Prior to first 5-year update (May 2028)
Expand Seawater Intrusion Monitoring Network	GL, GS, SWI		
Evaluate Groundwater–Surface Water Interactions	GW-SW*		
Develop Stakeholder Incentive Programs	GL, GS, WQ, GW-SW*, SWI		
Update Basin Numerical Model	GL, GS, WQ, GW-SW*, SWI		
Enhance Groundwater Well Database	GL, GS, WQ, GW-SW*, SWI		
Possible Future Projects and Management Actions			
Develop/Acquire Supplemental Water for Well Owners	GL, GS, WQ, GW-SW*, SWI	Considered if undesirable results are determined to be occurring and supplemental source(s) and funding are available	Schedule if conditions warrant
Require Well Metering	GL, GS, WQ, GW-SW*, SWI	Considered if undesirable results are determined to be likely to occur	Schedule if conditions warrant
Develop/Impose Pumping Allocations	GL, GS, WQ, GW-SW*, SWI		
Develop/Implement Recharge Projects	GL, GS, WQ, SWI		

Notes: GSP = Groundwater Sustainability Plan; GL = chronic lowering of groundwater levels; GS = reduction of groundwater in storage; WQ = degraded groundwater quality; GW-SW = depletion of interconnected surface water; SWI = seawater intrusion.
Pursuant to SGMA, the Montecito GSA may revise the projects and management actions as determined necessary to achieve sustainability.
* Measurable objectives have not been established for interconnected surface water. Implementation of these projects is expected to improve management of this sustainability indicator and support establishment of measurable objectives as part of Groundwater Sustainability Plan implementation.

GSP Implementation



This GSP serves as a roadmap for management of the MGB and identifies activities and associated costs needed for GSP implementation through 2028. As MGB conditions change and additional data is collected through monitoring and implementation of projects and management actions, the GSP will be updated accordingly. GSP implementation will be documented annually in reports submitted to DWR by April 1.

At least every 5 years following adoption of the GSP, the Montecito GSA will prepare and submit to DWR an agency evaluation and assessment report along with the annual report. This report, which is required by the SGMA, will include the implementation status of projects and management actions and a summary of the additional data and information acquired through monitoring activities. These evaluations/updates will be based on analysis of the data collected to date and incorporate necessary modifications to the GSP. Also included in the first 5-year evaluation will be a discussion of the data and information obtained that may inform and support the establishment of SMCs for the interconnected surface water–groundwater sustainability indicator.

Implementation of this GSP in the first 5 years is estimated to cost between approximately $800,000 and $1.8 million per year. The principal cost components associated with GSP implementation are as follows:

1. Implementation of baseline projects and management actions
2. Data collection, validation, and analysis
3. Annual report preparation
4. Management, administration, and other associated activities
5. Preparation of the 5-year GSP evaluations/updates

Estimates of future implementation costs beyond the first 5 years will be dependent on MGB conditions and reflect any needed adaptive management activities. Cost estimates will be reviewed and updated periodically and with each future GSP 5-year evaluation/update.

The current funding source available to the Montecito GSA for GSP implementation is a parcel fee. The Montecito GSA's 2020 5-year cost of service study and fee determination established the parcel fee through fiscal year 2025, which is collected annually on the County of Santa Barbara property tax roll for all parcels that reside over the MGB. The Montecito GSA will reassess the sufficiency of the established parcel fee periodically and will pursue a new 5-year cost of service study and fee determination if or when deemed appropriate. In addition to the parcel fee, the Montecito GSA applied for grant funds for implementation activities through the DWR Proposition 68 Sustainable Groundwater Management (SGM), Round 2 Grant program. A grant award determination is expected in mid-2023. If awarded, the grant will help fund a majority of the implementation of planned baseline projects and management actions supportive of additional data acquisition and long-term sustainability. Grant funds will continue to be pursued to the greatest extent possible in order to minimize costs and the financial burden on stakeholders.

Outreach

Montecito GSA was committed to active stakeholder and public involvement during GSP development which will continue during implementation. It was the agency's express intent to fully engage the community in the process of GSP development in order to implement its mission, comply with the SGMA, and serve the stakeholders in the MGB. A Communication and Engagement Plan (CEP) conforming to the guidance document established by DWR was drafted and adopted by the Montecito GSA in 2020.

A dedicated website provided up-to-date information throughout the GSP development process, along with the opportunity for visitors to join the stakeholder updates list. The stakeholder list built over time represents a diverse range of beneficial users and uses, such as local non-well owners, agriculture, domestic private well users, private water companies, environmental organizations, adjacent basins, government agencies, consultants, and the public at-large. Continuous outreach efforts included direct mailings, e-newsletters, press releases, advertisements in local media, articles, public meetings, event participation, and community presentations. Structured participation was organized through the formation of both a Stakeholder and Technical Advisory Committee, which held regularly scheduled public meetings. Between April 2019 and May 2023, Montecito GSA held more than 80 public meetings, material from which was and remains readily available on the website.



Conclusion

This GSP provides a valuable benefit to the community. It documents vital information about the MGB, which is an essential local water supply, particularly during drought. Through diligent data collection and analysis, and the setting of sustainability criteria, Montecito GSA has found no evidence that undesirable results exist currently or have occurred historically in the MGB. Data still needed for effective ongoing monitoring and evaluation has been identified, along with the specific projects to be implemented that will supply this important missing information. The five-year planning period covered in this GSP focuses on data acquisition projects. To achieve its goals, the Montecito GSA remains committed to fiscal responsibility and efficiency, minimizing costs, and pursuing grant funding to the greatest extent possible for all applicable projects and activities. The Montecito GSA and its GSP demonstrate effective management of the Montecito Groundwater Basin, taking into account the interests of all local groundwater users and stakeholders.



CHAPTER 1
INTRODUCTION

1.1 PURPOSE OF THE GROUNDWATER SUSTAINABILITY PLAN

The Montecito Groundwater Basin Groundwater Sustainability Agency (Montecito GSA), which consists exclusively of the Montecito Water District (MWD), has prepared this Groundwater Sustainability Plan (GSP) for the Montecito Groundwater Basin (MGB; DWR Basin No. 3-049). Upon formation, the Montecito GSA developed its Mission Statement, which is to "ensure a reliable and sustainable groundwater supply for the community through effective basin management pursuant to the Sustainable Groundwater Management Act" (Montecito GSA 2023a) This GSP was prepared in compliance with the 2014 Sustainable Groundwater Management Act (SGMA), which is codified in California Water Code (CWC), Part 2.75 (Sustainable Groundwater Management), Section 10720 et seq.[1] This GSP has been developed in accordance with the Department of Water Resources (DWR) GSP regulations[2] and applies to the entirety of the MGB.

Under the SGMA, a condition of groundwater sustainability within the basin must be reached and sustained for the 50-year planning and implementation horizon. Sustainability is defined as the absence of significant and unreasonable results as related to the six sustainability indicators: chronic lowering of groundwater levels, loss of groundwater storage, seawater intrusion, degraded water quality, land subsidence, and disconnection of interconnected surface and groundwater. Although the SGMA specifies the undesirable results to be addressed, the definition of significant and unreasonable is to be determined by the GSA in consideration of the beneficial uses and users of groundwater, land use, and basin interests.

As described in Chapter 3, Sustainable Management Criteria, of this GSP, undesirable results are not currently occurring within the MGB. However, geographical and/or temporal data gaps exist with respect to some sustainability indicators (Section 3.5.7.2, Identification of Data Gaps). The Montecito GSA has begun filling the data gaps with the implementation of several projects (Section 2.1.2.5, Monitoring Network Grant Programs) and will continue and supplement these projects with the execution of the baseline projects and management actions described in Chapter 4, Projects and Management Actions, of this GSP. Section 3.5, Monitoring Network, describes the data collection program for evaluation and adjustment of the sustainability criteria over the 20-year implementation period to ensure that the sustainability goal described in Section 1.2 is achieved.

This GSP evaluates the historical and current conditions of the MGB as they relate to sustainable management, as well as future conditions that may occur, and defines the conditions under which the groundwater resources will be sustainably managed in the future to support the diverse MGB interests. Available data and information have been gathered, and additional data will continue to be collected to specifically target indicators of sustainability over the next 20 years. This GSP documents a practical approach, determined by the Montecito GSA in collaboration with stakeholders and informed by the best available information, to achieving the sustainability goal and maintaining the long-term sustainability of the groundwater resources within the MGB.

1 Specific sections of the CWC are cited in this GSP as "CWC Section [...]."

2 "GSP regulations" refers to the emergency regulations adopted by DWR as California Code of Regulations (CCR), Title 23 (Waters), Division 2 (Department of Water Resources), Chapter 1.5 (Groundwater Management), Section 350 et seq. Specific Sections of the CCR are cited in the GSP as "CCR Section [...]."

1.2 SUSTAINABILITY GOAL

This GSP is intended to meet the overarching sustainability goal developed by the Montecito GSA to operate the MGB within the sustainable yield without causing undesirable results. The Montecito GSA's sustainability goal is defined as follows (Montecito GSA 2023b):

> The Montecito GSA's sustainability goal is to prevent undesirable results and optimize long-term use of the groundwater basin for the benefit of all stakeholders.
>
> This will be achieved through a collaborative, knowledge-based process informed by locally-defined quantitative criteria, ongoing monitoring and modeling, and incremental, data-supported management actions as needed to prevent seawater intrusion and ensure sustainable groundwater levels, storage, and quality.

1.3 AGENCY INFORMATION

The Montecito GSA is the single-agency GSA responsible for implementing the SGMA requirements within the MGB. The MGB is designated by the DWR under CWC Section 12924 as one of California's 515 alluvial basins. The MGB (DWR Basin No. 3-049) is a coastal groundwater basin encompassing approximately 9.6 square miles (6,145 acres) in the southeastern part of Santa Barbara County (County). The MGB underlies the unincorporated communities of Montecito and Summerland. The service area boundaries of MWD, which is the GSA for the MGB, extend beyond the boundaries of the MGB to the northwest, north, and northeast (Figure 1-1, The Montecito Groundwater Basin and Water District Boundaries).

To the southeast, the MGB boundary is coincident with the boundary of the 7,978-acre Carpinteria Groundwater Basin (DWR Basin No. 3-018) as well as the Carpinteria Valley Water District's service area. The MGB's western boundary roughly marks the boundary between the City of Santa Barbara and Montecito and separates the MGB from the 6,183-acre Santa Barbara Groundwater Basin (DWR Basin No. 3-017) (Figure 1-1).

The Montecito GSA contacts for matters related to this GSP are as follows:

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583 San Ysidro Road
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805.969.2271

Nick Kunstek
Groundwater Specialist
Montecito GSA
583 San Ysidro Road
Santa Barbara, California 93108
805.324.4207

1.3.1 Organization and Management Structure of the Groundwater Sustainability Agency

The Montecito GSA Board of Directors (Board) consists of the five members elected to the MWD Board and includes a Board-elected president and vice president. As established in the bylaws, the Montecito GSA staff is appointed by the Board and includes the general manager, Board secretary, general counsel, fiscal agent, and treasurer (Montecito GSA 2019). All Board meetings are open to the public and conducted in accordance with the Ralph M. Brown Act (Government Code Section 54950 et seq.). Board meetings are held quarterly and as needed at a location within the Montecito GSA jurisdictional limits. Agenda preparation and posting, voting, public comment, and the recording of meeting minutes is conducted in accordance with the applicable Government Code requirements. The Board has established standing and/or ad hoc committees with committee members appointed by the Board president. Committees also operate in compliance with the Brown Act, with the exception of ad hoc committees, which are not subject to the Brown Act.

Advisory Committees

The Board appointed a Stakeholder Advisory Committee (SAC) and Technical Advisory Committee (TAC) for the purposes of soliciting public involvement and utilizing local knowledge, insight, and technical expertise in GSP planning and preparation. Both committees meet on an approximately quarterly basis, and both are open to the public with public participation encouraged (see Section 2.1.7, Notice and Communication). The input from both committees has greatly contributed to the development of this GSP, and the Montecito GSA is grateful for the public service performed by the committee members. Both committees operate according to charters adopted by the Montecito GSA.

The SAC consists of seven members representing the major segments of the MGB interests including environmental, land use and planning, private basin users, well owners, residential (non-well owners), urban and agricultural, and the general public. SAC members must either own property overlying the MGB or be the authorized representative of the owner of a property overlying the MGB. The TAC consists of three members, all of whom have technical knowledge and experience working in a technical capacity within the MGB. TAC members are required to have a substantial background in hydrology, hydrogeology, geology, engineering, or a related discipline. Nearly all SAC and TAC members have participated in this capacity since committee formation and have informed GSP development throughout the process.

1.3.2 Legal Authority of the Groundwater Sustainability Agency

MWD, as a County Water District, is a local agency with water supply and management responsibilities overlying the MGB (CWC Section 30000 et seq. and CWC Section 10721[n]). Under the SGMA, any local public agency having water supply or water management responsibilities within a groundwater basin may elect to become a GSA for that basin. (CWC Section 10723[a]). MWD provided notice of its intent to become the GSA for the MGB and subsequently passed Resolution 2169, declaring the intent to become the GSA for the MGB after a public hearing (CWC Section 10723[b]). DWR declared MWD as the GSA for the MGB on November 28, 2018 (CWC Section 10723.8).

On April 19, 2019, the founding resolution of the Montecito GSA was passed in accordance with the SGMA (Montecito GSA Resolution No. 1; Montecito GSA 2019). The intent of the SGMA includes providing for the sustainable management of groundwater basins, enhancing local management of groundwater, establishing minimum standards for sustainable groundwater management, providing local agencies with the authority and assistance necessary to sustainably manage groundwater, improving data collection and understanding about

groundwater, and managing groundwater basins through the actions of local government agencies to the greatest extent feasible while minimizing state intervention (CWC Section 10720.1).

To achieve the goals of the SGMA, GSAs in medium- and high-priority basins are provided with the authority and responsibility to sustainably manage groundwater through the adoption of a GSP (CWC Section 10720.7). GSAs are granted broad powers to perform any act necessary or proper to carry out the purposes of the SGMA (CWC Section 10725.2). GSA are also granted specific authority, including the authority to:

- Require registration of groundwater extraction facilities (CWC Section 10725.6)
- Acquire real property, personal property, and water rights (CWC Section 10726.2)
- Construct, operate, and maintain works or improvements (CWC Section 10726.2)
- Impose spacing requirements on new wells and operating regulations on existing wells (CWC Section 10726.4)
- Control groundwater extractions by regulating, limiting, or suspending extractions from individual wells or in the aggregate (CWC Section 10726.4)
- Conduct investigations and inspections (CWC Section 10725.4)
- Impose penalties for violations of GSA rules and regulations (CWC Section 10732)
- Impose fees to fund the costs of groundwater management (CWC Section 10730.2)

The Montecito GSA will manage the MGB in accordance with the authority granted under California law and the bylaws, resolutions, ordinances, and regulations adopted by the Montecito GSA.

1.3.3 Estimated Cost of Implementing the GSP and the Montecito GSA's Approach to Meeting Costs

Costs associated with implementation of the GSP are anticipated to vary depending on the acquisition of new data, the selection/implementation of projects and management actions, changes to MGB sustainability conditions, and other factors. Chapter 5, Plan Implementation, of this GSP includes estimated costs and expected funding sources for GSP implementation, including monitoring activities, projects and management actions, annual reports, and periodic evaluations. The total cost to implement the GSP through the first periodic evaluation (2028) is estimated to be $6,435,000. Projecting costs beyond this period introduces increasing uncertainty because the implementation of specific projects and management actions will depend on future groundwater conditions and sustainability. The implementation of the GSP will be funded by Montecito GSA funding sources, which currently include a property fee developed each year for all parcels that overlie the MGB. The Montecito GSA has successfully attained, and will continue to pursue, available grant funding through DWR's Proposition 68 and other grant programs. The Montecito GSA regularly evaluates the adequacy of funding and will update its cost-of-service analysis and associated fee determination as needed.

1.4 GROUNDWATER SUSTAINABILITY PLAN ORGANIZATION

This GSP is organized according to the DWR guidance document, Groundwater Sustainability Plan (GSP) Annotated Outline (DWR 2016). The executive summary presents an overview of the GSP, groundwater conditions, and outcomes of the GSP. Chapter 1 introduces the MGB sustainability goal and provides information on the Montecito GSA and the purpose of the GSP. Chapter 2 presents the MGB and basin setting, including the planning

environment, geology, and aquifer characteristics of the MGB. Chapter 3 presents the sustainable management criteria and monitoring program. Chapter 4 provides information on the projects and management actions to achieve the sustainability goal. Chapter 5 provides information on the implementation of the GSP, including cost and schedule.

Appendix A includes the Preparation Checklist for GSP Submittal, which identifies where in this GSP each of the statutory requirements under the SGMA are addressed.

1.5 REFERENCES CITED

DWR (Department of Water Resources). 2016. *Guidance Document for the Sustainable Management of Groundwater: Groundwater Sustainability Plan (GSP) Annotated Outline*. December 2016.

Montecito GSA (Montecito Groundwater Basin Groundwater Sustainability Agency). 2019. "Resolution No. 1: Founding Resolution of the Board of Directors of the Montecito Groundwater Basin Groundwater Sustainability Agency Including the Adoption of Governance Bylaws." April 29, 2019. Accessed September 8, 2020. https://montecitogsa.com/doc/6599/.

Montecito GSA. 2023a. "Mission & Purpose: Established 2018." https://montecitogsa.com/about/mission-purpose/.

Montecito GSA. 2023b. *Update on Groundwater Sustainability Plan (GSP)*. Montecito GSA Townhall. February 21, 2023. PowerPoint slides. https://montecitogsa.com/mtgdocs/7464/Townhall_GSA-GSP_Presentation_2.21.2023_Final_v3.pdf.

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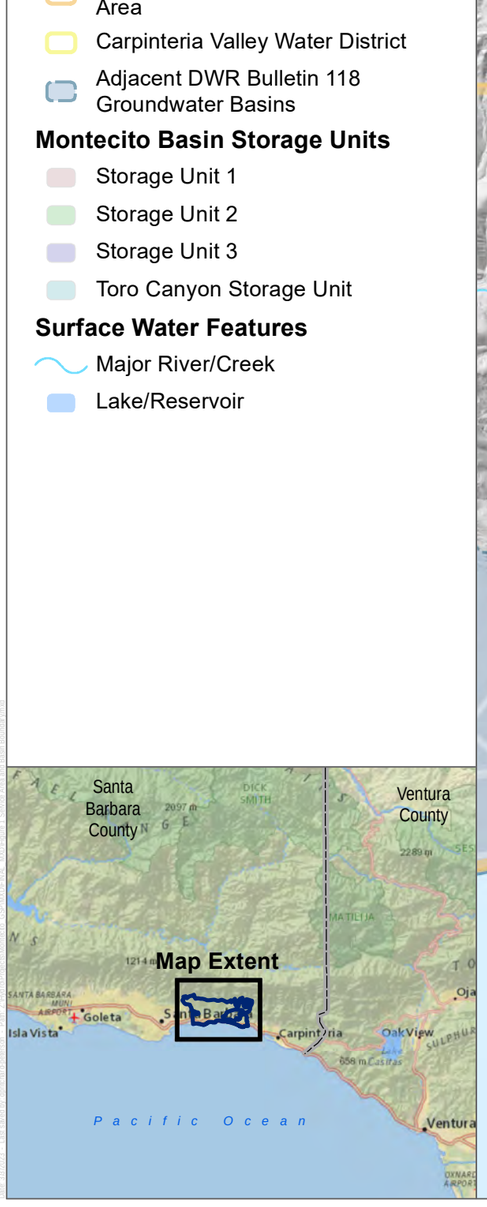
- Montecito Groundwater Basin and Groundwater Sustainability Agency Boundary (3-049, Plan Area)
- Montecito Water District
- City of Santa Barbara Water Service Area
- Carpinteria Valley Water District
- Adjacent DWR Bulletin 118 Groundwater Basins

Montecito Basin Storage Units

- Storage Unit 1
- Storage Unit 2
- Storage Unit 3
- Toro Canyon Storage Unit

Surface Water Features

- Major River/Creek
- Lake/Reservoir



Santa Ynez Mountains

Storage Unit #1

Storage Unit #2

Storage Unit #3

Toro Canyon Storage Unit

SANTA BARBARA BASIN 3-017

CARPINTERIA BASIN 3-018

Buell Reservoir

Ortega Reservoir

Andree Clark Bird Refuge

Picay Creek

Toro Canyon Creek

Garrapata Creek

San Ysidro Creek

Montecito Creek

Oak Creek

Romero Creek

Sycamore Creek

Arroyo Paredon

192

144

101

225

Pacific Ocean

DATUM: NAD 1983 DATA SOURCE: ESRI; DWR; USGS; County of Santa Barbara

DUDEK

0 0.5 1 Miles

FIGURE 1-1

The Montecito Groundwater Basin and Water District Boundaries

Montecito Groundwater Basin Groundwater Sustainability Plan

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CHAPTER 2
PLAN AREA AND BASIN SETTING

This chapter of the Montecito Groundwater Basin (MGB) Groundwater Sustainability Plan (GSP) is organized into four major parts. Section 2.1, Description of the Plan Area, covers administrative, statutory, and policy issues, as well as aspects of the existing environment related to water supply and demand. Section 2.2, Basin Setting, describes the physical setting and technical data used to develop the hydrogeologic conceptual model for the MGB. This section also describes the current and historical groundwater conditions in the MGB. Section 2.3, Water Budget, covers the groundwater budget, including groundwater flux, alternative water supplies, and quantification of historical, current, and future water budget conditions. Finally, Section 2.4, Management Areas, describes the management areas in the MGB. A list of references cited, as well as all figures, are provided at the end of the chapter. All available data gathered and articulated in this chapter was used to inform analyses in Chapter 3, Sustainable Management Criteria, of the GSP.

2.1 DESCRIPTION OF THE PLAN AREA

The plan area consists of the MGB, which is designated by the California Department of Water Resources (DWR) under California Water Code (CWC) Section 12924 as one of California's 515 alluvial basins. The MGB (DWR Basin No. 3-049) is a coastal groundwater basin encompassing approximately 9.6 square miles (6,145 acres) in the southeastern part of Santa Barbara County (County). The MGB underlies the unincorporated communities of Montecito and Summerland, a portion of Toro Canyon, and a 210-acre portion of the eastern edge of the City of Santa Barbara. It is bounded on the north and northeast by coarse-grained Tertiary age consolidated rocks associated with the Santa Ynez Mountains of California's Transverse Ranges and on the south by the Pacific Ocean. The eastern boundary of the MGB is approximately 0.25 miles to the east of Toro Canyon Creek, and roughly follows the creek corridor. To the southeast, the MGB boundary is coincident with the boundary of the 7,978-acre Carpinteria Groundwater Basin (DWR Basin No. 3-018) as well as the Carpinteria Valley Water District's service area. The MGB's western boundary roughly marks the boundary between the City of Santa Barbara and Montecito and separates the MGB from the 6,183-acre Santa Barbara Groundwater Basin (DWR Basin No. 3-017). The surface topography of the MGB ranges from near mean sea level (MSL) along the southern boundary to about 1,100 feet MSL at the northernmost reaches (Figure 2-1, Plan Area and Contributing Watersheds).

The service area boundaries of the Montecito Water District (MWD), which is the Groundwater Sustainability Agency (GSA) for the MGB, extend beyond the boundaries of the MGB to the northwest, north, and northeast (Figure 2-2, Water Purveyors within and Adjacent to the Groundwater Sustainability Agency Boundary). The service area of the City of Santa Barbara extends into the MGB along its western fringes, occupying approximately 74.8 acres of the MGB.[1] Although the City of Santa Barbara is not part of the Montecito Groundwater Basin Groundwater Sustainability Agency (Montecito GSA), management of this area will be coordinated with the City of Santa Barbara under an existing Memorandum of Understanding, included in Appendix B of this GSP. This GSP therefore consists of a "single plan covering the entire basin developed and implemented by one groundwater sustainability agency," per CWC Section 10727(b)(1). For the purpose of development and implementation of this GSP, the "plan area" is therefore synonymous with the MGB, although this GSP includes descriptions of adjacent areas for reference purposes (e.g., where relevant to discussion of plan area boundary conditions), as well as inflows and outflows in the groundwater budget.

[1] The Detachment Area, Coast Village Road Area, and Westmont Area, as labeled on Figure 2-2, are served by MWD but are located within the land use jurisdiction of the City of Santa Barbara; there are also fringe areas on the western edge of the MGB that are not within MWD's service area, but within the City of Santa Barbara's water service area. The areas outside of MWD's service area but within the MGB total approximately 74.8 acres and contain a single groundwater well (Well 4N/27W-13R01S).

DWR originally designated the MGB as a very low–priority basin;[2] however, it was reprioritized as a medium-priority basin during Phase 2 of DWR's Sustainable Groundwater Management Act (SGMA) basin reprioritization process (DWR 2020a). This reprioritization was based primarily on an increase in the calculated annual acre-feet (AF) of groundwater extracted from the MGB and well density. GSAs in medium- or high-priority basins "have the responsibility for adopting a Plan that defines the basin setting and establishes criteria that will maintain or achieve sustainable groundwater management" (23 CCR 350.4[e]).

To the east of the MGB, the Carpinteria Groundwater Basin was reprioritized from a low-priority basin to a high-priority basin in 2019 based on an increase in the calculated annual AF of groundwater extracted from the basin. MWD, in cooperation with the Carpinteria Valley Water District, applied for a jurisdictional basin boundary modification, which was approved by DWR in 2018 and resulted in a portion of the southeastern boundary between the MGB and the Carpinteria Groundwater Basin being moved west to coincide with the agencies' abutting service areas (Figure 2-2).

To the west of the MGB is the Santa Barbara Groundwater Basin (DWR Basin No. 3-017). During DWR's initial groundwater basin prioritization, DWR characterized the Santa Barbara Groundwater Basin as having a very low priority. The Santa Barbara Groundwater Basin boundary and prioritization remains as initially determined by DWR processes. As noted above, there is an existing Memorandum of Understanding between the City of Santa Barbara and the Montecito GSA, which includes plans to cooperate on a future basin boundary modification to simplify areas of overlap in jurisdiction and groundwater management (Figure 2-2).

Natural recharge to the MGB occurs through subsurface inflow from unconsolidated and consolidated rocks, infiltration of precipitation over the MGB, and stream seepage. The five major contributing watersheds that bisect the MGB include the Montecito Creek watershed, which is approximately 6.2 square miles (3,968 acres); the Oak Creek watershed, which is approximately 2.0 square miles (1,282 acres); the San Ysidro Creek watershed, which is approximately 4.9 square miles (3,144 acres); the Romero Creek watershed, which is approximately 5.0 square miles (3,223 acres); and the Toro Canyon Creek watershed, which is approximately 4.1 square miles (2,601 acres) (Figure 2-1). Together, these watersheds have an area of 22.2 square miles (14,217 acres). The entire watershed area contributing to the MGB, which includes regions that are not contained within any of the five major watersheds but that contribute recharge to the MGB, is 26.2 square miles (16,753 acres) (Figure 2-1). A summary of the groundwater basins, contributing watersheds, and DWR designations is provided in Table 2-1. Both MWD and the Carpinteria Valley Water District have existing groundwater management plans (GWMPs) developed under Assembly Bill (AB) 3030; these are to be superseded with adoption of GSPs.

[2] Basin prioritization classifies California's 515 basins and subbasins into priorities based on components identified in the CWC. The priority process consists of applying datasets and information in a consistent, statewide manner in accordance with the provisions in CWC Section 10933(b). Further information on DWR's basin prioritization process can be found on the following website: https://water.ca.gov/Programs/Groundwater-Management/Basin-Prioritization.

Table 2-1. Summary of the Montecito Groundwater Basin, Adjacent Basins, and Contributing Watershed Area

Basin/Watershed Name	Area			DWR Designations		Previous Groundwater Management Plan	GSP Required per SGMA
	Acres	*Square Miles*	*Basin Number*	*Critically Overdrafted*	*Basin Priority*		
Montecito Groundwater Basin	6,145	9.6	3-049	No	Medium	Yes	Yes
Adjacent Basins							
Santa Barbara Groundwater Basin	6,183	9.7	3-017	No	Very low	No	No
Carpinteria Groundwater Basin	7,978	12.5	3-018	No	High	Yes	Yes
Watersheds Contributing to the Montecito Groundwater Basin							
Montecito Creek, Oak Creek, San Ysidro Creek, Romero Creek, and Toro Canyon Creek Watersheds[a]	14,217	22.2	Not applicable				

Sources: DWR 2020b; USGS 2023.
Notes: DWR = Department of Water Resources; GSP = Groundwater Sustainability Plan; SGMA = Sustainable Groundwater Management Act.
[a] These watersheds are relevant for recharge to the Montecito Groundwater Basin and the water budget.

2.1.1 Summary of Jurisdictional Areas and Other Features

The plan area consists primarily of private land under County jurisdiction and is bordered to the west by the City of Santa Barbara, to the south by the Pacific Ocean, to the north by public land owned by the U.S. Forest Service, and to the east by the unincorporated community of Carpinteria (Figure 2-3, Jurisdictional Boundaries). The following is a description of additional water-related and resource agencies, the jurisdiction or function of which includes the plan area.

2.1.1.1 Land Use Jurisdictions within the Plan Area

Land use jurisdictions in the plan area primarily consist of unincorporated parts of the County, although the eastern edges of the City of Santa Barbara overlap approximately 210 acres of the western edges of the plan area (Figure 2-2). In addition to the County and the City of Santa Barbara, the California Coastal Commission (Commission) has permitting and oversight responsibilities over land use within the California coastal zone, which occupies an area of approximately 6.6 square miles (4,249 acres), also shown in Figure 2-3. There is no federal land within the MGB; however, parts of the watersheds south of the crest of the Santa Ynez Mountains that contribute runoff to MGB creeks are located within the Los Padres National Forest, which is owned by the federal government (Figure 2-3).

Santa Barbara County

The Department of Planning and Development has land use authority in the unincorporated Santa Barbara County parts of the plan area. The Department of Planning and Development conducts policy development, planning, permitting, and inspection services through its divisions, which includes administration, building and safety division,

development review, and long-range planning. Section 2.1.4, Existing Groundwater Regulatory Programs, provides greater detail on land use, population, and General Plan land use policies relevant to the GSP.

California Coastal Commission

The coastal zone within the MGB extends from 3 miles offshore to a minimum of about 0.5 miles inland at the west end and a maximum of about 1.5 miles inland at the east end of the plan area (Figure 2-3). Various activities within the coastal zone are regulated by the Commission, which was established by the California Coastal Act of 1976. In conjunction with local governments, the Commission regulates aspects of development and access to coastal waters within the coastal zone. Relevant to the MGB, the Commission regulates the construction of groundwater wells within the coastal zone. Section 2.1.4 provides greater detail on land use, population, and General Plan land use policies relevant to the GSP.

2.1.1.2 Water Agencies Relevant to the Plan Area

The retail water agency serving the plan area is MWD, with the City of Santa Barbara serving an approximately 69-acre area of the western fringe of the plan area. The wholesale water agency relevant to the plan area is the Central Coast Water Authority (CCWA),[3] which delivers MWD's allocation of State Water Project (SWP) water and supplemental water from other sources, if available, to Lake Cachuma. The water stored in Lake Cachuma and imported to the south coast via the Tecolote Tunnel is delivered through the South Coast Conduit from the City of Santa Barbara's William B. Cater Water Treatment Plant to the South Coast Water Agencies by the Cachuma Operations and Maintenance Board. Each water agency relevant to the plan area is described below. Water district boundaries and the locations of small private water systems are shown on Figure 2-2, and a larger view of regional water infrastructure is shown on Figure 2-4, Water Infrastructure Map.

Montecito Water District

MWD is an independent special district providing potable water service to a population of approximately 11,370 located within the unincorporated areas of Montecito and Summerland and western parts of Toro Canyon in Santa Barbara County. MWD is organized pursuant to CWC Section 30000 et seq., which grants it water supply and water management responsibilities within its service area overlying the MGB.

MWD was formed as a County Water District in November 1921, in accordance with the CWC, with the purpose of furnishing potable water within MWD's service area (MWD 2017). MWD executed the first contract with the U.S. Bureau of Reclamation in 1949 to receive water from Lake Cachuma (Bradbury Dam). A merger in 1995 with the former Summerland County Water District increased the total acreage of MWD's service area to the current size of 9,909 acres. MWD's service area includes the unincorporated Montecito and Summerland communities, as well as the western part of Toro Canyon and the eastern tip of the City of Santa Barbara (Figure 2-2). Figure 2-2 shows the western boundary of MWDs service area, where it overlaps with the City of Santa Barbara water service area, and the 93 acres of the MGB that is not covered by MWD's service area.

In the past, MWD's primary water supply management tools were the Water Supply Optimization Plan prepared in 2005 and the Future Water Demand and Water Supply Options report prepared in 2007 (MWD 2005, 2007).

[3] The Santa Barbara County Flood Control and Water Conservation District is the SWP contractor. It was allocated up to 57,700 acre-feet per year (AFY) of water for the region in 1963; however, ballot measures and other efforts to fund the necessary delivery infrastructure failed until 1991, when, after years of severe drought, voters authorized the required infrastructure funding that led to the formation of the CCWA (MWD 2017).

The Water Supply Optimization Plan analyzed and prioritized the use of MWD's various sources of supply, identified the optimal operation of the Lake Cachuma and Jameson Lake reservoirs, addressed the need for storage and banking of water outside of MWD's service area, and evaluated the purchase and use of other alternative dry-year supplies during periods of drought (MWD 2005). Similarly, the Future Water Demand and Water Supply Options report evaluated MWD's future water demand and the reliability of existing supplies, investigated potential water supply options to supplement existing supplies, and provided recommendations for how to avoid future water supply shortages.

Private Water Companies

In addition to MWD, there are multiple small private water companies that also provide water service within the plan area, including Wilkinson/Gill Water Company, Hot Springs/Montecito Creek Water Company, Ivydene Water Company, Lingate Lane Mutual Water Company, Miramar Addition and Improvement Company, Riven Rock Mutual Water Company, Toro Canyon Estates Mutual Water Company, Coyote Springs Water Company, Sea Meadows, and Sunshine Water Company (East Montecito Mutual Water Company) (Figure 2-2; MWD 2017). These small private water companies provide a mix of potable and non-potable water service for both domestic and irrigation/landscape purposes. See Section 2.1.4.3, Title 22 Drinking Water Program, for additional information on the permitting and reporting requirements of water companies.

Central Coast Water Authority

CCWA is a public entity organized under a joint exercise of powers agreement dated August 1, 1991, by the cities and special districts responsible for the creation and maintenance of water resources in portions of the North County, Santa Ynez Valley, and the south coast areas of Santa Barbara County. Beginning in 1997, CCWA has delivered SWP water to Lake Cachuma, where it is mixed with Cachuma Project water and any other stored water before being delivered through the Tecolote Tunnel to south coast water purveyors, including MWD. CCWA owns and operates a water treatment plant and pipeline that delivers water from the SWP to project participants in Santa Barbara and San Luis Obispo Counties. The distribution system consists of an approximate 130-mile-long pipeline (Coastal Branch Pipeline), treated water tanks at the water treatment plant, three interim storage facilities, one energy dissipation facility, nine turnouts, four isolation valve facilities, a chloramines removal and water pumping facility, and the Lake Cachuma inlet monitoring facility. Major reservoirs, pipelines, tunnels, and water treatment plants are shown on Figure 2-4.

Water supply projections for water from the SWP are based on DWR's determination of the long-term annual average delivery of MWD's SWP Table A allocation. MWD's full allocation of SWP water is 3,300 acre-feet per year (AFY), which includes a 300 AFY drought buffer to enhance the reliability of SWP water during shortages. In 2015, MWD received 2,015 AF from the SWP through CCWA (MWD 2017). As of 2020, the CCWA estimated that MWD would have up to 1,189 AF available for the year, much of it (up to 694 AF) consisting of carryover water from previous years, as the actual SWP allocation for 2020 was only 15% of MWD's Table A allocation (up to 495 AF; CCWA 2020). By contrast, in 2019, the allocation amount was 75%, illustrating the substantial difference that the water year type makes (DWR 2019, 2023). On average, MWD's annual DWR Table A allocation has been approximately 60% and in 2014 was a historically low 5% (MWD 2017). MWD expects that in the years to come, it is likely to receive between 59% and 61% of its full allocation (MWD 2017). This estimate is from the 2015 SWP Delivery Capability Report, which provides the best estimate of anticipated deliveries over the planning and implementation horizon under various hydrologic conditions (CCWA 2017).

Santa Barbara County Water Agency

The Santa Barbara County Water Agency was established by the state legislature in 1945 to control and conserve storm, flood, and other surface waters for beneficial use and to enter into contracts for water supply. It prepares investigations and reports on the County's water requirements, groundwater conditions, efficient use of water, and other water-supply-related technical studies and manages a number of Countywide programs, including the Integrated Regional Water Management (IRWM) Program, the Regional Water Efficiency Program, and the winter cloud seeding program. The Santa Barbara County Water Agency also administers the Cachuma Project and the Twitchell Dam Project contracts with the U.S. Bureau of Reclamation, holds the SWP water contract with DWR, and participates in some of the County's GSAs.

Cachuma Operations and Maintenance Board

The Cachuma Project is located within the Santa Ynez Valley of Santa Barbara County and is a primary water supply for the County's south coast communities. The Cachuma Reservoir was built by the U.S. Bureau of Reclamation beginning in 1950. In addition to serving the communities and agriculture of the lower Santa Ynez River via reservoir releases, water from the Cachuma Project is served to the south coast communities through the Santa Ynez Mountains via the Tecolote Tunnel, the South Coast Conduit, and several reservoirs and treatment plants (COMB 2019). The SWP supply to south coast agencies is delivered to the Cachuma Reservoir for distribution via Cachuma Project facilities (Figure 2-4).

The Cachuma Operations and Maintenance Board is the joint powers authority, formed in 1956, that is responsible for the operation and maintenance of all Cachuma Project facilities, with the exception of Bradbury Dam, which is operated by the U.S. Bureau of Reclamation. The Cachuma Operations and Maintenance Board's member units include the Goleta Water District, the City of Santa Barbara, MWD, and the Carpinteria Valley Water District. The master contract for the Cachuma Project water supply, held by the Santa Barbara County Water Agency, expired in 2020 and is currently under renegotiation. The project yield was determined to be 25,714 AFY, of which 2,651 AFY is allocated to MWD (SBCGJ 2016).

Cachuma Conservation and Release Board

Cachuma Conservation and Release Board is a joint powers authority formed in 1973 consisting of the Goleta Water District, the City of Santa Barbara, MWD, and the Carpinteria Valley Water District (the Carpinteria Valley Water District has since withdrawn from the joint powers authority). The member-funded organization is tasked with protecting the south coast water rights and is involved in the mandated protection of fisheries and steelhead restoration (CCRB 2020).

2.1.2 Existing Monitoring Programs

2.1.2.1 Groundwater Level Monitoring

In response to Senate Bill (SB) X7-6, passed by the state legislature in 2009, DWR developed the California Statewide Groundwater Elevation Monitoring (CASGEM) Program to encourage collaboration between local monitoring parties and DWR and to collect statewide groundwater elevations for the purpose of tracking seasonal and long-term groundwater elevation trends in groundwater basins. DWR works cooperatively with local agencies, referred to as CASGEM monitoring entities, to collect and maintain groundwater elevation data in a manner that is readily and widely available to the public through the CASGEM online reporting system.

In April 2018, MWD was designated the monitoring entity for the purpose of tracking groundwater elevation trends within the MGB under CASGEM. Under its groundwater monitoring program, MWD has been collecting semi-annual, static groundwater levels for all active and some inactive MWD groundwater production wells since 1983, occurring each spring and fall for high and low season groundwater levels (MWD 2018). MWD has submitted a CASGEM Monitoring Plan to DWR that identifies the 12 groundwater production wells where water levels will be collected and reported, describes the data collection methodology and reporting format, and commits to continuing to submit semi-annual groundwater elevation data to CASGEM by July 1 and by January 1 for each seasonal high and low groundwater elevation. Within the MGB, MWD has been submitting groundwater elevation data for 12 wells to the CASGEM online reporting system since spring 2018 (MWD 2018).

In addition, since 1983 MWD has conducted a survey of about 60 groundwater wells (consisting of both MWD-owned and private wells) within MWD's service boundary twice a year (Figure 2-5, Existing Groundwater Monitoring Network; MWD 2017). The collection of data twice a year reflects groundwater conditions following the rainfall/groundwater recharge season (spring) and the groundwater extraction season (fall). The survey consists of measuring the static water elevations in wells and converting this data to a water storage level with reference to MSL. Two groundwater wells in the survey are equipped with automated groundwater level sensors, and additional sensors will be added as part of the Sustainable Groundwater Management Grant (see Chapter 4, Projects and Management Actions). The data has been collected by MWD to continue monitoring the MGB and to ascertain groundwater storage conditions within the four defined groundwater storage units in the plan area. MWD also coordinates with the U.S. Geological Survey (USGS), which monitors one well (Well 4N/26W-17J02S or Ennisbrook 5) in the MGB. Groundwater wells that are routinely monitored for groundwater levels are shown on Figure 2-5 and listed in Table 2-2.

Table 2-2. Existing Groundwater Monitoring Network

Common Well Name	MWD Well ID	CASGEM Well ID	Latitude	Longitude	Use	Groundwater Monitoring Networks		
						Elevation	*Quality*	*Production*
Storage Unit 1								
Valley Club 2	1-1	51947	34.43428534	−119.6169238	Irrigation	Yes	No	Yes
EVR 8	1-3	N/A	34.43352008	−119.603945	Monitoring	Yes	No	No
N/A	1-4	N/A	34.44786976	−119.6352207	N/A	Yes	No	No
N/A	1-5	N/A	34.44751774	−119.6398833	N/A	Yes	No	No
N/A	1-6	N/A	34.44022383	−119.6394658	N/A	Yes	No	No
N/A	1-7	N/A	34.4378693	−119.6412301	N/A	Yes	No	No
N/A	1-8	N/A	34.43807662	−119.6416611	N/A	Yes	No	No
N/A	1-10	N/A	34.43646126	−119.6060257	N/A	Yes	No	No
N/A	1-11	N/A	34.43700335	−119.6064426	N/A	Yes	No	No
N/A	1-13	N/A	34.4367037	−119.614938	N/A	Yes	No	No
N/A	1-14	N/A	34.43690695	−119.6228628	N/A	Yes	No	No
Live Oaks	1-15	N/A	34.43563354	−119.6264154	Monitoring	Yes	No	No
N/A	1-16	N/A	34.439228	−119.6266207	N/A	Yes	No	No
Hodges	1-17	N/A	34.43708048	−119.6304058	Monitoring	Yes	No	No
N/A	1-18	N/A	34.44083974	−119.6310058	N/A	Yes	No	No
N/A	1-18a	N/A	34.44083974	−119.6310058	N/A	Yes	No	No
T. Mosby	1-19	51941	34.43890778	−119.6325848	Domestic	Yes	Yes	Yes

Table 2-2. Existing Groundwater Monitoring Network

Common Well Name	MWD Well ID	CASGEM Well ID	Latitude	Longitude	Use	Groundwater Monitoring Networks		
						Elevation	*Quality*	*Production*
N/A	1-21	N/A	34.44063562	−119.6213389	N/A	Yes	No	No
N/A	1-28	N/A	34.44552264	−119.6063785	N/A	Yes	No	No
N/A	1-29[a]	N/A	34.4486092	−119.6327239	N/A	Yes	No	No
N/A	1-30	N/A	34.44646232	−119.6317048	N/A	Yes	No	No
N/A	1-31	N/A	34.43823117	−119.6463892	N/A	Yes	No	No
N/A	1-32	N/A	34.45218904	−119.6669693	N/A	Yes	No	No
N/A	1-33	N/A	34.44356239	−119.6171353	N/A	Yes	No	No
N/A	1-35	N/A	34.44566107	−119.6609628	N/A	Yes	No	No
N/A	1-36	N/A	34.44392102	−119.6649438	N/A	Yes	No	No
N/A	1-37	N/A	34.43923511	−119.6234443	N/A	Yes	No	No
N/A	1-38[a]	N/A	34.45005922	−119.6697054	N/A	Yes	No	No
N/A	1-40	N/A	34.44396595	−119.6258503	N/A	Yes	No	No
N/A	1-42	N/A	34.43976288	−119.6094941	N/A	Yes	No	No
N/A	1-43[b]	N/A	34.44330678	−119.5788951	N/A	Yes	No	No
N/A	1-45	N/A	34.44277841	−119.6094477	N/A	Yes	No	No
N/A	1-47	N/A	34.4531118	−119.6567542	N/A	Yes	No	No
N/A	1-48	N/A	34.44297749	−119.6573498	N/A	Yes	No	No
EVR 3	1-49	51950	34.43118494	−119.6067338	Irrigation	Yes	No	Yes
EVR 4	1-50	51951	34.43125376	−119.6080552	Irrigation	Yes	No	Yes
Seaview 2	1-51	N/A	34.4356375	−119.6293937	Monitoring	Yes	No	No
N/A	1-52	N/A	34.44671339	−119.6172078	N/A	Yes	No	No
Las Fuentes	1-53	51948	34.4360176	−119.605703	Irrigation	Yes	No	Yes
EVR 6	1-54	51952	34.43159237	−119.6078519	Irrigation	Yes	No	Yes
Storage Unit 2								
N/A	2-2	N/A	34.43319798	−119.6516919	N/A	Yes	No	No
N/A	2-3	N/A	34.43321036	−119.6521918	N/A	Yes	No	No
Storage Unit 3								
Las Entradas 2	3-2	51946	34.42383974	−119.613408	Irrigation	Yes	No	Yes
N/A	3-5[a]	N/A	34.41894272	−119.6557273	N/A	Yes	No	No
N/A	3-7	N/A	34.41874629	−119.6433174	N/A	Yes	No	No
Neal	3-8	N/A	34.42567611	−119.6386139	Monitoring	Yes	No	No
N/A	3-9	N/A	34.4280764	−119.6308149	N/A	Yes	No	No
Paden 2	3-12a	51942	34.42551094	−119.6196748	Domestic	Yes	Yes	Yes
N/A	3-15	N/A	34.42339094	−119.616081	N/A	Yes	No	No
N/A	3-16	N/A	34.42766978	−119.6445449	N/A	Yes	No	No
N/A	3-17	N/A	34.42959189	−119.6511446	N/A	Yes	No	No
N/A	3-19	N/A	34.41983172	−119.6410392	N/A	Yes	No	No
N/A	3-20	N/A	34.41896692	−119.6387953	N/A	Yes	No	No
Amapola	3-22	51943	34.42757182	−119.6249585	Domestic	Yes	Yes	Yes

Table 2-2. Existing Groundwater Monitoring Network

Common Well Name	MWD Well ID	CASGEM Well ID	Latitude	Longitude	Use	Groundwater Monitoring Networks		
						Elevation	*Quality*	*Production*
Morgan	3-23	N/A	34.42382164	−119.6127863	Monitoring	Yes	No	No
Underwood	3-24	N/A	34.42186514	−119.6224629	Monitoring	Yes	No	No
Ennisbrook 2	3-25	51944	34.42562371	−119.6221383	Domestic	Yes	Yes	Yes
Ennisbrook 5	3-26	51945	34.42734473	−119.6203879	Domestic	Yes	Yes	Yes
N/A	3-27	N/A	34.41910028	−119.6477425	N/A	Yes	No	No
N/A	3-28	N/A	34.42028748	−119.626366	N/A	Yes	No	No
Toro Canyon Storage Unit								
N/A	4-4	N/A	34.43216406	−119.5745258	N/A	Yes	No	No
Edgewood	4-6	51949	34.41626413	−119.5773536	Irrigation	Yes	No	Yes

Notes: MWD = Montecito Water District; CASGEM = California Statewide Groundwater Elevation Monitoring ; N/A = not available or not applicable.

[a] Well located immediately outside the Montecito Groundwater Basin boundary.

[b] Well included in Storage Unit 1 monitoring network; however, well is located in the Toro Canyon Storage Unit.

2.1.2.2 Groundwater Extraction Monitoring

MWD collects groundwater extraction information on at least a weekly basis from up to 12 of its municipal supply wells. All of the municipal supply wells are equipped with propeller flow meters that record total production in gallons. On a monthly basis, the total volume in gallons produced by each MWD well is recorded and reported in AF. Groundwater wells that are routinely monitored for groundwater production are shown on Figure 2-5 and in Table 2-2.

2.1.2.3 Groundwater Quality Monitoring

The State Water Resources Control Board (SWRCB) Groundwater Ambient Monitoring and Assessment (GAMA) Program conducts comprehensive monitoring of California's groundwater quality, compiles and standardizes groundwater quality data across several different sources and regulatory programs, and makes that data readily accessible to the public. In addition, GAMA conducts groundwater studies related to groundwater vulnerability, groundwater quality in domestic wells, and groundwater impacts associated with non-point sources of contamination. GAMA also contains a collection of scientific assessment reports that contain results of regionally specific groundwater quality investigations (SWRCB 2020). Water quality data from the SWRCB Division of Drinking Water (DDW) is included in GAMA, including information on cleanup sites with the potential to impair water quality. In addition, the Surface Water Ambient Monitoring Program and the California Environmental Data Exchange Network contain water quality data collected by state and regional monitoring programs. The Regional Water Quality Control Boards (RWQCBs) also oversee several regulatory programs that collect and report water quality data, such as the Irrigated Lands Regulatory Program (ILRP). Some of these data is accessible in GAMA. Groundwater quality data for the MGB is included in both the GAMA and California Environmental Data Exchange Network programs and was used in the preparation of the GSP (see Section 2.2.4.4, Groundwater Quality).

MWD routinely monitors water quality in its active domestic groundwater production wells (both raw and treated groundwater quality) and submits the data to SWRCB in compliance with Title 22 of the California Code of

Regulations (CCR). Groundwater wells that are routinely monitored for groundwater quality are shown on Figure 2-5 and in Table 2-2.

2.1.2.4 Precipitation and Streamflow Monitoring

The primary sources of historical and current climate and streamflow data for the MGB include the County of Santa Barbara Public Works Department, the National Oceanic and Atmospheric Administration, the California Irrigation Management Information System (CIMIS), and USGS. The primary web access portals for climate data are the County's Public Works Department Hydrology Section webpage, the National Oceanic and Atmospheric Administration's Climate Data Online service, and the CIMIS website. The primary web access portals for streamflow data are the County's Public Works Department Hydrology Section webpage and the USGS National Water Information System Mapper. The data from these monitoring entities are used to inform development of the MGB setting, hydrogeologic conceptual model, and groundwater budget.

There are two weather stations in the MGB, both of which are monitored by the County (Figure 2-6, Weather Stations and Average Annual Precipitation in the Plan Area [1981–2010]). The two weather stations in the MGB include the Montecito (Station No. 325) and Summerland (Station No. 328) stations. The Montecito station has a continuous precipitation record that spans the period from water year 1926 to the present, while the Summerland station has a record that spans the period from water year 1971 to the present, with a data gap from water year 1996 to 2014.[4] In addition to the two stations in the MGB, there are a total of 20 weather stations within a 5-mile radius of the MGB, two of which are located nearby within MWD's service area boundary and are monitored by the County (Figure 2-6). The two stations that are outside the MGB but within the MWD service area include the Cold Springs Debris Basin (Station No. 210) and Doulton Tunnel (Station No. 231) stations. Additionally, the weather station with the longest and most complete measurement record in the vicinity of the MGB is the Santa Barbara station (Station No. 234) monitored by the County, which has a continuous precipitation record that spans the period from water year 1900 to the present. In addition, although there is no CIMIS station within the MGB, the closest CIMIS station is the Santa Barbara station (Station No. 107), located approximately 4 miles west of the MGB at the north end of the Santa Barbara Golf Club. This station has recorded reference evapotranspiration (ETo) data for the region since 1993.

There is one active stream gauge in the MGB monitored by the County (Figure 2-6). This stream gauge (Station No. 2552/2555), which is located on Montecito Creek near the intersection of Hot Springs Road and Olive Mill Road, has recorded sub-hourly (40-minute) stream discharge and stage data since February 2016. Between February 2016 and April 2020, the highest mean daily discharge was 106.44 cubic feet per second in March 2020. Stream discharge typically ceased during the summer months.

In addition to the Montecito Creek gauge, there is an inactive USGS stream gauge (Station No. 11119660) on San Ysidro Creek, located approximately 650 feet upstream of the MGB's northern boundary (Figure 2-6). The San Ysidro Creek gauge recorded mean daily discharge from October 1979 to September 1983. During this period, the mean daily stream discharge was 2.74 cubic feet per second. Stream discharge over the measurement record ranged from a mean daily discharge of 0.07 cubic feet per second in October 1982 to 108 cubic feet per second in January 1983. Table 2-3 lists the weather stations and stream gauges in the vicinity of the plan area.

[4] A water year is defined as October 1 of the preceding calendar year to September 30 of the current calendar year. For example, water year 2019 is defined as the period from October 1, 2018, through September 30, 2019.

Table 2-3. Weather Stations and Stream Gauges in the Vicinity of the Plan Area

Station Name (Agency No./ID)	Latitude	Longitude	Elevation (Feet MSL)	Status	Period of Record
Weather Stations					
National Oceanic and Atmospheric Administration					
Juncal Dam, CA US (USC00044422)	34.490795	−119.506888	2,260	Active	1941–present
Montecito California, CA US (USR0000CMNC)	34.461395	−119.648088	1,500	Active	1996–present
Santa Barbara, CA US (USC00047902)	34.41669519	−119.6843875	16	Active	1893–present
Santa Barbara 1.9 NE, CA US (US1CASB0004)	34.44999519	−119.6999875	811	Active	2010–present
County of Santa Barbara					
Botanic Garden (321)	34.45388519	−119.7068875	800	Active	1944–present
Carpinteria Fire Station (208)	34.39693518	−119.5177876	30	Active	1948–present
Carpinteria USFS (383)	34.40193518	−119.4913876	120	Active	1948–present
Cater Water Treatment Plant (229)	34.45416519	−119.7302875	500	Active	1966–present
Cold Springs Debris Basin (210)	34.45110518	−119.6199876	519	Active	1964–present
Doulton Tunnel (231)	34.45777518	−119.5657876	1,775	Active	1931–present
Edison Trail (252)	34.44277517	−119.5077876	1,650	Active	1993–present
El Deseo Ranch (255)	34.49138518	−119.6955875	3,300	Active	1966–present
Gibraltar Dam (230)	34.52249518	−119.6821875	1,500	Active	1919–present
Jameson Dam (232)	34.49082517	−119.5068876	2,230	Active	1925–present
KTYD (227)	34.47110518	−119.6768875	2,375	Active	1968–present
Montecito (325)	34.42749518	−119.6402876	135	Active	1925–present
Santa Barbara (234)	34.42610519	−119.7035875	130	Active	1899–present
Santa Barbara City College (474)	34.40527519	−119.6885875	65	Active	1981–present
Santa Barbara Caltrans (335)	34.43860519	−119.7555875	160	Active	1954–present
Stanwood Fire Station (228)	34.44388519	−119.6905875	670	Active	1953–present
Summerland (328)	34.41527518	−119.5813876	85	Active	1970–present
California Irrigation Management Information System					
Santa Barbara (107)	34.43734819	−119.7374075	N/A	Active	1993–present
Stream Gauges					
County of Santa Barbara					
Montecito Creek (2552/2555)	34.429587	−119.640544	N/A	Active	2016–present
U.S. Geological Survey					
San Ysidro Creek (11119660)	34.45	−119.6219444	N/A	Inactive	1979–1983

Sources: NOAA 2019; CIMIS 2019; County of Santa Barbara 2019a; USGS 2019.
Notes: MSL = mean sea level; USFS = U.S. Forest Service; Caltrans = California Department of Transportation; N/A = data are not available.

2.1.2.5 Monitoring Network Grant Programs

MWD, as the GSA for the MGB, was awarded a Sustainable Groundwater Management Grant funded by the California Drought, Water, Parks, Climate, Coastal Protection, and Outdoor Access For All Act of 2018 (Proposition

68; California Public Resources Code, Section 80000 et seq.) and the Water Quality, Supply, and Infrastructure Improvement Act of 2014 (Proposition 1; California Public Resources Code, Section 79700 et seq.). The grant agreement was executed in May 2020 and provided funds to the Montecito GSA for projects and planning toward the development of the GSP. According to the professional services agreement for DWR grant task support between the Montecito GSA and Dudek, dated October 16, 2020, the grant-funded activities "associated with the planning, development, and preparation of a GSP…will incorporate appropriate Best Management Practices (BMPs) as developed by DWR and will result in a more complete understanding of the groundwater subbasin to support long-term sustainable groundwater management." The projects funded by the grant that are relevant to filling data gaps and achieving sustainability within the MGB are:

- Seawater intrusion monitoring
- Private well metering pilot program
- Surface water flow gauge installation
- Monitoring well construction

Each project has been implemented, and they are now producing data relevant to the monitoring program and an understanding of initial conditions within the MGB. The projects have all been initiated and are now producing data to support the sustainability goal established for the MGB and monitoring the sustainable management criteria established in Chapter 3. Data from these projects will also support an update of the Basin Numerical Model (BNM), which has been developed to evaluate and manage the MBG. The grant projects are described below along with a description of how each component has been integrated into the GSP monitoring program.

2.1.2.5.1 Seawater Intrusion Monitoring

The purpose of the seawater intrusion monitoring project is to determine the presence or lack of seawater intrusion within the MGB and to identify conditions conducive to its occurrence. An additional project goal is to help distinguish sources of chloride in coastal groundwater. This task will be accomplished by monitoring groundwater levels and quality in several pre-existing wells and at least one proposed new well located near the coastline (Figure 2-7, Existing Grant-Funded Monitoring Programs). The seawater intrusion monitoring network currently includes five groundwater wells, four located in Storage Unit 3 and one in the Toro Canyon Storage Unit. Additionally, a new dedicated monitoring well was constructed in southwestern part of the MGB in Storage Unit 3 to expand the seawater intrusion monitoring network and help address an identified data gap (Chapter 4). These wells will be used to assess existing and potential seawater intrusion risk and will be used as monitoring points for minimum thresholds related to groundwater quality, in particular chloride concentrations. Laboratory analysis of groundwater samples will be conducted quarterly for a period of approximately 3 years and semi-annually thereafter. In order to analyze water quality parameters related to incipient seawater intrusion and the source of saline groundwater, analytes will include iodide, bromide, and silica, in addition to chloride. Quarterly reports will be prepared and submitted to DWR in accordance with grant requirements.

2.1.2.5.2 Private Well Metering Pilot Program

The purpose of the private well metering pilot program is to obtain a sample dataset of private well groundwater extractions in the MGB. This data will then be used in the estimation of total groundwater extraction from the MGB. The project includes installation of up to 45 meters on private wells. Future programs may include remote meter-read capabilities and incentives for voluntary participation.

2.1.2.5.3 Surface Water Flow Gauge Installation

The purpose of the surface water flow gauge installation project is to collect stream stage and discharge data to better approximate groundwater recharge from streams within the MGB. This project provides a direct method for estimating recharge from streams and improves the understanding of groundwater–surface water interactions within the MGB. Installation of temporary stream stage and discharge equipment and measurements of surface water flows on all the major creeks that transect the MGB began in late 2021. Additionally, semipermanent stilling wells and one radar unit were installed on San Ysidro Creek and one stilling well on Romero Creek to measure water levels and to estimate flow (Figure 2-7). The difference in flow between the gauging sites on each creek will be used to estimate recharge to the MGB aquifer and assist in calibrating the BNM. Monitoring program components include camera installation to document conditions at key locations, stream gauges, and variable interval data loggers. It is anticipated that data will be downloaded approximately monthly.

2.1.2.5.4 Groundwater Monitoring Well Construction

The monitoring well construction project fills data gaps identified in the MGB, including aquifer and aquitard lithology and depositional extents, groundwater levels and quality, storage unit groundwater exchange, seasonal groundwater flow dynamics, and seawater intrusion. Through this project, the Montecito GSA has constructed two new dedicated monitoring wells: one located in Storage Unit 2, near the intersection of Oak Creek and the Arroyo Parida Fault, and the other located in the southwestern part of Storage Unit 3 near the coast. These wells are used to monitor groundwater levels, groundwater quality, and seawater intrusion in the MGB (Section 3.5.2.1, Groundwater Monitoring).

2.1.3 Existing Management Plans

2.1.3.1 Groundwater Management Plan for the Montecito Water District

In 1992, the state legislature provided an opportunity for local groundwater management with the passage of AB 3030, the Groundwater Management Act (CWC Part 2.75, Section 10750 et seq.). Many basins developed GWMPs to provide planned and coordinated monitoring, operation, and administration of groundwater basins with the goal of long-term groundwater resource sustainability. The Groundwater Management Act was first introduced in 1992 as AB 3030 and has since been modified by SB 1938 in 2002 and AB 359 in 2011. These significant pieces of legislation establish, among other things, specific procedures on how GWMPs are to be developed and adopted by local agencies.

MWD adopted a GWMP under AB 3030 in 1998 (MWD 1998). When it was published, the GWMP drew from existing data and sources and provided a review of groundwater conditions in the MGB to date. It also provided guidance for ongoing monitoring and management of groundwater in the MGB, such as wellhead/recharge area protection, well construction/abandonment procedures, ongoing groundwater level monitoring procedures, and control of groundwater contaminant sources, among others (MWD 1998). The GWMP included a safe yield estimate for the MGB of 1,650 AFY, based on an MWD study from 1980 (MWD 1998). The 1998 GWMP will be superseded by this GSP.

2.1.3.2 Santa Barbara County Integrated Regional Water Management Plan 2019 Update

The Santa Barbara County IRWM Program began in 2005 following the passage of Proposition 50, the Water Security, Clean Drinking Water, Coastal and Beach Protection Act of 2002. Chapter 8 of Proposition 50 authorized the legislature to appropriate $500 million for IRWM planning, the intent of which was to encourage agencies to

develop plans using regional water management strategies for water resources and to develop projects using these IRWM strategies to protect communities from drought, protect and improve water quality, and improve local water security by reducing dependence on imported water. The Santa Barbara County IRWM developed and then adopted its first IRWM plan in 2007 and under Proposition 50 received $25 million for 14 Countywide projects. The Santa Barbara County IRWM Plan was updated under the Proposition 84 Guidelines in 2013 and received 5.7 million for 13 Countywide projects. In 2018, the region was awarded almost $900,000 in direct funds to disadvantaged communities, and the region applied for further implementation funds (up to $6.3 million) in spring 2019. It should be noted that there are no disadvantaged communities, severely disadvantaged communities, or economically distressed areas within the MGB (DWR 2020c).

In July 2019, another update to the IRWM Plan was prepared to ensure that the County remains eligible for funding under the Proposition 1 Guidelines (County of Santa Barbara 2019b). The Proposition 1 IRWM Grant Program provides funding for projects that help meet the long-term water needs of the state, including the need to decrease reliance on imported water sources, increase infrastructure resilience to the impacts of climate change, and locally manage and prioritize watershed resources and water infrastructure projects. The 2019 update focused on improving the previous IRWM Plan and incorporating the outcome of the SGMA and the formation of GSAs (County of Santa Barbara 2019b). The IRWM Plan region encompasses all of Santa Barbara County.

2.1.3.3 Urban Water Management Plan

Water supply management is outlined in the 2015 and 2020 Urban Water Management Plan (UWMP; MWD 2017, 2021). All urban water suppliers (as defined in CWC Section 10617), including MWD, are required to prepare water management plans on a 5-year cycle.[5] These plans describe existing and planned water supply sources, identify human and/or environmental threats to water reliability, outline how they will meet state-mandated water conservation targets,[6] establish water shortage contingency plans, and assess whether their existing and future water supplies will be sufficient over a 20-year planning horizon. Projections of growth and land use in the service area along with drought scenarios are incorporated in the long-term water supply assessment. There are no entities considered to be agricultural water suppliers in the MGB, and thus there are no agricultural water management plans relevant to the plan area.[7]

MWD's 2020 target for water conservation was 338 gallons per capita per day, compared to MWD's baseline calculation for the 10-year period ending in 2010 of 422 gallons per capita per day. MWD achieved the 2020 target and the 2015 interim target, having reduced per capita per day water use to 284 gallons in 2015. The 2015 UWMP prepared by MWD (MWD 2017) identifies ways to increase the diversity, reliability, and resilience (drought-proofing) of its water supply portfolio and to protect the sustainability of its groundwater resources by limiting the amount of water MWD pumps from the MGB (MWD 2017). Table 2-4 summarizes MWD's water supply portfolio from 1995 to 2015. The majority of MWD's water supply comes from three major surface water sources (in order of decreasing volume): Lake Cachuma/Cachuma Project water, water from Jameson Lake and Santa Ynez River Tributary Diversions, and SWP water. Collectively over the last 20 years, surface water has made up more than 95% of MWD's typical water year supply, with Lake Cachuma (48%) and Jameson Lake (26%) representing the bulk of MWD's water supply. The SWP on average made up 15% of the water supply in an average year, although it has been as low as

5 Per CWC Section 10617, an urban water supplier means a supplier, either publicly or privately owned, providing water for municipal purposes either directly or indirectly, to more than 3,000 customers or supplying more than 3,000 AFY of water.

6 The Water Conservation Act of 2009 (i.e., SB X7-7) requires that the state reduce urban water consumption by 20% by the year 2020, as measured in gallons per capita per day.

7 Per CWC Section 10608.12(a), an agricultural water supplier means a water supplier, either publicly or privately owned, providing water to 10,000 or more irrigated acres, excluding recycled water.

0% in major drought years. MWD serves the remaining portion of its service area demand from its municipal supply wells in the MGB. The municipal supply wells have provided as little as 53 AF in 1999 to as much as 637 AF in 2015. MWD has the capacity to produce up to 700 AF of local groundwater, although this capability would only be used in an emergency drought situation and would require low utilization in following years to allow the MGB to recover (MWD 2017).

Table 2-4. Produced Water Supply Portfolio (1995–2015) for the Montecito Water District Service Area

Water Source	20-Year Minimum		20-Year Maximum		20-Year Average (AF)	Average Percentage of Total
	AF	*Year*	*AF*	*Year*		
MWD Municipal Supply						
Fox Creek Diversion	1.9	2015	64	1998	8	0.1
Jameson Lake	351	2015	2,279	1997	1,420	25.5
Juncal Seepage	0	2014/15	145	1995	62	1.1
Doulton Tunnel Infiltration	161	2015	851	2005	353	6.3
Alder Creek Diversion	7.0	2015	448	1998	0	0.0
MWD Groundwater Wells	53	1999	637	2015	250	4.5
Lake Cachuma/ Cachuma Project	467	2014	3,913	2013	2,661	47.8
State Water Project	0	Multiple[a]	3,016	2007	808	14.5
Total Water Produced	3,839	1998	7,163	2007	N/A	N/A
				Total	5,562	100.0

Source: MWD 2017 (adapted from table T11).
Notes: AF = acre-feet; MWD = Montecito Water District.; N/A = not applicable.
[a] Years where no State Water Project water was delivered include 1995, 1996, 1997, 2001, 2006, and 2012.

Across all surface water sources, there is a high range of water yield depending on water year type, which is consistent with the wide range between minimum and maximum amounts in Table 2-4. Besides climatological factors, constraints on surface water availability also include biological opinions for protection of endangered species, which is particularly relevant for SWP imports and for yield from Lake Cachuma. It should be noted that Table 2-4 does not include supplemental water purchases from other agencies. During extreme droughts, MWD has the ability to purchase supplemental water from other water agencies and transport it though SWP infrastructure. For example, over a 2-year period during the 2014–2015 drought, MWD purchased 6,006 AF of water from several outside water agencies. These purchases often involve an exchange component, whereby MWD owes a water "debt" to the agencies from which water was purchased, to be repaid over a specified timeframe (e.g., 10 years).

One of the primary challenges described in the UWMP is the low, and decreasing, reliability from surface water supplies, including MWD's local reservoirs, as well as imports of water from the SWP and Lake Cachuma (MWD 2017). Historically, the SWP has supplied on average 60% of the full allocation of 3,300 AFY, with annual allocations ranging from 5% to 100%. In addition, allocations to MWD from the Santa Ynez watershed supplying Lake Cachuma

and Jameson Lake were reduced to zero during the 2015–2016 water year. MWD's proportionate share of water from Lake Cachuma is 10.3%, and MWD's maximum annual available supply from Lake Cachuma is 2,651 AFY. Water in Lake Cachuma is shared with four other member units, consisting of the Goleta Water District, the City of Santa Barbara, the Santa Ynez River Water Conservation District – Improvement District No. 1, and the Carpinteria Valley Water District. The current water supply capacity of Lake Cachuma is approximately 184,121 AF, with SWRCB administering water rights (under Water Right Order 94-5) that govern, among other things, maintaining the beneficial uses of the water for vegetation, fish, and downstream users. The protection of these beneficial uses and Southern California steelhead trout (*Oncorhynchus mykiss*) is an ongoing issue that is expected to constrain the amount of surface water available from Lake Cachuma.

The annual diversion maximum from Jameson Lake (including its Santa Ynez diversions) is 2,000 AF, as re-affirmed by the California Supreme Court in the 1998 Jordan decision (MWD 2017). As shown in Table 2-4, water diverted from Jameson Lake over the last 20 years has averaged approximately 26% of MWD's yearly production total, though the lake's share of MWD's total production has decreased to closer to 10% in recent years due to naturally occurring reservoir siltation and drought conditions. Yearly diversions over the past 20 years ranged from approximately 2,279 AFY in 1997 to a low of 351 AFY in 2015 (MWD 2017). Diversions over the past 3 years were greatly reduced due to a severe multiyear drought and no reservoir recharge.

Future sustainable management of these reservoirs could reduce annual deliveries from these sources to extend their supply during drought periods. The UWMP describes how these challenges will be met in the future, documents a trend of decreasing per-capita water use by MWD customers, especially in response to statewide drought mandates restricting water use, and plans to maintain some of these decreases in the future (MWD 2017). There is an overall trend of increased water use efficiency by MWD customers alongside a trend of decreasing surface water reliability, in which surface water deficits are met by higher levels of groundwater pumping and purchases of supplemental water (MWD 2017). Opportunities described in the UWMP include continuing negotiations for a long-term water supply agreement for imported/purchased water from the City of Santa Barbara resulting from the Charles E. Meyer Desalination Plant, further investigation of the feasibility of using recycled water from within MWD's service area and/or from neighboring agencies to offset potable water demand, groundwater banking programs, and continuing aggressive water conservation programs (MWD 2017). MWD has a water supply agreement with the City of Santa Barbara that provides MWD with 1,430 AFY of potable water irrespective of hydrologic conditions. This is made possible by the City's Charles E. Meyer Desalination Plant. Deliveries commenced in January 2022, and the agreement has a term of 50 years. It should be noted that there is a limited opportunity (due to hydrogeologic conditions and lack of feasible locations) to implement a managed groundwater recharge program with advanced treatment recycled water in the MGB (GSI 2020). See Section 2.3.9, Surface Water Available for Groundwater Recharge or In-Lieu Use, for the current status of potential water management opportunities.

Another approach previously used by MWD and described in the UWMP to respond to water supply shortages includes the adoption of temporary water meter moratoriums, which limit and control new water service connections, and/or the establishment of water use restrictions, including water use allocations and penalties. These approaches were used from 1973 to 1997 and 2014 to 2019 with the adoption of Ordinances 47 and 92, respectively, and proved to be an effective strategy to decrease customer water demands (MWD 2017). The data suggests that groundwater well construction in the MGB increased during these meter moratoriums.

UWMPs provide valuable data on regional water demand and supply, provide a means of measuring how effective water conservation and water use efficiency efforts have been, and set the framework for evaluating and prioritizing future capital improvements. With groundwater being an important local source of water supply for the plan area, the sustainable management criteria as well as the projects and management actions developed in this GSP draw

from information in prior UWMPs and are likewise expected to heavily inform the next UWMP cycle. The 2015 UWMP acknowledges how compliance with the SGMA and development of this GSP will affect water management planning, such as the potential to collect additional information on groundwater use by private well operators and to provide tools needed to more closely monitor groundwater use and thereby more accurately determine MGB balance and yield (MWD 2017).

2.1.4 Existing Groundwater Regulatory Programs

2.1.4.1 Porter–Cologne Water Quality Control Act and Clean Water Act Permitting

The Porter–Cologne Water Quality Control Act of 1969 (Porter–Cologne Act; codified in CWC Section 13000 et seq.) is the primary state water quality control law for California. Whereas the federal Clean Water Act applies to all waters of the United States, the Porter–Cologne Act applies to waters of the state, which includes isolated wetlands and groundwater in addition to federal waters.[8] The Porter–Cologne Act is implemented by SWRCB and the nine RWQCBs. In addition to other regulatory responsibilities, the RWQCBs have the authority to conduct, order, and oversee investigation and cleanup where discharges or threatened discharges of waste to waters of the state could cause pollution or nuisance, including impacts to public health and the environment. The MGB is located along the southern tip of the Central Coast Region (RWQCB Region 3) and within the South Coast Hydrologic Unit, per the RWQCB Water Quality Control Plan for the Central Coastal Basin (Central Coast Basin Plan; Central Coast RWQCB 2019). These statutes are relevant to the GSP in that they regulate the quality of point-source discharges (e.g., wastewater treatment plant effluent, industrial discharges, and on-site wastewater treatment systems [OWTSs]) and non-point source discharges (e.g., stormwater runoff) to the underlying aquifer.

The Central Coast Basin Plan designates beneficial uses, establishes water quality objectives, and contains implementation programs and policies to achieve those objectives for all waters addressed through the Central Coast Basin Plan (CWC Sections 13240–13247). The Porter–Cologne Act provides the RWQCBs with authority to include in their basin plans water discharge prohibitions applicable to particular conditions, areas, or types of waste. The Central Coast Basin Plan is continually being updated to include amendments related to implementation of total maximum daily loads, revisions of programs and policies within the RWQCB Central Coast Region, and changes to beneficial use designations and associated water quality objectives. The beneficial uses for groundwater are identified in the Central Coast Basin Plan as being suitable for agricultural water supply, municipal and domestic water supply, and industrial use (Central Coast RWQCB 2019). Unlike beneficial uses of surface water (which vary based on individual surface water), the RWQCB designates the same beneficial uses for all DWR-designated groundwater basins throughout the Central Coast Region.

The Central Coast Basin Plan defines water quality objectives for groundwater generally (for taste, odors, and radioactivity), as well as specific to beneficial uses (i.e., municipal/domestic supply and agricultural supply). The water quality objectives for municipal/domestic supply are the same as primary drinking water standards (i.e., maximum contaminant levels [MCLs]) found in Title 22 of the CCR. For agricultural uses of groundwater, the Central Coast Basin Plan provides water quality objectives consisting of maximum concentrations for various inorganic chemicals (including certain metals and nitrate) and guidelines for various physical and general mineral properties (Central Coast RWQCB 2019; Tables 3-1 and 3-2 of this GSP). Although the Central Coast Basin Plan defines additional objectives specific to certain groundwater basins, there are no specific objectives identified for the MGB (Central Coast RWQCB 2019).

[8] "Waters of the state" are defined in the Porter–Cologne Act as "any surface water or groundwater, including saline waters, within the boundaries of the state" (CWC Section 13050[e]).

It should be noted that the Central Coast Basin Plan addresses inland waters, coastal waters (enclosed bays, estuaries, and coastal lagoons), and groundwater, whereas the Water Quality Control Plan for Ocean Waters of California (Ocean Plan; SWRCB 2019a) establishes beneficial uses and water quality objectives for waters of the Pacific Ocean. Also, the Ocean Plan prescribes effluent quality requirements and management principles for waste discharges and specifies certain waste discharge prohibitions. The Ocean Plan also provides that SWRCB shall designate Areas of Special Biological Significance and requires wastes to be discharged a sufficient distance from these areas to assure maintenance of natural water quality conditions (SWRCB 2019a). There are no Areas of Special Biological Significance or Marine Protected Areas, as identified by SWRCB or the California Department of Fish and Wildlife, in or adjacent to the plan area, the closest being Campus Point State Marine Conservation Area, located offshore of Isla Vista.

The Porter–Cologne Act requires a "Report of Waste Discharge" for any discharge of waste (liquid, solid, or otherwise) to land or surface waters that may impair a beneficial use of surface or groundwater of the state. CWC Section 13260(a) requires that any person discharging waste or proposing to discharge waste—other than to a community sewer system—that could affect the quality of the waters of the state file a Report of Waste Discharge with the applicable RWQCB. For discharges directly to surface water (waters of the United States), a National Pollutant Discharge Elimination System (NPDES) permit is required, which is issued under both state and federal law; for other types of discharges, such as waste discharges to land (e.g., spoils disposal and storage), erosion from soil disturbance, or discharges to waters of the state (such as groundwater and isolated wetlands), waste discharge requirements (WDRs) are required and are issued exclusively under state law. WDRs typically require many of the same best management practices and pollution control technologies as required by NPDES-derived permits.

The NPDES and WDR programs regulate construction, municipal, and industrial stormwater and non-stormwater discharges under the requirements of the Clean Water Act of 1972 and the Porter–Cologne Act, respectively. The construction and industrial stormwater programs are administered by SWRCB, whereas individual WDRs, low-threat waivers, and other MGB-specific programs are administered by the Central Coast RWQCB. Programs and policies that have particular relevance to the MGB include the following:

1. Stormwater General Permits (Construction and Industrial General Permits). SWRCB and the Central Coast RWQCB administer a number of general permits that are intended to regulate activities that collectively represent similar threats to water quality across the state and thus can appropriately be held to similar water quality standards and pollution prevention best management practices. Construction projects more than 1 acre in size are regulated under the statewide Construction General Permit and are required to develop and implement a stormwater pollution prevention plan. Similarly, industrial sites are also required to develop a stormwater pollution prevention plan that identifies and implements best management practices necessary to address all actual and potential pollutants of concern. There are no entities within the MGB currently subject to an industrial stormwater pollution prevention plan (SWRCB 2019b).
2. Irrigated Lands Regulatory Program. Water discharges from agricultural operations include irrigation runoff, flows from tile drains, irrigation return flows, and stormwater runoff. These discharges can affect water quality by transporting pollutants, including pesticides, sediment, nutrients, salts (including selenium and boron), pathogens, and heavy metals from cultivated fields into surface waters and/or groundwater. To prevent agricultural discharges from impairing the waters that receive these discharges, the ILRP regulates discharges from irrigated agricultural lands. This is done by issuing WDRs or conditional waivers of WDRs to growers. These orders contain conditions requiring water quality monitoring of receiving waters and corrective actions when impairments are found. Through a series of events related to the passage of SB 390 (Alpert), the ILRP originated in 2003. Initially, the ILRP was developed for the Central Valley RWQCB.

As the Central Valley RWQCB ILRP progressed, a groundwater quality element was added to the filing requirement for agricultural lands that had previously been subjected to only surface water discharge concerns. To date, the different RWQCBs are in different stages of implementing the ILRP. The Central Coast RWQCB has a conditional waiver program for irrigated agricultural lands throughout the region, focusing on priority water quality issues such as pesticides and toxicity, nutrients, and sediments—especially nitrate impacts to drinking water sources. There are a number of enrollees to the program within the MGB in the Summerland and Toro Canyon areas.

3. **OWTS Requirements.** Requirements for the siting, design, operation, maintenance, and management of OWTSs are specified in SWRCB's OWTS policy (SWRCB 2018). The OWTS policy sets forth a tiered implementation program with requirements based upon levels (tiers) of potential threat to water quality. The OWTS policy includes a conditional waiver for on-site systems that comply with the policy. Since 1991, on-site sewage disposal systems in the County have been regulated by the County Public Health Department, Environmental Health Services Division. County regulations for on-site sewage disposal systems are contained in Article I, Chapter 18C of the County Code, which was most recently updated in 2015. These regulations set forth specific requirements related to permitting and inspection of on-site systems; septic tank design and construction; drywell and disposal field requirements; and servicing, inspection, reporting, and upgrade requirements. Standards pertaining to system sizing and construction are contained in the California (Uniform) Plumbing Code. Additional requirements for on-site sewage disposal systems in the County are adopted as part of community plans or as project-specific mitigation measures or conditions applied to development proposals lying within a designated "Special Problem Area" of the County (which includes Summerland). The Central Coast RWQCB approved the County's Local Agency Management Program, developed by Environmental Health Services with local stakeholders, on November 20, 2015, and it became fully effective January 1, 2016.

4. **Individual WDRs**. Individual WDRs are required for point source discharges to land not otherwise covered under a general permit program or conditional waiver. The purpose of individual WDRs is to define discharge prohibitions, effluent limitations, and other water quality criteria necessary to ensure discharges do not result in exceedances of Central Coast Basin Plan objectives for receiving waters, including groundwater. There is only one individual WDR in the plan area, consisting of a categorical waiver of WDRs for certain small discharges of fruit and vegetable processing waste in Toro Canyon (Central Coast RWQCB Order No. R3-2004-0066). In addition, combined NPDES/WDRs are issued to two wastewater treatment facilities in the MGB:

    - Montecito Sanitary District Wastewater Treatment Facility (Order No. R3-2012-0016, NPDES Permit CA0047899)
    - Summerland Sanitary District Wastewater Treatment Plant (Order No. R3-2013-0042, NPDES Permit CA0048054)

These facilities are subject to a monitoring and reporting program that requires regular sampling of influent, effluent, and receiving waters to verify that the facilities are meeting applicable water quality standards (e.g., the Ocean Plan). Required submittals under the NPDES/WDR permits include a variety of monitoring, inspection, and technical reports that are submitted monthly and annually to the Central Coast RWQCB, as well as requirements for reporting and rectifying emergency/unplanned discharges (e.g., sanitary sewer overflows).

Implementation of the GSP would not affect the applicability or implementation of the regulatory programs discussed above, and continued implementation of Porter–Cologne Act and the Clean Water Act permitting would advance the GSP's sustainability goals related to water quality. The County requires new development and

redevelopment projects proposed within the MGB to comply with NPDES permits, WDRs, and OWTS requirements as part of its permitting and approval process. These programs will continue to provide benefits to water quality by requiring both point and non-point discharges to comply with Central Coast Basin Plan water quality objectives and to be protective of Central Coast Basin Plan beneficial uses throughout the SGMA's planning and implementation horizon. In addition, the application of stormwater permits means specific performance standards for capture and infiltration of stormwater runoff would be implemented where applicable, providing opportunities for enhanced recharge of the MGB.

2.1.4.2 Groundwater Well Permitting

Statewide standards for the construction, repair, reconstruction, or destruction of wells are found in DWR Bulletins 74-81 and 74-90 (i.e., California Well Standards) (DWR 1981, 1991). The California Well Standards include requirements to avoid sources of contamination or cross-contamination, proper sealing of the upper annular space (i.e., first 50 feet), disinfection of the well following construction work, use of appropriate casing material, and other requirements. In October 2017, Governor Brown signed SB 252, which became effective on January 1, 2018. SB 252 requires well permit applicants in critically overdrafted basins to include information about the proposed well, such as location, depth, and pumping capacity. The bill also requires the permitting agency to make the information easily accessible to the public and the GSAs. Based on available data and analysis, the MGB is not designated as critically overdrafted.

The County Environmental Health Services issues groundwater well permits in the plan area, and notifies MWD of newly permitted wells in the plan area. MWD uses information obtained from the County to maintain a database of parcels with private wells and ensure the parcel is enrolled in MWD's backflow and cross connection prevention program.

In addition, water wells drilled within the coastal zone qualify as "development" pursuant to Coastal Act Section 30106 and thus require a Coastal Development Permit (CDP), either from the County or the Commission. The County adopted a Local Coastal Program (LCP) in 1982 and gained permitting authority within the coastal zone at that time. However, the Commission retains permitting authority within certain specified areas, including tidelands, submerged lands, and public trust lands. The Commission also retains appeal jurisdiction throughout many areas in the coastal zone, including in environmentally sensitive habitat areas and within 100 feet of any stream, wetland, or other waterway. Therefore, a CDP from the County must be obtained for wells located within the certified LCP jurisdiction, and a CDP from the Commission must be obtained for wells located within their retained jurisdiction. Both the County and the Commission maintain land use maps that delineate their respective jurisdictions. Since the policies of the Coastal Act are incorporated into the County LCP, the development standards applied to new wells are similar regardless of which agency is issuing the CDP. Namely, Coastal Act Section 30231 states (emphasis added):

> The biological productivity and the quality of coastal waters, streams, wetlands, estuaries, and lakes appropriate to maintain optimum populations of marine organisms and for the protection of human health shall be maintained and, where feasible, restored through, among other means, minimizing adverse effects of waste water discharges and entrainment, controlling runoff, **preventing depletion of ground water supplies and substantial interference with surface waterflow**, encouraging waste water reclamation, maintaining natural vegetation buffer areas that protect riparian habitats, and minimizing alteration of natural streams.

The County LCP also contains the following policies:

> **Policy 2-2:** The long-term integrity of groundwater basins or sub-basins located wholly within the coastal zone shall be protected. To this end, the safe yield as determined by competent hydrologic evidence of such a groundwater basin or sub-basin shall not be exceeded except on a temporary basis as part of a conjunctive use or other program managed by the appropriate water district. If the safe yield of a groundwater basin or sub-basin is found to be exceeded for reasons other than a conjunctive use program, new development, including land division and other use dependent upon private wells, shall not be permitted if the net increase in water demand for the development causes basin safe yield to be exceeded, but in no case shall any existing lawful parcel be denied development of one single family residence. This policy shall not apply to appropriators or overlying property owners who wish to develop their property using water to which they are legally entitled pursuant to an adjudication of their water rights.
>
> **Policy 2-3:** In the furtherance of better water management, the County may require applicants to install meters on private wells and to maintain records of well extractions for use by the appropriate water district.

Executive Order N-7-22 was signed into effect on March 28, 2022, in response to intensifying drought conditions across the state. Among other requirements, Order N-7-22 prohibits a county, city, or other public agency from (i) approving a permit for a new groundwater well or for alteration of an existing well in a basin subject to the SGMA and classified as medium- or high-priority without first obtaining written verification from a GSA managing the basin that the well would not be inconsistent with any sustainable groundwater management program and would not decrease the likelihood of achieving a sustainability goal for the basin; or (ii) issuing a permit for a new groundwater well or for alteration of an existing well without first determining that extraction of groundwater from the proposed well is not likely to interfere with the production and functioning of existing nearby wells and is not likely to cause subsidence that would adversely impact or damage nearby infrastructure. These requirements do not apply to permits for wells that will provide less than 2 AF per year of groundwater for individual domestic users or that will exclusively provide groundwater to public water supply systems as defined in Section 116275 of the Health and Safety Code.

The Montecito GSA plans to evaluate the potential impacts of a new groundwater well or altered existing well on MGB groundwater resources on a case-by-case and cumulative basis by reviewing all available information about the well, including, but not limited to, geographic location, planned use, and well construction specifications, and periodically updating the BNM.

2.1.4.3 Title 22 Drinking Water Program

The SWRCB DDW regulates public water systems in the state to ensure the delivery of safe drinking water to the public. A public water system is defined as a system for the provision of water for human consumption through pipes or other constructed conveyances that has 15 or more service connections or regularly serves at least 25 individuals daily at least 60 days out of the year. Of the 10 private water companies in the MGB, 2 (Lingate Mutual Water Company and Montecito Sea Meadows) are classified as public water systems and included in the SWRCB's Drinking Water Watch, a web portal to view public water systems location, facilities, sources, and samples. Private domestic wells, wells associated with drinking water systems with less than 15 residential service connections, industrial wells, and irrigation wells are not regulated by DDW. Single-parcel and multiple-parcel/state small water systems are regulated by the County. SWRCB DDW enforces the monitoring requirements established in Title 22 of

the CCR for public water system wells, and all the data collected must be reported to SWRCB DDW. Title 22 also designates the MCLs for various waterborne contaminants, including volatile organic compounds, non-volatile synthetic organic compounds, inorganic chemicals, radionuclides, disinfection byproducts, general physical constituents, and other parameters. Water quality compliance monitoring of all source water is required every 12 to 108 months (1 to 9 years) depending on the constituent. For example, nitrate as nitrogen shall be tested for every 12 months, whereas gross alpha (radiological) is required to be tested for every 108 months. Additionally, public water systems are required to submit annual consumer confidence reports that detail the water quality testing results. Similarly, the County enforces the monitoring requirement established in Title 22 for single-parcel and multiple-parcel/state small water systems. Small water systems are required to complete water source yield and quality testing as part of the permit application process and water quality testing at regular defined intervals upon receipt of an approved permit.

2.1.4.4 Montecito Water District Water Supply Planning and Water Use Efficiency

Over the years, California has passed a series of SBs, including SB X7-7, SB 610, SB 221, SB 1262, and most recently SB 606, that together outline the regulatory framework for water conservation and water supply planning and for considering issues of water availability in the environmental and permitting process for land use plans, projects, and subdivisions. These bills have been codified in CWC Sections 10608–10609.42, which establish water use and demand reduction targets; CWC Sections 10610–10657, which address UWMPs; CWC Sections 10910–10914, which address water supply assessments; and California Government Code Section 66473.7 (part of the Subdivision Map Act of 1893), which contains requirements related to written verifications (i.e., "will-serve" letters). Collectively, these laws, along with the California Environmental Quality Act (CEQA) of 1970, prompt cities, counties, special districts, and water suppliers to evaluate growth in a broader geographic and temporal context, by coordinating land use planning with water availability and sustainability. MWD's UWMP is described in greater detail in Section 2.1.3, Existing Management Plans. SB 1262, which became effective in 2017, made changes to existing laws to integrate to some extent existing laws governing written verifications and water supply assessments with the passage of the SGMA. The sections of the CWC addressing water supply now contain several provisions relating specifically to groundwater, which, if used wholly or in part to supply a project or subdivision, triggers additional analytical steps that could expand the necessary scope of a CEQA document, water supply assessment, and/or written verification, as applicable. SB 1262 added language in the subdivision map act clarifying additional considerations for when part or all of the water supply comes from groundwater, especially in adjudicated basins, basins in critical overdraft, and/or basins designated as high or medium priority pursuant to the SGMA. In addition to incorporating information from UWMPs, water supply assessments may incorporate relevant information from GSPs prepared pursuant to the SGMA.

AB 1668 and SB 606, passed in May 2018, would require the SWRCB, in coordination with DWR, to adopt long-term standards for the efficient use of water, as provided, and performance measures for commercial, industrial, and institutional water use on or before June 30, 2022. The bill, among other things, establishes a standard for indoor water use of 55 gallons per capita daily to be reached by 2025, 52.5 gallons per capita daily beginning in 2025, decreasing to 50 gallons per capita daily beginning in 2030, or as determined jointly by DWR and SWRCB in accordance with necessary studies and investigations. DWR will also adopt long-term standards for outdoor residential water use and outdoor irrigation in connection with commercial, industrial, and institutional water use. With the 20% by 2020 conservation goal pursued in the Water Conservation Act of 2009, these bills extend UWMP requirements but will measure compliance with uniform standards based on the aggregate amount of water that would have been delivered the previous year by an urban retail water supplier if all that water had been used efficiently (rather than relative to a water district's baseline). The legislation has a variance process available to allow for exceptions in special circumstances approved by DWR. AB 1668 continues the requirements for urban

water suppliers to submit UWMPs every 5 years (though in years ending in 6 and 1 instead of 0 and 5) and makes water suppliers ineligible for *any* water grant or loan if it does not submit a UWMP. The bills also add requirements for agricultural water management plans to be organized by groundwater basin or subbasin.

In December 2022, MWD approved the Water Use Efficiency Plan, which identifies 20 conservation measures to be implemented as part of a strategic conservation program intended to reduce water demands for customers overlying the MGB. The conservation measures include indoor rebates for high efficiency appliances and toilets but focuses heavily on outdoor water use rebates such as mulch, drip irrigation, turf removal, and smart irrigation controllers. The Water Use Efficiency Plan includes an annual budget of approximately $500,000 towards water saving measures in 2023 and beyond.

2.1.4.5 Operational Flexibility and Conjunctive Management Considerations

Operational flexibility is a key consideration in integrated water resource management because it helps water purveyors adapt to known legal, operational, and environmental constraints and plan for an uncertain future, especially as it relates to drought resiliency and the effects of climate change. Operational flexibility can be measured over a given time horizon and/or geographic scale (e.g., water district service area) as the difference between available water supply and service area demand. Operational flexibility is maximized when a water purveyor has a large variety of sources in a water supply portfolio, when it has local control over such sources, and when such sources are connected to each other (e.g., conjunctively managed). On a general statewide scale, water purveyors are increasingly looking to minimize reliance on imported water supplies by promoting stormwater recharge, maximizing wastewater recycling, and sustainably developing local sources of water.

For the plan area, the delivery of Cachuma Project water is provided through cooperation with the U.S. Bureau of Reclamation and an interagency agreement that established the Cachuma Operation and Maintenance Board, which operates key distribution systems. The South Coast Conduit delivers water from Lake Cachuma to the south coast of the County. The Conduit's functionality and flexibility are essential to meeting both day-to-day needs and future demand. The nature and operation of the South Coast Conduit allows the south coast Cachuma member units to integrate their various sources of water to provide conjunctive use of several groundwater basins and water exchanges among water users along its length. The South Coast Conduit is also integrated with water treatment plant operations at the City of Santa Barbara William B. Cater Water Treatment Plant, which provides treated water to the City of Santa Barbara, MWD, and the Carpinteria Valley Water District; and the Goleta Water District Corona Del Mar Water Treatment Plant, which provides treated water to the Goleta Valley. A series of integrated projects to protect the South Coast Conduit's integrity and increase its utility, reliability, and flexibility are an important part of the IRWM Plan (County of Santa Barbara 2019b).

MWD and other south coast water agencies collectively draw from a combination of sources—including the Cachuma Project, surface water imports from the SWP, recycled water (produced outside the MWD service area), and groundwater—that differ in terms of the volume available, area served, timing of peak availability, and reliability. Climate and regulatory constraints (e.g., water quality standards, water rights, and minimum environmental flows) have historically had a greater impact on the availability of surface water supplies. MWD has exercised its authority to manage the MGB in a manner that avoids critical overdraft and manages the MGB conjunctively with its surface water supplies in accordance with its adopted GWMP (MWD 1998). MWD's conjunctive use program allows the MGB to recharge in years of above-average precipitation so that groundwater can be extracted in years of below-average precipitation when surface water supplies are below normal (MWD 2017). MWD does not currently have a groundwater banking plan within the MGB due to limited local groundwater/aquifer production and storage capabilities (GSI 2020; MWD 2017).

The GSP complements and enhances existing projects and programs currently in place to maximize beneficial use of water resources and increase operational flexibility within the MGB and within MWD's jurisdiction as a whole. Because the south coast basins are all interconnected either physically or through water sources, the opportunity for operational flexibility exists and is being used by MWD and local water agencies.

2.1.5 Land Use Elements or Topic Categories of Applicable General Plans

The following section presents a review of population and land use characteristics of the plan area, and the various land use plans and their applicability to groundwater resource management. State law requires that all cities and counties adopt a comprehensive, long-term General Plan that outlines physical development of the county or city. The General Plan must cover a local jurisdiction's entire planning area so that it can adequately address the broad range of issues associated with the city or county's development. Ultimately, the General Plan expresses the community's development goals and embodies public policy relative to the distribution of future public and private land uses. The General Plan may be adopted as a single document or as a group of documents relating to subjects or geographic segments of the planning area.

Most of the planning documents relevant to the plan area fall under the umbrella of the County's Comprehensive Plan, which is a "living document" made up of many parts that are periodically updated by the County's Department of Planning and Development. The core structure of the document is to have broad Countywide land use policies that then get refined in various community plans—the local setting, policy issues, and community concerns are taken into account through a public participation process. Land use plans within the California coastal zone must also be consistent with California Coastal Act of 1976 requirements and submitted to the Commission for review and approval. Planning departments along California's coastline, including the County, establish LCPs for this purpose. When an LCP is approved by the Commission, the Commission's coastal permitting authority over most new development is transferred to the local government, which applies the requirements of the LCP in reviewing proposed new developments. All elements of a General Plan, whether mandatory or optional—including community plan principles, goals, objectives, policies, and plan proposals—must be internally consistent with each other, and all elements have equal legal status (i.e., no element is legally subordinate to another).

The development and implementation of the GSP is relevant to several General Plan and community plan elements, and vice versa, because both contain policies and implementation actions that are intended to be protective of water resources. All applicable land use plans acknowledge the major constraints on growth that the lack of water availability presents, and the County's General Plans broadly encourage water conservation and prohibit development, such as tentative map and subdivision approvals, unless the availability of water can be proven out. Several plan elements intersect, including the Conservation Element, the Environmental Resource Management Element, and the Groundwater Resources Element, and contain policies specifically aimed at water resources and groundwater sustainability.

In a few cases, identified below, the passage of the SGMA and the adoption of this GSP render some of the land use plan policies or underlying assumptions within them out of date. Where this occurs, it is expected that future General Plan and community plan updates, and/or updates to General Plan theoretical buildout estimate, will consider the sustainability goals, sustainable management criteria, and the projects and management actions of this GSP, and revise the relevant land use plans accordingly.

2.1.5.1 Land Use and Population

The primary developed land uses in the plan area consist of residential with lesser amounts of agricultural, recreational, educational, and commercial (Figure 2-8, Current Land Use). Residential land makes up the vast majority of the developed land use in the plan area and generally consists of large (1 or more acres), privately owned parcels. The remainder of the plan area is characterized by tracts of undeveloped natural hillsides and lowlands vegetated with native chaparral. Future development in Montecito is regulated by the County Department of Planning and Development and further described below. Table 2-5 presents a summary of land uses in the plan area, separated between the California coastal zone portion and the rest of the MGB.

Table 2-5. Summary of Land Use in the Plan Area

Land Use	Number of Parcels	Area (Acres)	Percent of Total
Coastal Zone			
Single-Family Residential (>0.5 acres)	460	766.1	13
Single-Family Residential (<0.5 acres)	755	195.0	3
Multiunit Residential	564	56.7	<1
Commercial	112	105.8	2
Parks and Golf Courses	7	19.0	<1
Institutional	15	60.6	<1
Public Services/Infrastructure (including roads)[a]	26	422.1	7
Undeveloped Open Space/Vacant Land	174	270.68	4
Subtotal	*2,113*	*1,896.0*	*31*
Inland			
Single-Family Residential (>0.5 acres)	1,714	2,814.3	46
Single-Family Residential (<0.5 acres)	622	152.2	2
Multiunit Residential	63	31.7	<1
Commercial	15	20.2	<1
Parks and Golf Courses	16	158.3	3
Institutional	30	287.4	5
Public Services/Infrastructure (including roads)[a]	20	257.4	4
Undeveloped Open Space/Vacant Land	238	527.1	9
Subtotal	*2,718*	*4,248.7*	*69*
Total[b]	**4,831**	**6,145**	**100**

Source: County of Santa Barbara 2019c.
Notes:
[a] This land use includes road rights-of-way that were not included in the parcel data layer.
[b] Note that 210 acres of the overall total are within the City of Santa Barbara, including 61 acres of residential, 47 acres of golf course, 23 acres of undeveloped open space, 25 acres of commercial, 11 acres of institutional, and 43 acres of public services/infrastructure (including road rights-of-way that were not included in the parcel data layer).

The MGB intersects a small portion of the City of Santa Barbara and intersects the following Census-Designated Places: Montecito, Summerland, and Toro Canyon (MWD 2017). The population of the plan area is approximated from the analysis of population conducted for MWD's 2015 UWMP, which estimates a population of approximately 11,370 people (MWD 2017). The UWMP uses the DWR Online Population Tool to estimate population but acknowledges that it may underestimate population for MWD's service area due to several factors unique to its customer base. The presence of institutional service connections such as Westmont College, which averages

approximately 1,200 on-campus students each semester, may not be accounted for in the DWR Online Population Tool. Additionally, many Montecito residents may not be counted by census data because they are primary residents in another city or state and their Montecito residence is considered a secondary residence. In both cases, these customers still add demand to the potable water system but may not be accounted for by the DWR Online Population Tool. In order to comply with the guidelines of this UWMP, MWD has elected to use the DWR Online Population Tool results for planning purposes but also realizes that these numbers may underestimate actual population served (MWD 2017).

As shown in Table 2-6, the population is projected to increase slightly by 268 people by 2035, based on growth projections in the Santa Barbara County Association of Governments Regional Transportation Plan and Sustainable Communities Strategy. Growth opportunities are limited because much of the community is already built out with low-density residential land uses. In addition, substantial constraints on growth already exist and are expected to persist. These constraints consist of water availability, grading and slope limitations, coastal resources sensitivities, and quality of life and community character concerns. Some limited redevelopment may be anticipated and is likely to primarily consist of mixed-use, multifamily development, or second/accessory dwelling units. The provision of affordable housing is a major challenge for the community, and the Montecito Community Plan (described in Section 2.1.5.2, Santa Barbara County Comprehensive Plan) addresses this challenge by allowing secondary dwelling units on certain commercial-zone properties and by increasing maximum densities on select existing residential parcels (County of Santa Barbara 1995).

Table 2-6. Population of the Plan Area

Source	Population					
	2010	*2015*	*2020*	*2025*	*2030*	*2035*
DWR Online Population Tool	11,292	10,461	N/A	N/A	N/A	N/A
DWR Online Population Tool (modified)	N/A	11,370	N/A	N/A	N/A	N/A
SBCAG Regional Transportation Plan and Sustainable Communities Strategy (straight-line interpolation of data from 2010 and 2035)	11,309	11,370	11,441	11,506	11,572	11,638

Sources: MWD 2017.
Notes: DWR = Department of Water Resources; SBCAG = Santa Barbara County Association of Governments; N/A = data are not available.

The Montecito Community Plan provides a theoretical buildout estimate that allows for 963 new residential units; however, it should be noted that these are from 1995 and that buildout to a theoretical maximum allowable density is unlikely given the previously mentioned constraints on growth. Based on MWD's land use data for the MGB, there are 363 parcels identified as vacant. For the few remaining vacant parcels, it should be noted that having a legally created lot that meets zoning requirements still may not be buildable due to a number of factors, such as floodplain and/or natural hazard issues (wildfire and/or mudflow), having legal access to roadways, and having access to sewer or water. Building permits are granted on a case-by-case basis by the County, and it is not possible to accurately estimate the number of legally buildable parcels in the MGB.

It is important to note that DWR Online Population Tool calculates the 2015 number of persons per connection by creating a trend line of the persons per connection from 2000 to 2010 and continues that trend to the year 2015. Based on the data input to the DWR Online Population Tool, the year 2015 projected population for MWD's service area did not align with the population data from the Santa Barbara County Association of Governments as adopted in the 2040 Regional Transportation Plan and Sustainable Communities Strategy. The Santa Barbara County Association of Governments population data was used to confirm the estimated population from the DWR Online Population Tool for the years 2010 and 2015. Table 2-6 provides population estimates by source, and Figure 2-9, Census-Designated Places and Population, shows population density.

2.1.5.2 Santa Barbara County Comprehensive Plan

The County's Comprehensive Plan outlines land use and growth policies at the Countywide level and has several elements particularly relevant to groundwater sustainability, including the following:

- **Conservation Element (County of Santa Barbara 2010).** The Conservation Element describes water resources, agricultural resources, ecological systems, historical and archaeological sites, and mineral resources and recommends policies and programs designed to protect them.
- **Groundwater Resources Section (County of Santa Barbara 2009a).** The Groundwater Resources Section is a stand-alone section of the Conservation Element that provides a review of groundwater resource limitations throughout the County and establishes groundwater resource policies for each of the groundwater basins in the County. At the time of original publication in 1994, the total estimated gross supply of water for the MGB was estimated to range from approximately 4,770 to 4,930 AFY.
- **Environmental Resource Management Element (County of Santa Barbara 2009b).** The Environmental Resource Management Element is a compendium of the Seismic Safety and Safety Element, the Conservation Element, and the Open Space Element and includes topics such as prime agricultural lands, slopes, biological resources, habitat areas, floodplain and floodways, and geologic hazards, among others.
- **Coastal Land Use Plan (County of Santa Barbara 2019d).** The Coastal Land Use Plan (CLUP) includes policies related to beach access, recreation, marine environment, environmentally sensitive habitat areas, agriculture, visual resources, coastal dependent energy, and industrial development. These policies establish standards for future growth and development in the coastal zone and supersede other policies.
- **Community Plans.** The County's Comprehensive Plan is supplemented by individual community plans that take into account the local setting, policy issues, and community concerns. The community plans applicable to the GSP plan area are the Montecito Community Plan (County of Santa Barbara 1995), the Summerland Community Plan (County of Santa Barbara 2014), and the Toro Canyon Plan (County of Santa Barbara 2004).

The relevant land use plans are summarized in Table 2-7 and described below.

Table 2-7. Summary of General Plan and Community Plan Land Use Policies Relevant to Groundwater Sustainability in the Plan Area

Element	Policy/Action No.	Description	GSP Consistency
Santa Barbara County Comprehensive Plan			
Conservation Element – Groundwater Resources Section	**Goal 1**: To ensure adequate quality and quantity of groundwater for present and future County residents, and to eliminate prolonged overdraft of any groundwater basins.		
	Policy 1.1	The County shall encourage and assist all of the County's water purveyors and other groundwater users in the conservation and management, on a perennial yield basis, of all groundwater resources.	Consistent.
	Action 1.1.1	The County shall encourage and, where feasible, financially assist in continued studies of new or supplemental water sources and the more efficient use of existing sources, for the purpose of avoiding, reducing, or eliminating prolonged overdraft. To ensure that such water is used to reduce overdraft (as opposed to supplying only new uses), the County shall encourage water purveyors to give first priority to offsetting existing demands met by over drafting groundwater supplies.	Consistent.
	Action 1.1.2	The County will seek the voluntary cooperation with purveyors during the early planning of any supplemental water sources that the purveyors propose or plan to develop. The County will coordinate with the purveyor, to the extent allowed by the purveyor, to ensure that: (1) environmental constraints are fully incorporated into the location and design of such projects; and (2) mitigations are applied to the fullest extent feasible and consistent with County permit conditioning policies and practices to minimize the magnitude of significant impacts.	Consistent.
	Policy 1.2	The County shall encourage innovative and/or appropriate, voluntary water conservation activities for increasing the efficiency of agricultural water use within the County.	Consistent.
	Action 1.2.1	The County shall provide support to the Soil Conservation Service, the Resource Conservation District, and other appropriate agencies to continue the Irrigation Management Program and other such water conservation and management efforts.	Consistent.
	Action 1.2.2	The County shall support the expansion of existing efforts by the U.C. Cooperative Extension/Farm Advisor, in cooperation with the Agricultural Commissioner, Soil Conservation Service, Resource Conservation District, and other appropriate agencies, to develop and update a verifiable comprehensive database on agricultural water use and conservation effectiveness. Such efforts should include incentives for groundwater users to collect and provide more accurate data, as needed to permit the development of more precise determinations of consumptive groundwater use.	Consistent, but the SGMA now provides additional regulatory authority and tools to collect groundwater data.

Table 2-7. Summary of General Plan and Community Plan Land Use Policies Relevant to Groundwater Sustainability in the Plan Area

Element	Policy/Action No.	Description	GSP Consistency
	Policy 1.3	The County shall act within its powers and financial abilities to promote and achieve the enhancement of groundwater basin yield.	Consistent. Montecito GSA now has additional authorities to do the same.
	Action 1.3.1	Where feasible and consistent with the County's applicable Comprehensive Plan element(s), the County shall encourage and assist appropriate agencies in ongoing or future projects and programs which increase groundwater recharge and basin yield, as long as such projects and programs can be shown not to degrade groundwater quality. Such activities could include, but would not be limited to, cloud seeding, range management, dams, and spreading basins.	Consistent. It should be noted, though, that the effectiveness and feasibility of managed recharge within the MGB has been determined to be limited (GSI 2020).
	Goal 2: To improve existing groundwater quality, where feasible, and to preclude further permanent or long-term degradation in groundwater quality.		
	Policy 2.1	Where feasible, in cooperation with local purveyors and other groundwater users, the County shall act to protect groundwater quality where quality is acceptable, improve quality where degraded, and discourage degradation of quality below acceptable levels.	Consistent.
	Action 2.1.1	In reviewing or preparing basin management plans under the Groundwater Management Act and other applicable law, the County shall consider both the quantity and quality of groundwater in affected basins. Pumpage that causes intrusion of poor quality water, if and where identified, should receive particular attention for improved management.	This policy should be updated to reflect the SGMA, as it supersedes the Groundwater Management Act.
	Action 2.1.2	In basins or sub-basins with water quality problems, the County will encourage reduction of salt and other pollutant loading from all sources through cooperative, voluntary efforts and, where feasible, will take direct action in this regard.	Consistent. Note that while cooperative and voluntary efforts are preferred, the SGMA gives Montecito GSA authority to mandate mitigation if sustainability criteria are threatened or exceeded.

Table 2-7. Summary of General Plan and Community Plan Land Use Policies Relevant to Groundwater Sustainability in the Plan Area

Element	Policy/Action No.	Description	GSP Consistency
	Policy 2.2	The County shall support the study of adverse groundwater quality effects which may be due to agricultural, domestic, environmental and industrial uses and practices.	Consistent.
	Action 2.2.1	The County shall cooperate in ongoing and future studies which determine the current and potential extent of agricultural, domestic, environmental and industrial pollutants in various County aquifers, and to ascertain better methods by which agriculturalists can prevent increasing pollutant loads in the future. Such studies should be coordinated with the basin planning and enforcement work done by the RWQCB and SWRCB, and should involve other appropriate agencies and groundwater users.	Consistent.
	Goal 3: To coordinate County land use planning decisions and water resources planning and supply availability.		
	Policy 3.1	The County shall support the efforts of the local water purveyors to adopt and implement groundwater management plans pursuant to the Groundwater Management Act and other applicable law.	These policies and actions should be updated to reflect the SGMA, as it supersedes the Groundwater Management Act. MWD's 1998 Groundwater Management Plan prepared pursuant to the Groundwater Management Act is superseded by this GSP.
	Action 3.1.1.	The County shall encourage the preparers of groundwater management plans to consider environmental factors, including but not limited to the potential link between groundwater resources and riparian habitat.	
	Policy 3.2	The County shall conduct its land use planning and permitting activities in a manner which promotes and encourages the cooperative management of groundwater resources by local agencies and other affected parties, consistent with the Groundwater Management Act and other applicable law.	
	Action 3.2.1	The County Flood Control & Water Conservation District or the County Water Agency, as feasible and as requested by a local agency or agencies pursuant to the Groundwater Management Act, may assume responsibility in preparing a groundwater management plan pursuant to the Groundwater Management Act and other applicable law.	
	Policy 3.3	The County shall use groundwater management plans, as accepted by the Board of Supervisors, in its land use planning and permitting decisions and other relevant activities.	
	Action 3.3.1	The Board of Supervisors, in consultation with the County Planning Commission, shall accept a groundwater management plan which promotes and is consistent with the Goals of this Groundwater Resources Section of the Conservation Element. Such acceptance shall be rescinded where specific facts and circumstances indicate that a plan has been rendered inadequate to promote these Goals.	

Table 2-7. Summary of General Plan and Community Plan Land Use Policies Relevant to Groundwater Sustainability in the Plan Area

Element	Policy/Action No.	Description	GSP Consistency
	Action 3.3.2	The County shall conserve waters to the extent feasible through exercise of the County's discretionary land use planning and permitting decisions, and shall promote such conservation through related public and private actions.	
	Policy 3.4	The County's land use planning decisions shall be consistent with the ability of any affected water purveyor(s) to provide adequate services and resources to their existing customers, in coordination with any applicable groundwater management plan.	Consistent.
	Action 3.4.1	The County, in its planning activities, shall work cooperatively with local water purveyors, the County Water Agency, the County Flood Control and Water Conservation District, State and Federal agencies concerned with water resources, and private groups and individuals with particular interest and expertise related to water resources.	Consistent.
	Action 3.4.2	Santa Barbara County shall develop its land use plans and policies in a manner which takes into account all groundwater uses (e.g., domestic, agricultural, natural resources and habitats, etc.).	Consistent.
	Action 3.4.4	Santa Barbara County shall encourage and assist local water purveyors in developing adequate water supplies (groundwater, surface water, desalination, etc.) to serve their customers and communities consistent with the applicable general plan(s).	Consistent.
	Action 3.4.5	The County shall facilitate the efforts of purveyors to serve overlying landowners from the purveyor's system.	Consistent.
	Policy 3.5	In coordination with any applicable groundwater management plan(s), the County shall not allow, through its land use permitting decisions, any basin to become seriously overdrafted on a prolonged basis.	Consistent. Note that MGB is not designated as critically overdrafted by DWR.

Table 2-7. Summary of General Plan and Community Plan Land Use Policies Relevant to Groundwater Sustainability in the Plan Area

Element	Policy/Action No.	Description	GSP Consistency
	Action 3.5.1	Based on input from the County Water Agency and P&D, the Board, in coordination with the responsible water purveyor(s), shall designate any basins within the county as "seriously overdrafted" if the following conditions are present: Prolonged overdraft which results or, in the reasonably foreseeable future (generally within ten years) would result, in measurable, unmitigated adverse environmental or economic impacts, either long-term or permanent. Such impacts include but are not limited to seawater intrusion, other substantial quality degradation, land surface subsidence, substantial effects on riparian or other environmentally sensitive habitats, or unreasonable interference with the beneficial use of a basin's resources. The County's fundamental policy shall be to prevent such overdraft conditions.	Consistent. These now constitute the main sustainability indicators under the SGMA. Note that MGB is not designated as critically overdrafted by DWR.
	Action 3.5.2	In seriously overdrafted basins, the County shall not approve discretionary development permits if such development requires new net extractions or increases in net extractions of groundwater, pending development and County acceptance of a basin management plan, consistent with the Groundwater Management Act or other applicable law, which adequately addresses the serious overdraft.	Consistent. Note that MGB is not designated as critically overdrafted by DWR.
	Policy 3.6	The County shall not make land use decisions which would lead to the substantial overcommitment of any groundwater basin.	Consistent.
	Policy 3.7	New urban development shall maximize the use of effective and appropriate natural and engineered recharge measures within project design, as defined in design guidelines to be prepared by the Santa Barbara County Flood Control and Water Conservation District (SBCFCWCD) in cooperation with P&D.	Consistent.
	Action 3.7.1	In cooperation with the USGS and local water purveyors, the County should conduct or participate in a study to identify in more detail those areas where natural and enhanced recharge is occurring or may occur in each of the County's major groundwater basins and develop detailed design guidelines for ways to protect recharge areas from further degradation.	Consistent. It should be noted, though, that the effectiveness and feasibility of managed recharge within the MGB has been determined to be limited.
	Policy 3.8	Water-conserving plumbing, as well as water-conserving landscaping, shall be incorporated into all new development projects, where appropriate, effective, and consistent with applicable law.	Consistent.

Table 2-7. Summary of General Plan and Community Plan Land Use Policies Relevant to Groundwater Sustainability in the Plan Area

Element	Policy/Action No.	Description	GSP Consistency
	Action 3.8.1	The County shall continue to encourage and, where feasible, financially participate in water-saving landscape experiments and education programs, such as those conducted by the Water Agency's Regional Water Conservation Program.	Consistent.
	Action 3.8.2	The County shall continue to develop and refine uniform standards and guidelines for water conservation in new development projects, which shall recognize that different physical characteristics within various areas may require more than a single set of standards and guidelines. All cities within the County shall be encouraged to adopt similar standards and guidelines.	Consistent.
	Policy 3.9	The County shall support and encourage private and public efforts to maximize efficiency in the pre-existing consumptive M&I use of groundwater resources.	Consistent.
	Policy 3.10	The County, in consultation with the cities, affected water purveyors, and other interested parties, shall promote the use of consistent "significance thresholds" by all appropriate agencies with regard to groundwater resource impact analysis.	Consistent.
	Action 3.10.1	The County shall continue to refine and update its "significance thresholds" as new data becomes available and as overdraft conditions persist, as specified in the County's CEQA Guidelines. The County's acceptance of duly prepared and adopted groundwater management plans also may necessitate the adjustment of appropriate groundwater thresholds.	Consistent. MGB is not designated as critically overdrafted by DWR, and sustainable management criteria of this GSP may necessitate updated significance thresholds.
	Goal 4: To maintain accurate and current information on groundwater conditions throughout the County.		
	Policy 4.1	The County shall act within its powers and financial abilities to collect, update, refine, and disseminate information on local groundwater conditions.	Consistent.

Table 2-7. Summary of General Plan and Community Plan Land Use Policies Relevant to Groundwater Sustainability in the Plan Area

Element	Policy/Action No.	Description	GSP Consistency
	Action 4.1.1	The County Water Agency shall continue to monitor water levels from existing monitoring wells and, in coordination with the U.C. Cooperative Extension/Farm Advisor, shall request, on a voluntary basis, private and public water purveyors and major private groundwater users, including agricultural users, to provide periodic records of groundwater production. Unless deemed unnecessary by the Water Agency's Board of Directors for any year, the Agency shall compile an annual report on the status of pumping amounts, water levels, overdraft conditions, and other relevant data, and shall submit this report to the Board of Supervisors for its acceptance and possible further action. The annual report to the Board shall include a review of the results of all groundwater quality monitoring conducted in the County.	Consistent. For the MGB, the Montecito GSA will have this responsibility. The Montecito GSA will send annual reports required by DWR to the County as well.
	Action 4.1.2	The County, in consultation with the cities, other counties, affected water purveyors, and other interested parties, shall promote the use of consistent standards by all appropriate agencies with regard to groundwater resources.	Consistent. Note that sustainability criteria for basins under management of a GSP will be specific to each basin.
	Action 4.1.3	The County recognizes the need for more accurate data on all groundwater basins within the County and shall continue to support relevant technical studies, as feasible.	Consistent.
	Action 4.1.4	The County should identify areas where natural resources and habitats depend upon groundwater, and where such resources and habitats have been adversely affected by groundwater overdraft.	Consistent.
	Action 4.1.6	The service area boundaries of existing and planned private water companies shall be defined. These companies shall be requested to provide this information to P&D and the County Water Agency no later than 12/31/94 or, for subsequently organized companies, within six months of their final formation.	To be determined. The locations of private water companies are included in this GSP as Figure 2-2.
	Action 4.1.7	The County recommends that all public and private water companies, districts, and agencies, to the extent legally possible, maintain mutual aid agreements with adjacent districts or private water companies in case of water shortages. Any such agreements shall be noted by the County Water Agency in its annual report (see Action 4.1.1). Such agreements would be based on short-term or emergency needs or identified economic benefits to all parties.	Consistent. Not currently existing.

Table 2-7. Summary of General Plan and Community Plan Land Use Policies Relevant to Groundwater Sustainability in the Plan Area

Element	Policy/Action No.	Description	GSP Consistency
	Action 4.1.8	All water districts and city water departments which have prepared a Water Conservation Plan (under the 1984 Urban Water Management Act) and/or other long-term water planning studies, shall be asked to submit a copy of such plan(s) to the County Water Agency and P&D for review and comment. P&D shall meet with these purveyors to discuss the population/land use projections and their current status.	Consistent.
	Action 4.1.9	The County Water Agency shall continue to work with local water purveyors and other appropriate entities to promote the efficient use of water by all users through education and incentive programs. Progress on such programs shall be reported by the County Water Agency in its annual report (see Action 4.1.1).	Consistent. GSP annual reports will be submitted to the County at the same time they are submitted to DWR.
	Action 4.1.10	The County shall continue to encourage and, where feasible, financially participate in USGS, DWR, SWRCB, and local water purveyors' studies of water quality in basins throughout the County.	Consistent.
	Action 4.1.11	The County shall continue to encourage and, where feasible, materially assist the seawater intrusion monitoring programs of the USGS, local water purveyors, and other appropriate agencies.	Consistent.
	Action 4.1.12	The County shall encourage and, where feasible, materially contribute to the refinement and updating of agricultural water use ("duty") factors by the Soil Conservation Service, the U.C. Cooperative Extension/Farm Advisor, or other appropriate entities.	Consistent.
	Action 4.1.13	The County shall encourage and, where feasible, materially contribute to the refinement of estimates of agricultural water return flows by the State Department of Water Resources, the U.C. Cooperative Extension/Farm Advisor, or other appropriate entities.	Consistent.
Coastal Land Use Plan			
	Goal II.A: Maintain orderly growth consistent with available resources and the semi-rural character of the community.		

Table 2-7. Summary of General Plan and Community Plan Land Use Policies Relevant to Groundwater Sustainability in the Plan Area

Element	Policy/Action No.	Description	GSP Consistency
Montecito Planning Area	Policy II.A.I	In order to pace development with long-term readily available resources and services (i.e. water, sewer, roads, schools), the County shall not permit the number of primary residential units to exceed an annual rate of one half of one percent of the permitted 1989 housing stock unless specifically exempted by ordinance. This rate shall represent the maximum allocated residential growth rate until such time that the County determines, through a periodic public review of the status of services and infrastructure in the Montecito Planning Area, that further growth can be accommodated by acceptable and reliable supplies and capacities without diminishing the quality of life in the community.	Consistent.
	Policy II.A.II	A temporary reduction in the annual one-half percent dwelling unit permit rate and corresponding reduction in number of permit allocations for the Montecito Planning Area may be enacted by the Board of Supervisors, if the short term availability of resources is jeopardized by the continued allocation of such permits.	Consistent.
Development Planning Issues	Policy 2-1	In order to obtain approval for a division of land, the applicant shall demonstrate that adequate water is available to serve the newly created parcels except for parcels designated as “Not a Building Site” on the recorded final or parcel map.	Consistent.
	Policy 2-2	The long term integrity of groundwater basins or sub-basins located wholly within the coastal zone shall be protected. To this end, the safe yield as determined by competent hydrologic evidence of such a groundwater basin or sub-basin shall not be exceeded except on a temporary basis as part of a conjunctive use or other program managed by the appropriate water district. If the safe yield of a groundwater basin or sub-basin is found to be exceeded for reasons other than a conjunctive use program, new development, including land division and other use dependent upon private wells, shall not be permitted if the net increase in water demand for the development causes basin safe yield to be exceeded, but in no case shall any existing lawful parcel be denied development of one single family residence. This policy shall not apply to appropriators or overlying property owners who wish to develop their property using water to which they are legally entitled pursuant to an adjudication of their water rights.	Consistent. Terminology will be updated with adoption of this GSP, but the spirit and intent are consistent.
	Policy 2-3	In the furtherance of better water management, the County may require applicants to install meters on private wells and to maintain records of well extractions for use by the appropriate water district.	To be determined.
	Policy 2-4	Within designated urban areas, new development other than that for agricultural purposes shall be serviced by the appropriate public sewer and water district or an existing mutual water company, if such service is available.	Consistent.

Table 2-7. Summary of General Plan and Community Plan Land Use Policies Relevant to Groundwater Sustainability in the Plan Area

Element	Policy/Action No.	Description	GSP Consistency
	Policy 2-5	Water-conserving devices shall be used in all new development.	Consistent.
	Policy 2-6	Prior to issuance of a development permit, the County shall make the finding, based on information provided by environmental documents, staff analysis, and the applicant, that adequate public or private services and resources (i.e., water, sewer, roads, etc.) are available to serve the proposed development. The applicant shall assume full responsibility for costs incurred in service extensions or improvements that are required as a result of the proposed project. Lack of available public or private services or resources shall be grounds for denial of the project or reduction in the density otherwise indicated in the land use plan. Where an affordable housing project is proposed pursuant to the Affordable Housing Overlay regulations, special needs housing or other affordable housing projects which include at least 50% of the total number of units for affordable housing or 30% of the total number of units affordable at the very low income level are to be served by entities that require can-and-will-serve letters, such projects shall be presumed to be consistent with the water and sewer service requirements of this policy if the project has, or is conditioned to obtain all necessary can-and-will-serve letters at the time of final map recordation, or if no map, prior to issuance of land use permits.	Consistent.
	Policy 2-7	Consistent with PRC Section 30604 (e), the County may deny a project for a period of up to one year if the Board of Supervisors finds that 1) a public agency has been specifically authorized to acquire the property on which the development is located, and 2) there are funds available or funds could reasonably be expected to be made available within one year for such acquisition.	Consistent.
	Policy 2-8	The County shall give equal priority to the following land uses in the coastal zone of Montecito and Summerland: -Expansion of public recreational opportunities -Visitor-serving commercial uses, i.e., restaurants, retail commercial, motels, etc. -Low and moderate income housing -Agricultural expansion	Agricultural expansion, if supplied with groundwater, may not be consistent with GSP sustainability goals. MWD is not issuing CWSAs for new agricultural expansion.
	Policy 2-11	All development, including agriculture, adjacent to areas designated on the land use plan or resource maps as environmentally sensitive habitat areas, shall be regulated to avoid adverse impacts on habitat resources. Regulatory measures include, but are not limited to, setbacks, buffer zones, grading controls, noise restrictions, maintenance of natural vegetation, and control of runoff.	Consistent.

Table 2-7. Summary of General Plan and Community Plan Land Use Policies Relevant to Groundwater Sustainability in the Plan Area

Element	Policy/Action No.	Description	GSP Consistency
Hazards – Hillside and Watershed Protection	Policy 3-18	Provisions shall be made to conduct surface water to storm drains or suitable watercourses to prevent erosion. Drainage devices shall be designed to accommodate increased runoff resulting from modified soil and surface conditions as a result of development. Water runoff shall be retained on-site whenever possible to facilitate groundwater recharge.	Consistent.
	Policy 3-19	Degradation of the water quality of groundwater basins, nearby streams, or wetlands shall not result from development of the site. Pollutants, such as chemicals, fuels, lubricants, raw sewage, and other harmful waste, shall not be discharged into or alongside coastal streams or wetlands either during or after construction.	Consistent.
Montecito Community Plan			
Biological Habitats	Policy BIO-M-I.20	Pollution of streams, sloughs, drainage channels, underground water basins, estuaries, the ocean, and areas adjacent to such waters shall be minimized.	Consistent.
Flooding and Drainage	Policy FD-M-2.1	Development shall be designed to minimize the threat of on-site and downstream flood potential and to allow recharge of the groundwater basin to the maximum extent feasible.	Consistent.
	Policy FD-M-4.6	Other than projects that are currently approved and/or funded, no further concrete channelization or major alterations of streams shall be permitted	Consistent.
Water	Policy WAT-M-1.1	In planning for future water supply, the County shall encourage reasonable, practical, reliable, efficient, and environmentally sound water policies.	Consistent.
	Policy WAT-M-1.2	The County should coordinate with the Montecito Water District in order to encourage conservation and coordinate supplies with current and future demand.	Consistent.
	Action WAT-M-1.2.1	County shall work with the Montecito Water District to promote educational programs which encourage water resource conservation.	Consistent.
	Development Standard WAT-M-1.2.1	Landscape plans, where required for development, shall include drip irrigation systems and/or other water saving irrigation systems.	Consistent.
	Policy WAT-M-1.3	The County (in conjunction with the Montecito Water District) shall monitor the effects of development on water sources and the County shall prepare and make public a report regarding the status of Montecito Planning Area water supply and demand every five years or when circumstances substantially change (e.g., new water supplies become available).	Consistent.

Table 2-7. Summary of General Plan and Community Plan Land Use Policies Relevant to Groundwater Sustainability in the Plan Area

Element	Policy/Action No.	Description	GSP Consistency
	Policy WAT-M-1.4	The County Water Agency shall work cooperatively with the Montecito Water District, other local, state, and federal agencies, and private groups and individuals with particular interest and expertise related to water, in the pursuit of water allocation or conservation techniques and investigation of alternative water sources.	Consistent.
	Action WAT-M-1.4.1	The County shall coordinate with the Montecito Water District in their review of discretionary development proposals.	Consistent.
	Policy WAT-M-1.5	When supplemental alternative water sources become available, a buffer of 10 percent between supply and demand should be maintained in reserve for periods of drought condition.	Consistent.
	Action WAT-M-1.5.1	If an overdraft situation should occur, the County shall encourage the Montecito Water District to use new water supplies when available to reduce the overdraft caused by the District.	Consistent.

Sources: County of Santa Barbara 2009a, 2019d.
Notes: GSP = Groundwater Sustainability Plan; County = County of Santa Barbara; U.C. = University of California; SGMA = Sustainable Groundwater Management Act; Montecito GSA = Montecito Groundwater Basin Groundwater Sustainability Agency; MGB = Montecito Groundwater Basin; RWQCB = Regional Water Quality Control Board; SWRCB = State Water Resources Control Board; MWD = Montecito Water District; DWR = Department of Water Resources; P&D = Planning and Development Department; USGS = U.S. Geological Survey; M&I = municipal and industrial; CEQA = California Environmental Quality Act; PRC = California Public Resources Code; CWSA = Certificate of Water Service Availability.

Comprehensive Plan Elements

In the Groundwater Resources section of the Conservation Element, the County included several findings that generally remain accurate, although certain expectations, particularly with regard to the availability of SWP water, may no longer be accurate. For example, at the time of preparation (1994), the County recognized that new supplemental water sources, such as SWP water and augmentation of local supplies, would be available and could serve to replenish groundwater basins or be used in lieu of groundwater. As noted above in the summary of the latest UWMP, MWD is now planning for ongoing limitations and/or periodic drought-related curtailments of water supply from the SWP and has determined that active/managed recharge of the MGB may be infeasible due to limitations in physical space, lack of adequate unsaturated thickness of the aquifer, and various environmental/regulatory considerations (e.g., water quality) (GSI 2020). Existing conditions therefore challenge the expectation contained in the Groundwater Resources section of the County's Comprehensive Plan (County of Santa Barbara 2009a). Furthermore, the land use plans describe groundwater-related actions as voluntary cooperative and collaborative efforts that are not mandated under the regulatory schemes that existed at the time. With the passage of the SGMA, this has changed.

Coastal Land Use Plan

In 1982, the County adopted the CLUP, which established land uses within the coastal zone. The CLUP and implementation program, which compose the County's LCP,[9] are designed as a separate coastal element to the County's Comprehensive Plan. The CLUP lays out the general patterns of development throughout the coastal areas of the County. Its purpose is to protect coastal resources while accommodating development within the coastal zone. The LCP provides a high-level overview of land use planning policies aimed at compatibility and compliance with Commission regulations protecting wildlife, aesthetic, and recreational resources in the plan area. The other Comprehensive Plan elements are applicable within the coastal zone; however, the CLUP takes precedence if a conflict exists between these two plans.

The CLUP acknowledges the general water resource limitations of the south coast area. Specifically, it states that Section 30231 of the California Coastal Act requires that depletion of groundwater supplies be prevented. Section 30241 requires that public service and facility expansions and non-agricultural development do not impair agricultural viability either through increased assessment costs or degraded air and water quality. It acknowledges that wastewater treatment and collection facilities were near capacity levels in Summerland and Montecito (although the Montecito Sanitary District is at less than half capacity currently), which presented an additional constraint to development in these areas. It includes a number of development policies related to service system capacity and water availability (LCP Policies 2-1 through 2-6). Policies revolve around requiring developers to prove out the adequacy and sustainability of available water supply prior to approval of planned development, giving the County authority to require applicants to install meters on private wells and to maintain records of well extractions for use by the appropriate water district, and requiring maximum water conservation. The CLUP acknowledges that the plan area is experiencing constraints due to limited water resources, stating that because "buildout in these areas, i.e., the total number of housing units permitted under the land use plan, exceeds available water supplies, priorities for development are needed to assure that the priority land uses specified in Section 30254 of the Coastal Act are not precluded and that the depletion of groundwater supplies is prevented" (County of Santa Barbara 2019d, p. 24).

[9] As required by the California Coastal Act of 1976, the LCP is the land use plans, zoning ordinances, zoning district maps, and implementing actions that, when taken together, meet the requirements of and implement the provisions and policies of the California Coastal Act.

The CLUP has an implementing policy that directs the County to adopt a growth management ordinance that regulates the number of additional new primary residential units permitted each year by the Resource Management Department.

Montecito Community Plan

The Montecito Community Plan sets out specific goals relating to community development, public facilities and services, and resources and constraints. It states the objectives of the goals and names specific policies and actions to carry out those policies. The community plan also designates the type of land use (e.g., residential, commercial) allowed for each parcel within the Montecito Planning Area and the maximum density allowed for residential parcels (e.g., one dwelling unit allowed per acre in SRR-1.0 zones, 4.6 dwelling units allowed per acre in SRR-4.6 zones). These designations determine the amount of growth that can be expected through potential subdivision of land. Zoning for every parcel is then mapped to match the land use and density specified in the Montecito Community Plan. Community plan policies relevant to groundwater resources are provided in Table 2-7.

Summerland Community Plan

Summerland was originally subdivided in December 1888 as a spiritualist community. The new lots were generally divided in a grid pattern of 25 feet by 50 feet to accommodate tents for visitors on a steep slope north of what is now U.S. Highway 101. These small lots are one of the issues that still face the town today, as building on them can be challenging due to the small size of the lots and the steep slopes. Most of the Summerland Planning Area is within the coastal zone, with the exception of 22 parcels northeast of Ortega Ridge Road.

Summerland originally had water service provided by the Summerland Water District (which was formally dissolved and merged with MWD in 1995). In the mid-1980s, after the lifting of a moratorium that had been placed on new water meters due to the drought and severe water shortage of the later 1970s, Summerland Water District released 200 water meters, which overwhelmed the community with new construction and led to the designation of the area by the County as a “Special Problem Area” due to grading, flooding, and parking problems the growth brought with it. This kicked off a process to develop the Summerland Community Plan (County of Santa Barbara 2014), which, along with an accompanying final environmental impact report, was initially adopted in 1992 and most recently updated in 2014.

Toro Canyon Community Plan

Toro Canyon is bordered by the Summerland and Montecito Community Plan areas to the west, the Pacific Ocean to the south, the Los Padres National Forest to the north, and Rancho Monte Allegre and Carpinteria City limits to the east. The southern portion of Toro Canyon lies within the coastal zone.

Toro Canyon’s 5,750 acres support large areas of agriculture (including greenhouses), low-density residential, some commercial and recreational areas, and undeveloped open space. The Toro Canyon Community Plan recognizes that steep slopes, poor soils, limited sewer service, sensitive habitats, fire hazard, and narrow winding roads seriously constrain intensified residential development in Toro Canyon. The community plan indicates that the County’s Comprehensive Plan allows for up to 305 new units under theoretical buildout of General Plan land use designation, but that it does not account for adopted County policy (e.g., the Montecito Growth Management Ordinance [MGMO]) or physical constraints such as access and fire protection, limited public road access, lack of adequate wastewater systems, sensitive habitat protection, and steep slopes, nor does it account for additional secondary residential uses such as residential second units and farm employee dwellings.

The Montecito and Carpinteria Sanitary Districts each serve small portions of Toro Canyon, although 80% of area residents rely on private septic systems for wastewater disposal. Large numbers of horses and domestic animals residing in Toro Canyon may be a source of water pollution.

Montecito Growth Management Ordinance

Montecito enacted the MGMO, which recognizes the physical constraints on growth within the community, the desire to preserve the semi-rural character of the area, and the limited reach and expansion capabilities of existing public services and infrastructure. The MGMO adopts a 0.5% permit allocation growth rate (along with exemptions for affordable units and second residential units), compared to a pre-ordinance average population increase of 2.26% per year. The 0.5% annual permit allocation is equivalent to 19 units per year. With regard to water resources, the MGMO recognizes that large uncertainties exist with regard to the ability of the current and future water supply to accommodate existing and future water demands, which is one of the major reasons for the establishment of the MGMO, since it is viewed as preventing the accelerated rate of depletion and/or overdrafting of the MGB while encouraging cooperative efforts with water agencies and purveyors to obtain a long-range, acceptable, reliable source of water to serve the community. The MGMO is consistent with the goals and objectives of this GSP.

2.1.5.3 Other Planning/Land Use Considerations

It should also be noted that all discretionary projects proposed within the MGB are required to comply with CEQA. In 2019, the Governor's Office of Planning and Research released an update to the CEQA Guidelines that included a new requirement to analyze projects for their compliance with adopted GSPs. Specifically, the new applicable significance criteria include the following (14 CCR 15000 et seq.):

- Would the program or project substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the project may impede sustainable groundwater management of the basin?
- Would the program or project conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan?

Therefore, to the extent to which General Plans allow growth that could have an impact on groundwater supply, such projects would be evaluated for their consistency with adopted GSPs and for whether they adversely impact the sustainable management of the MGB. Under CEQA, potentially significant impacts identified must be avoided or substantially minimized unless significant impacts are unavoidable, in which case the lead agency must adopt a statement of overriding considerations.

The County has long implemented its own CEQA significance thresholds based on heightened public concern and awareness for the scarcity of the County's groundwater resources. Under County guidelines, "safe yield" is defined as "the maximum amount of water which can be withdrawn from a basin (or aquifer) on an average annual basis without inducing a long-term progressive drop in water level" (Baca 1992).[10] The Environmental Thresholds and Guidelines Manual prepared by the County (County of Santa Barbara 2018) outlines the appropriate use and application of various environmental impact thresholds as they relate to groundwater resources. The County originally determined in 1992 that the safe yield of the MGB was 1,215 AFY, with pumping that put the MGB into overdraft with an estimated "remaining life of available storage" at the time to be 37.5 years (County of Santa Barbara 2009a). For the Toro Canyon Groundwater Basin, the safe yield was estimated to be 270 AFY, and the Toro Canyon Groundwater Basin was

[10] Note that the safe yield definition in the CEQA significance thresholds is not the same as the SGMA definition.

determined not be in overdraft (Baca 1992). Historical safe yield estimates for the MGB are discussed in Section 2.2.3.3, Sustainable Yield.

2.1.6 Additional GSP Elements

Required GSP elements include those listed below (CWC 10727.4; 23 CCR 354.8[g]). Each element that is applicable to the MGB includes a description of where within the GSP it is addressed.

- Control of saline water intrusion: There are no existing saline water intrusion programs in the MGB. Information on seawater intrusion is included in Section 2.2.4.3, Seawater Intrusion; Section 3.2.3, Seawater Intrusion – Undesirable Results; Section 3.3.4, Seawater Intrusion – Minimum Thresholds; and Section 3.4.3, Seawater Intrusion – Measurable Objectives.
- Wellhead protection is discussed in Section 2.1.4.2, Well Permitting.
- Migration of contaminated groundwater is discussed in Section 2.2.4.4, Groundwater Quality.
- Well abandonment and well destruction programs are discussed in Section 2.1.4.2, Well Permitting.
- Replenishment of groundwater extractions is discussed in Section 2.3, Water Budget.
- Conjunctive use and underground storage are discussed in Section 2.3, Water Budget.
- Well construction policies are discussed in Section 2.1.4.2, Well Permitting.
- Groundwater contamination cleanup, recharge, diversions to storage, conservation, water recycling, conveyance, and extraction projects are discussed in Section 2.2.4.4, Groundwater Quality.
- Efficient water management practices are discussed in Section 2.1.4.5, Operational Flexibility and Conjunctive Management Considerations, and Section 2.1.5, Land Use Elements or Topic Categories of Applicable General Plans.
- Relationships with state and federal regulatory agencies are discussed in Section 2.1.1.1, Land Use Jurisdictions within the Plan Area; Section 2.1.7.4, Summary of Initial Information on Relationships between State and Federal Regulatory Agencies; and Section 2.3, Water Budget.
- Land use plans and efforts to coordinate with land use planning agencies to assess activities that potentially create risks to groundwater quality or quantity are discussed in Section 2.1.5, Land Use Elements or Topic Categories of Applicable General Plans.
- Impacts on groundwater-dependent ecosystems (GDEs) are discussed in Section 2.2.4.6, Groundwater–Surface Water Connectivity, and Section 2.2.4.7, Groundwater-Dependent Ecosystems.

2.1.7 Notice and Communication

Notification, communication, and collaboration have been conducted during all phases of GSP development:

- Montecito GSA formation
- Initial GSP notification
- GSP development
- Draft GSP review and comments

MWD notified DWR of its intent to become the exclusive GSA on June 29, 2018. The required notification of intent to prepare the GSP was submitted to DWR on April 30, 2019. The notification specified the preparation of a single GSP for the entire MGB. The Montecito GSA has maintained a publicly available Sustainable Groundwater Management website that includes extensive information on the MGB, Montecito GSA Board of Directors (Board), and GSP process, including draft GSP chapters made available for public review, meetings and workshops, and opportunities for public involvement and comment. A Communication and Engagement Plan (CEP) was prepared by the Montecito GSA and adopted by the Board on April 14, 2020 (Section 2.1.7.5). The CEP is a living document, the purpose of which is to provide a guide for public and stakeholder participation in the SGMA process. It is included as Appendix C of this GSP. There has been ongoing coordination with agencies having groundwater management responsibilities in the basins adjacent to the MBG (the City of Santa Barbara to the west and Carpinteria Valley Water District to the east). Memoranda of understanding relevant to this coordination are included in Appendix B.

The Montecito GSA engaged with stakeholders regarding the SGMA process and groundwater management prior to DWR's reprioritization of the MGB from very low to medium priority (reprioritization finalized by DWR January 4, 2019) and during MGB boundary modification (approved by DWR February 2019). The GSP development phase included extensive outreach and engagement with the stakeholders, including beneficial users, as described in more detail in Section 2.1.7.2, Public Meetings and Workshops Summary, and Section 2.1.7.5, Communication. The Draft GSP review and comment phase included a formal public comment period for the Draft GSP and response to comments, as discussed in Section 2.1.7.3, Summary of Comments and Responses.

The final notification and engagement phase of GSP preparation will begin upon submittal of this GSP to DWR. This phase is ongoing with engagement of interested parties and stakeholders during implementation of the monitoring plan, annual and periodic updates, and GSP revision, as needed.

2.1.7.1 Summary of Beneficial Uses and Users

The beneficial uses of groundwater within the MGB include municipal, agricultural, and residential water supply. Beneficial users of groundwater and those interests potentially affected by groundwater management include but are not limited to municipal and private water purveyors, private well owners, local land use planning agencies, and environmental and recreational users (Table 2-8). There are no disadvantaged communities or federally recognized tribal lands within the plan area. The beneficial users of groundwater within the plan area are described in more detail in the following paragraphs.

Municipal Well Operators and Public and Private Water Purveyors. MWD is the only public water agency that operates groundwater wells within the plan area. Private water companies that operate groundwater wells include Wilkinson/Gill Water Company, Hot Springs/Montecito Creek Water Company, Ivydene Water Company, Lingate Lane Mutual Water Company, Miramar Addition and Improvement Company, Riven Rock Mutual Water Company, Toro Canyon Estates Mutual Water Company, Coyote Springs Water Company, Sea Meadows, and Sunshine Water Company (East Montecito Mutual Water Company) (Section 2.1.1.2, Water Agencies Relevant to the Plan Area). The Montecito GSA consists solely of MWD, and input from private water companies has been solicited through the outreach methods described in Section 2.1.7.5. In addition, there has been coordination with private water companies as needed to prepare this GSP and implement the related grant projects.

Local Land Use Planning Agencies. The County and the Commission have planning authority over the portions of the plan area within their jurisdictional boundaries. Input from local land use planning agencies has been solicited through the outreach methods described in Section 2.1.7.5.

Environmental Users. Environmental users of groundwater within the MGB may include GDEs in the form of riparian and aquatic habitat. The Montecito GSA has taken steps to incorporate the interests of environmental users in the development of the GSP through a review and documentation of the potential interconnectedness of surface and groundwater in the subbasin as described in Section 2.2.4.7. Additionally, environmental stakeholders were invited to attend public meetings and comment on the public draft of the GSP. Comments on the public draft were incorporated into the final GSP.

Table 2-8. Stakeholders in the Plan Area

Category of Interest	Stakeholder Groups	Engagement Purpose
General Public	General Public	Inform and solicit input on sustainable groundwater management within the Montecito Groundwater Basin
Land Use	Montecito Water District County of Santa Barbara City of Santa Barbara Carpinteria Valley Water District California Coastal Commission Montecito Association	Collaborate on land use policies and requirements to ensure mutual compatibility and support
Private Users	Private Well Owners Wilkinson/Gill Water Company Hot Springs/Montecito Creek Water Company Ivydene Water Company Lingate Lane Mutual Water Company Miramar Addition and Improvement Company Riven Rock Mutual Water Company Toro Canyon Estates Mutual Water Company Coyote Springs Water Company Sea Meadows Sunshine Water Company (East Montecito Mutual Water Company)	Assess needs and impacts of residential use and collaborate to ensure sustainable groundwater management
Urban/Agriculture Users/Golf Courses	Montecito Water District Avocado and Citrus Growers Valley Club Birnam Wood Golf Club Montecito Club	Collaborate to ensure mutually beneficial sustainable management of groundwater
Environmental and Ecosystem	Federal and State agencies (Fish and Wildlife) Environmental Groups	Inform and solicit input on sustainable groundwater management regarding MGB ecosystems
Integrated Water Management	Integrated Regional Water Management Program (Santa Barbara County Region) Recycled Water Coalition	Inform, involve, and collaborate to improve regional sustainability

2.1.7.2 Public Meetings and Workshops Summary

Following is a list of meetings at which Montecito GSA business was conducted and workshops, the sole purpose of which was to inform and solicit input from the public and stakeholders. Included in the list is meetings of the Stakeholder Advisory Committee (SAC) and Technical Advisory Committee (TAC). Each meeting listed was advertised in advance and provided opportunity for input from the public.

- April 29, 2019 – Montecito GSA Board Meeting
- July 24, 2019 – Montecito GSA Board Meeting
- October 8, 2019 – Montecito GSA Board Meeting
- November 14, 2019 – Montecito GSA Finance Committee Meeting
- December 19, 2019 – Montecito GSA Strategic Planning Committee Meeting
- January 14, 2020 – Montecito GSA Board Meeting
- January 21, 2020 – Montecito GSA Strategic Planning Committee Meeting
- February 7, 2020 – Montecito GSA Strategic Planning Committee Meeting
- February 24, 2020 – Montecito GSA Public Workshop
- March 10, 2020 – Montecito GSA Finance Committee Meeting
- April 1, 2020 – Montecito GSA Strategic Planning/Finance Committee Meetings
- April 14, 2020 – Montecito GSA Board Meeting
- June 12, 2020 – TAC Meeting
- June 18, 2020 – SAC Meeting
- June 24, 2020 – Montecito GSA Board Meeting
- July 21, 2020 – Montecito GSA Finance Committee Meeting
- July 28, 2020 – Montecito GSA Board Meeting
- September 16, 2020 – TAC Meeting
- September 24, 2020 – SAC Meeting
- October 13, 2020 – Montecito GSA Board Meeting
- November 10, 2020 – Montecito Association Board Meeting
- December 11, 2020 – TAC Meeting
- December 17, 2020 – SAC Meeting
- January 12, 2021 – Montecito GSA Board Meeting
- January 13, 2021 – Summerland Citizens Association Board Meeting
- April 2, 2021 – TAC Meeting
- April 14, 2021 – Montecito GSA Board Meeting
- September 17, 2021 – TAC Meeting

- October 12, 2021 – Montecito GSA Board Meeting
- December 2, 2021 – TAC Meeting
- January 11, 2022 – Montecito GSA Board Meeting
- March 28, 2022 – TAC Meeting
- April 1, 2022 – Montecito GSA Strategic Planning Committee Meeting
- May 11, 2022 – Public Workshop
- September 11, 2022 – Montecito GSA Strategic Planning Committee Meeting
- September 26, 2022 – TAC Meeting
- October 11, 2022 – Montecito GSA Board Meeting
- November 1, 2022– Montecito GSA Board Meeting
- November 15, 2022 – Montecito GSA Board Meeting
- January 19, 2023 – TAC Meeting
- January 23, 2023 – SAC Meeting
- January 25, – Montecito GSA Strategic Planning Committee Meeting
- January 30, 2023 – Montecito GSA Finance Committee Meeting
- February 6, 2023 – Montecito GSA Board Meeting
- February 21, 2023 – Community Townhall/Public Workshop
- March 17, 2023 – Montecito GSA Strategic Planning Committee Meeting
- March 21, 2023 – Montecito GSA Board Meeting
- April 17, 2023 – Community Townhall/Public Workshop
- May 19, 2023 – Montecito GSA Special Board Meeting

Note that the list will be updated as additional meetings occur.

2.1.7.3 Summary of Comments and Responses

The Montecito GSA released a public draft of the GSP on March 30, 2023. Prior to the release of the Public Draft GSP, a community townhall/public workshop was held on February 21, 2023, and an additional community townhall/public workshop was held on April 17, 2023. Both workshops were held to answer questions and solicit comments on the Public Draft GSP. The 45-day public comment period was open between March 30, 2023, and May 14, 2023. Formal comments were accepted in writing only. The comments were submitted electronically via email or via the Montecito GSA Public Comment Form to info@montecitogsa.com. A total of 3 comment letters were received. Before completing this Final GSP, the public comments received on the Draft GSP were reviewed and, where appropriate, incorporated into this Final GSP. Public comments on the Draft GSP are included in Appendix D.

2.1.7.4 Summary of Initial Information on Relationships between State and Federal Regulatory Agencies

The Montecito GSA has not entered into any formal agreements with the federal government regarding preparation or administration of this GSP or groundwater management pursuant to Section 10720.3(c) of the SGMA. There are no federally recognized Native American tribes within the plan area.

The Montecito GSA recognizes the need for both formal and informal consultation with state and federal regulatory agencies throughout the implementation of the GSP. The Montecito GSA includes the following state and federal regulatory agencies on its list of interested parties:

- United States Forest Service
- California Department of Fish and Wildlife
- California Coastal Commission
- California Department of Water Resources

2.1.7.5 Communication

A CEP was developed for this GSP (Appendix C). The purpose of the CEP is to create a common understanding and transparency throughout the groundwater sustainability planning process, including fulfilling the requirements of the SGMA as described in 23 CCR 354.10(d). The CEP conforms to DWR guidance and introduces groundwater management and summarizes the SGMA background and role of Montecito GSA (DWR 2018a). The CEP identifies the goals and outcomes of the outreach process; identifies opportunities for public engagement and provides a discussion of how public input and response will be incorporated; describes how the Montecito GSA encourages the active involvement of diverse social, cultural, and economic elements of the population within the MGB; and describes the method by which the Montecito GSA will inform the public about GSP and groundwater management progress.

The Montecito GSA has provided ongoing opportunities for stakeholder involvement in the GSP development, including the development and maintenance of a dedicated Montecito GSA website (https://montecitogsa.com/). Among other functions, the website includes agendas, minutes, and presentations for meetings; draft GSP chapters; a form by which the public may submit comments; the GSP schedule; and additional GSP technical information. Draft chapters of the GSP were posted online throughout the GSP development process beginning in the fall of 2020. All final draft chapters of the GSP were available online for 91 days, including an official 45-day public comment period prior to adoption on May 19, 2023. The Montecito GSA encouraged active participation from stakeholders throughout the GSP development process.

2.2 BASIN SETTING

2.2.1 Historical, Current, Projected Climate

2.2.1.1 Precipitation

The climate of the south coast of the County and the MGB is Mediterranean, with warm, dry summers and cool, often wet, winters. Precipitation is variable across the region due to the high relief, east–west-trending, transverse Santa Ynez Mountains. Average rainfall increases with elevation in the Santa Ynez Range, with the top of the range receiving nearly twice the precipitation of elevations at or near MSL (County of Santa Barbara 2019b). The

Parameter-Elevation Regressions on Independent Slopes Model 30-year (1981–2010) digital elevation model precipitation grid shows that the average annual precipitation in the MGB ranges from about 18 inches per year along the southern edge of the MGB near the coast to nearly 26 inches per year in the northernmost parts of the MGB (Figure 2-6). The region also experiences significant year-to-year and decadal variability in precipitation, in which extended dry periods are followed by consecutive wet years. This variability is evident from the precipitation record of weather stations in and near the MGB (Figure 2-10, Water Year Precipitation). In typical wet years, large winter storms from the Pacific Ocean deliver heavy precipitation (DWR 2015).

Based on length of record and proximity to the MGB, the five most representative weather stations for climate analysis are the Montecito, Summerland, Doulton Tunnel, Cold Springs Debris Basin, and Santa Barbara stations. Average water year precipitation data for the five weather stations for the period from 2000 to 2019 (20-year period) are provided in Table 2-9. Based on this 20-year record, the mean water year precipitation in the vicinity of the MGB ranges from 17.51 inches (Santa Barbara station) to 25.59 inches (Doulton Tunnel station), for a combined mean precipitation of 21.14 inches (Summerland station is excluded from calculation of mean precipitation due to limited data).

Table 2-9. Average Water Year Precipitation from 2000 to 2019 for Select Rain Gauges in the Vicinity of the Montecito Groundwater Basin

	Rain Gauge				
	Montecito (No. 325)	*Summerland (No. 328)[a]*	*Cold Springs Debris Basin (No. 210)[b]*	*Doulton Tunnel (No. 231)*	*Santa Barbara (No. 234)*
Water Year	*Measured Precipitation (Inches)*				
2000	22.61	N/A	25.21	28.58	22.75
2001	26.46	N/A	30.04	33.53	25.81
2002	10.36	N/A	11.04	11.89	9.20
2003	26.26	N/A	30.80	30.37	24.79
2004	11.82	N/A	15.37	15.27	10.70
2005	42.01	N/A	50.58	62.40	37.05
2006	24.30	N/A	29.81	31.57	22.33
2007	7.30	N/A	8.91	9.64	6.62
2008	19.64	N/A	26.12	21.71	17.41
2009	12.05	N/A	16.23	19.94	11.84
2010	21.62	N/A	29.82	39.88	20.43
2011	30.79	N/A	42.50	46.02	28.49
2012	10.73	N/A	15.99	15.66	11.63
2013	10.22	N/A	14.68	16.53	8.98
2014	7.67	N/A	10.57	10.13	8.06
2015	9.63	10.11	12.76	14.36	10.55
2016	11.31	10.68	13.90	15.35	11.62
2017	26.79	26.18	28.83	36.18	26.55
2018	9.71	10.61	N/A	16.47	9.52
2019	22.01	21.22	29.37	36.33	25.85
Average	**18.16**	**15.76**	**23.29**	**25.59**	**17.51**

Source: County of Santa Barbara 2019a; NOAA 2019.
Notes: N/A = data are not available.

[a] Water year precipitation data are not available for the Summerland station for the years 2000–2014.
[b] Water year precipitation data are not available for the Cold Springs Debris Basin station for the year 2018.

Cumulative departure from mean precipitation over the historical record shows considerable variability in precipitation and several wet and dry periods (Summerland station is excluded from evaluation due to limited data) (Figure 2-10).

The precipitation record for the Montecito station spans the period from water year 1926 to 2019. Over this period, the cumulative departure from the mean precipitation shows several short- and long-term wet and dry sequences. Between 1926 and 1934, the cumulative departure from mean precipitation curve declines, indicating either a relatively short-term decrease or trailing end of a long-term decrease in precipitation. The apparent short-term decrease is followed by a decade-long increase in precipitation from 1934 to 1944. From 1944 to 1977, the cumulative departure from mean precipitation curve generally declines again, indicating a dry period that extended over 33 years. From 1977 to 2006, the cumulative departure from mean precipitation curve generally trends upward again, with the exception of 4 consecutive years of below-average precipitation from 1987 to 1990. From 2006 to 2019, the cumulative departure from mean curve again steadily declines, indicating an extended dry period. As can be seen on Figure 2-10, 1998 was the wettest year on record (54.43 inches), while 2007 was the driest year on record (7.30 inches). Water year 2019, the most recent water year recorded at the Montecito station, was an above-average water year, with 22.01 inches of precipitation measured.

Precipitation Year Types

Individual water years at the Montecito station were categorized based on total measured precipitation as a percentage of the station average precipitation using the following criteria: "critical" if precipitation was below 50% of the station average, "dry" if between 50% and 75%, "below normal" if between 75% and 100%, "above normal" if between 100% and 150%, and "wet" if above 150% of the station average precipitation. The number of years of each water year type as recorded at the Montecito station are provided in Table 2-10.

Table 2-10. Montecito Groundwater Basin Water Year Types

Precipitation Year Category	Percent of Mean Precipitation	Number of Years
Critical	Below 50	9
Dry	50 to 75	29
Below normal	75 to 100	17
Above normal	100 to 150	28
Wet	Above 150	11

Note: Average precipitation at Montecito station from water year 1926 to 2019 is 19.82 inches.

2.2.1.2 Temperature

Temperatures in the vicinity of the MGB fluctuate on a seasonal basis from warm summers to cool winters. The weather station in the vicinity of the MGB with the longest and most complete temperature record is the National Oceanic and Atmospheric Administration Santa Barbara station (Station No. 47902), which spans the period from 1893 to present. Based on the Santa Barbara station, the average annual temperature is 60.6°F, ranging from an average low of 43.2°F in January to an average high of 75.3°F in September. The historical all-time minimum and maximum temperatures recorded at the Santa Barbara station are 20°F and 108°F, respectively.

2.2.1.3 Evapotranspiration

Reference evapotranspiration (ETo) in the MGB is based on data collected at the nearest CIMIS station (Station No. 107; Figure 2-6) on a daily basis between 2010 and 2019. The average ETo measured at CIMIS Station 107 between 2010 and 2019 (10-year period) is 43.95 inches, or 3.66 feet, per year (Table 2-11). In contrast, the average annual precipitation in the MGB is approximately 21.14 inches per year, or about one-half the average ETo for the area. The ETo values calculated from the CIMIS data reflect the amount of water that could be transpired by grass or alfalfa if supplied by irrigation but do not represent the actual transpiration from any specific crop or native vegetation. To calculate the ETo rate for a specific vegetation type, the ETo is multiplied by a crop coefficient that adjusts the water consumption for each crop relative to the water consumption of alfalfa.

Table 2-11. Monthly and Yearly Reference Evapotranspiration Totals for CIMIS Station No. 107 from 2010 to 2019 (Inches)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Total
2010	1.64	2.10	4.20	4.36	5.94	4.66	4.91	5.19	3.85	2.84	2.28	1.20	43.17
2011	1.96	2.29	3.30	4.74	5.77	3.96	5.14	5.07	3.56	3.21	1.95	1.79	42.74
2012	2.12	2.67	3.39	4.26	5.66	4.94	5.19	5.73	4.33	3.63	1.92	1.39	45.23
2013	2.03	2.52	3.39	4.27	5.70	4.49	4.83	5.15	4.44	3.32	2.04	2.00	44.18
2014	2.20	2.30	3.70	5.00	6.02	5.17	5.43	5.26	4.38	3.55	2.32	1.47	46.80
2015	1.91	2.38	4.05	4.71	4.58	4.79	5.01	5.26	4.42	3.65	2.61	2.01	45.38
2016	1.64	3.22	3.71	4.95	4.11	4.94	5.59	4.93	3.61	2.76	1.99	1.30	42.75
2017	0.96	1.29	3.95	4.91	4.97	5.06	4.76	3.78	3.33	3.95	2.07	1.91	40.94
2018	1.83	2.68	3.30	4.92	4.56	5.05	6.00	5.61	3.86	3.45	2.24	1.73	45.23
2019	1.67	2.02	3.87	4.32	3.98	3.12	5.71	5.71	4.79	4.17	2.19	1.51	43.06
Average	**1.80**	**2.35**	**3.69**	**4.64**	**5.13**	**4.62**	**5.26**	**5.17**	**4.06**	**3.45**	**2.16**	**1.63**	**43.95**

Source: CIMIS 2019.
Note: CIMIS = California Irrigation Management Information System.

According to the State of California Evapotranspiration Map developed by CIMIS, the MGB is located within Evapotranspiration Zone 10, with an annual average ETo of 49.1 inches, or 4.09 feet (CIMIS 1999). This regional average ETo estimate is comparable to the ETo measured at CIMIS station 107 (Table 2-11).

2.2.1.4 Projected Climate

As described above, historical and current precipitation data for the MGB indicate significant inter-annual and decadal scale fluctuations in precipitation associated with variability in the magnitude and number of storm events that occur over a given period. To evaluate climate change impacts on precipitation in the MGB, DWR-projected 2030 and 2070 precipitation change factors were applied to the historical precipitation record of the Montecito and Doulton Tunnel stations.

Climate change data are provided by DWR in both tabular and spatial formats. These data consist of monthly adjustment factors (e.g., change factors) used to scale historical precipitation and evapotranspiration (ET) data. To determine which change factor grid cell values to apply to the Montecito and Doulton Tunnel stations, the station locations were overlain by the change factor model grid in a geographic information system. Based on the spatial data, the Doulton Tunnel station falls within model grid cell 9269; however, the Montecito station, and the majority of the MGB, is located outside the change factor model grid. To avoid unrealistic increases in projected precipitation

due to the orographic enhancement the Santa Ynez Mountains have on precipitation patterns in the MGB, the precipitation change factor values of the nearest "coastal" model grid (grid cell 10150) were applied to the Montecito station precipitation record. Additionally, the change factor dataset covers the period from January 1915 to December 2011. For water years after 2011, change factor values for the pre-2011 water year with the most similar mean annual precipitation were used.

Based on the Montecito station historical precipitation record, mean water year precipitation is projected to increase by 0.20 inches and 0.64 inches by 2030 and 2070, respectively. Based on the Doulton Tunnel station historical precipitation record, mean water year precipitation is projected to increase by 0.09 inches and 0.72 inches by 2030 and 2070, respectively.

Projected Drought Severity

Water supply planning is predicated, in part, on the most severe drought anticipated to occur during the planning period. There are various methods to determine the drought to be used for planning purposes, including the most severe drought that has occurred since historical climate records have been kept, the most severe indicated by dendrochronology, or other indirect methods. Ideally, the "design" drought takes into account expected trends from long-term climate change. Figure 2-10 shows Santa Barbara precipitation since 1900 along with the cumulative departure from mean. Note that several dry periods have occurred during that time, with varying lengths and rainfall shortages. Drought severity is generally predicted to intensify due to greater inter-annual precipitation variability and projected warming upwards of 7°C (12.6°F) by the end of the century. According to downscaled global climate model simulations for a mid-twenty-first century 20-year dry spell in California, it is predicted that an extended drought would have a precipitation deficit comparable to the greatest precipitation deficit observed historically, but with temperatures 1°C to 3°C (1.8°F to 5.4°F) above historical levels, depending on whether the drought occurs earlier or later in the twenty-first century (Pierce et al. 2018).

2.2.2 Hydrogeologic Conceptual Model

The hydrogeologic conceptual model provides the framework for the development of water budgets, analytical and numerical models, and monitoring networks. Additionally, the hydrogeologic conceptual model serves as a tool for stakeholder outreach and communication and assists with the identification of data gaps. A hydrogeologic conceptual model does not compute specific quantities of water flowing through or moving into or out of a basin but rather provides a general understanding of the physical setting, characteristics, and processes that govern groundwater occurrence and movement within a basin. The parameters of the hydrogeologic conceptual model developed for the plan area are depicted on Figure 2-11, Hydrogeologic Conceptual Model. These parameters include basin boundaries, stratigraphy, land use, and the components of inflow and outflow from the MGB. The following subsections detail the geologic and hydrogeologic characteristics of the MGB.

The MGB underlies the central coastal plain of the Transverse Ranges Geomorphic Province. The Transverse Ranges Geomorphic Province is characterized by east–west-trending mountain ranges from Point Arguello at the coast, inland to the San Bernardino Mountains. The province includes the offshore Channel Islands, which are similar in orientation and geologic composition to the mainland (CGS 2002). The southernmost mountains of the Transverse Ranges are the Santa Monica Mountains. The Transverse Ranges are actively uplifting in response to compression along an east–west-trending section of the San Andreas Fault (CGS 2002). The Transverse Ranges Geomorphic Province's northern boundary is the east–west-trending Santa Ynez Fault, along which uplift of the Santa Ynez Mountains is occurring. The southern Transverse Ranges boundary is the Santa Monica Fault Zone, at the southern base of the Santa Monica Mountains.

The MGB underlies the terraces and plains between the Santa Ynez Mountains to the north and the Pacific Ocean to the south (Figure 2-12a, Dibblee Geologic Map, and Figure 2-12b, Dibblee Geologic Map Legend). The underlying geologic structure of the MGB consists of downward-folded (synclinal) bedrock of the southern Santa Ynez Mountains underlying an unconsolidated sediment-filled depression (Figure 2-13, A–A′ Geologic Cross Section). Several faults transect the MGB trending in a general east–west direction. These faults delineate the boundaries of what many historical reports and studies have treated as three distinct groundwater storage units (Figures 2-12a and 2-12b). Toro Canyon, a fourth storage unit located along the eastern MGB boundary, has been designated as well, presumably based on the relative isolation of aquifer deposits from the other aquifers to the east and west (Figure 2-14, B–B′ Geologic Cross Section, and Figure 2-15, C–C′ Geologic Cross Section). A topographic high portion of the MGB, located west of Toro Canyon Creek in the southeastern portion of the MGB, is devoid of unconsolidated water-bearing deposits and is excluded from the MGB as defined by DWR (Figures 2-12a, 2-12b, and 2-14).

Geologic Units

The geologic units of the MGB are of two general types: consolidated rocks, which compose the east–west-trending Santa Ynez Mountains and underlie the MGB, and the unconsolidated sediments that overlie the basement rock and compose the MGB aquifer and surficial geology (Muir 1968). The boundary between the consolidated and unconsolidated rocks represents an unconformity across which lithological units representing millions of years are missing. The geologic units underlying the MGB are described below from oldest to youngest.

Tertiary Age Consolidated Rocks

Tertiary age consolidated rocks of the southern side of the Santa Ynez Mountains are folded beyond vertical where they are exposed in the areas surrounding the MGB (Figures 2-12a and 2-13). Note that Figure 2-12b provides a key for the features shown in Figure 2-12a. Similarly, Figure 2-16, Geologic Cross Sections Legend, provides a key for the features shown in Figures 2-13, 2-14, and 2-15. Sedimentary Eocene[11] age consolidated sandstone, shale, siltstone, and mudstone formations of marine origin include the Juncal, Matilija, Cozy Dell, and Coldwater sandstone. The combined thickness of these exceeds 15,000 feet (Muir 1968).

Overlying the Coldwater sandstone is the Sespe Formation, a terrestrial red to pink silt shale and claystone with interbedded sandstone and conglomerate. The Sespe Formation is of Oligocene age[12] and outcrops sporadically throughout the MGB (Figure 2-12a). Overlying the Sespe Formation are several Miocene[13] age units, which include the Vaqueros, Rincon, and Monterey Formations. While the Vaqueros Formation consists mainly of thickly bedded, fine-grained sandstone, the Rincon Formation is primarily claystone and siltstone. The Monterey Formation, which is found in small outcrops on the eastern and western margins of the MGB, is a weathered white and siliceous shale and limestone (Figure 2-12a).

The total thickness of the consolidated rocks underlying the MGB is about 20,000 feet (GTC 1974).

Quaternary Age Poorly Consolidated to Unconsolidated Deposits

Unconsolidated deposits of Pleistocene[14] to Holocene[15] age unconformably overlie the consolidated Tertiary bedrock filling the structural depression of the coastal plain with sediments eroded mainly from the uplifted areas

11 From about 56 million to 34 million years before present.
12 From about 34 million to about 23 million years before present.
13 From about 23 million to 5.4 million years before present.
14 From about 2.6 million to 11,700 years before the present.
15 From about 11,700 years before the present to the present.

north of the MGB (Muir 1968). The groundwater resources of the MGB exist primarily within these deposits (see Section 2.2.3, Principal Aquifers and Aquitards).

Santa Barbara Formation

The Late Pliocene–Early Pleistocene[16] Santa Barbara Formation is of marine origin and directly overlies the consolidated Monterey Formation throughout much of the coastal plain of the County (GTC 1974). However, the Santa Barbara Formation is present in only limited parts of the MGB where it does not crop out and is present only at depth (Figures 2-13 and 2-14). The formation is mostly brown to grey, weakly consolidated, massive siltstone and sandstone with some clay (GTC 1974). The formation is as thick as 2,200 feet in some areas of the south coast of the County. However, uplift and erosion have reduced or eliminated the formation in much of the MGB (GTC 1974). The formation is present only in the southwest part of the MGB (DWR 2004), where it is thought to be on the order of a couple hundred feet thick (GTC 1974). Therefore, it is not considered to be a significant source of groundwater in the MGB (DWR 2004).

Casitas Formation

The Pleistocene Casitas Formation is of continental origin and is present in each of the MGB storage units, where it consists of variable lithology including yellow to brown gravel, sand, silt, clay, and cobbles (Muir 1968). Where the Santa Barbara Formation is absent, the Casitas Formation unconformably overlies the older consolidated bedrock (Figure 2-13). Where the Santa Barbara Formation is present, it may grade, or finger, into the overlying Casitas Formation. Data from oil wells and other borings indicate the Casitas Formation is between 500 and 600 feet thick in the MGB.

Due to a tendency for the formation to coarsen upward, it is mainly the upper formation that yields water to wells (DWR 2004). Within the MGB, the Casitas Formation is characterized by discontinuous and lenticular zones of fine-grained clay and sandy clay, resulting in discontinuous aquifers and aquicludes (GTC 1974). The aquifer in this formation is confined or partially confined in some parts of the MGB, including on the north side of the Arroyo Parida Fault (DWR 2004).

Alluvial and Terrace Deposits

Surficial alluvial and terrace deposits of Pleistocene to Holocene age unconformably overlie the Casitas Formation and include terrace, alluvial fan, stream channel, and beach sand deposits up to 500 feet thick (Muir 1968). Pleistocene deposits include older alluvium, terraces, and fanglomerate. Such deposits include red-brown boulders and cobbles in a matrix of sand and clay (GTC 1974). Holocene deposits are mainly present in the south part of the MGB and in creek channels, where they consist of unconsolidated deposits of gravel, sand, silt, and clay. Older deposits are not easily distinguished from Holocene formations due to their similar lithology and gradation or interfingering of contacts (GTC 1974). Alluvial and terrace deposits yield limited quantities of groundwater to shallow screened wells (GTC 1974).

Basin Bottom

SGMA regulations require description of the "definable bottom of the basin" (CWC Section 354.14), and DWR guidance documents suggest several different ways to define the basin bottom (DWR 2016). It may be defined

[16] From about 5.3 million to 2.6 million years before the present.

based on physical properties, such as the transition from permeable unconsolidated sediment to bedrock, or by water quality considerations, such as the depth below which water is unusable for most potable or agricultural purposes due to poor water quality. Although groundwater is present in the fractures of consolidated bedrock of pre-Pliocene Tertiary age, and water from these formations recharges the unconsolidated sediments, the formations are known to yield poorly and unpredictably to groundwater wells (GTC 1974). Therefore, the bottom of the Santa Barbara Formation, where present, and bottom of the Casitas Formation are the basin bottom as defined for this GSP. Depth to the basin bottom varies by location, but in general the unconsolidated, water-bearing MGB deposits extend to a maximum depth of about 1,200 feet below ground surface (bgs) (GTC 1974).

Geologic Structure

After an extended period of deposition during the mid-Tertiary period, the Transverse Ranges were subject to intense compression and folding in response to movement along the east–west-oriented part of the San Andreas Fault (Harden 2004). As a result of this and subsequent episodes of folding, the Santa Ynez Mountains were uplifted and the Tertiary bedrock deformed into the folds illustrated in Cross Sections A–A′, B–B′, and C–C′ (Figures 2-13, 2-14, and 2-15, respectively). Storage Unit 1, north of the Arroyo Parida Fault, overlies the east–west-trending hinge line and north limb of a large syncline (Cross Section A–A′; Figure 2-13). Notably, the beds of the syncline are overturned, dipping to the north such that any groundwater infiltrating the consolidated bedrock tends to flow to the north, away from the MGB. Additional folds include the Summerland Syncline and Loon Point Anticline within the Toro Canyon area (Cross Section C–C′; Figure 2-15). Major faulting within the MGB and the south coast of Santa Barbara County as a whole occurred subsequent to the major episodes of folding (Upson 1951).

The MGB has been divided in previous reports and studies into groundwater storage units based on the presence of several faults (Figures 2-12a and 2-12b). Storage Unit 1 extends from the Arroyo Parida Fault to the northern boundary of the MGB, Storage Unit 2 from the Arroyo Parida Fault south to the Montecito Fault, and Storage Unit 3 from the Montecito Fault to the Pacific Ocean (the MGB's southern boundary). The Fernald Point Fault trends in a northeasterly direction from where it enters the coast west of Summerland and terminates against the Arroyo Parida Fault (Figures 2-12a and 2-12b). Each of these faults offsets the consolidated bedrock underlying the MGB, in some areas by as much as thousands of feet (Cross Section A–A′; Figure 2-13). In parts of the MGB, there is evidence that the faults offset the unconsolidated formations that compose the MGB's aquifers, and act as barriers to groundwater flow (GTC 1974). An additional fault, the Rincon Creek Fault, trends in an east–west direction an unknown distance off the south coast (USGS 2020).

Major Faults

USGS has grouped all of the major faults in the MGB under the fault system name "Mission Ridge Fault System" and used different fault section names from those of older reports, including a Geotechnical Consultants Inc. (GTC 1974) report. However, the fault traces are similarly located by each source, with the exception of the Rincon Creek Fault Zone (see description below). The fault names from GTC (1974) are used herein to more clearly distinguish between the faults being described.

Arroyo Parida Fault

The Arroyo Parida Fault trends east–west and composes the southern boundary of Storage Unit 1. It is a steeply dipping normal fault (GTC 1974) with some left lateral movement (USGS 2020). It has been considered to act as a significant barrier to groundwater flow in historical reports.

Montecito Fault

The Montecito Fault was first described by GTC (1974) to be a steeply dipping or vertical fault, with the north side having moved upward in relation to the south. It forms the southern boundary of the uplifted block that has been designated as Storage Unit 2. Historical reports have indicated that the fault acts as a significant barrier to groundwater flow (GTC 1974).

Rincon Creek Fault Zone

The Rincon Creek Fault has been variously located from approximately 1,000 feet offshore of the MGB (GTC 1974) to more than 1 mile offshore (USGS 2020). The location is important because the fault may be instrumental in the degree to which seawater intrusion may occur within the MGB. Based on the geology shown in the north–south cross section (Cross Section A–A′; Figure 2-13), the greater the distance of the offshore fault, the greater the exposure of unconsolidated units and the potential for seawater intrusion. Regardless of the postulated location of the fault, previous reports and studies have disagreed as to the extent to which the fault acts as a barrier to seawater intrusion (see Section 2.2.4.3). Although the USGS Quaternary Faults Web Application includes few details regarding the fault orientation and sense of movement, GTC (1974) describes the fault as a southward-dipping reverse fault based on oil well logs (Cross Section A–A′; Figure 2-13).

Fernald Point Fault

Designated the Arroyo Parida Section of the Mission Ridge Fault System by USGS (2020), the Fernald Point Fault is steeply dipping (greater than 60^{o}) in variable directions, as reported by various researchers (GTC 1974). Therefore, it is unclear whether the fault is a normal or reverse fault. GTC (1974) shows the fault as vertical, with the west side uplifted relative to the east side. It is along the Fernald Point Fault that the Summerland Hills are postulated to have been uplifted relative to the rest of the MGB (GTC 1974).

Groundwater Storage Units

Although several of the prominent regional faults had been mapped and referenced in early reports (Upson 1951; Muir 1968), and storage units defined in the MGB and throughout the south coast of Santa Barbara County, it was with the designation of the Montecito Fault that the MGB storage units were designated as referenced in their current configuration (GTC 1974). Sources that have referred to or have used the storage units as designations for various calculations since their definition by GTC (1974) include Hoover (1980a), MWD (1998), Slade (1991), and DWR (2004), among others.

Although historical reports commonly include the Toro Canyon Storage Unit with the Carpinteria Groundwater Basin, the Toro Canyon Storage Unit was defined by DWR as part of the MGB (DWR 2004). DWR has designated none of the storage units as subbasins (DWR 2020b).[17] However, per the SGMA Guidelines, areas within the MGB may be defined as separate Management Areas for the purpose of facilitating sustainable management (CWC Section 354.20). The decision to define any of the storage units as management areas may be based on several factors, including the extent of hydrogeologic separation, unique land use, and data availability. Different sustainability criteria may be defined for individual management areas as long as there is a consistent definition of undesirable results throughout the basin.

[17] A "subbasin" is defined as "any subdivision of a basin based on geologic and hydrologic barriers or institutional boundaries, as further described or defined in Bulletin 118" (23 CCR 341[g][2]).

The presence of faults does not, in itself, justify the designation of storage units within a basin unless hydrogeologic separation is evident. Such evidence has commonly included significant differences in water levels and disrupted gradients across faults, indicating that the faults act to prohibit or significantly inhibit flow across them. Groundwater elevation contour maps for the years 1961 and 1970 (GTC 1974) and 1983 and 1991 (Slade 1991) illustrate significant differences across the faults that define Storage Units 1, 2, and 3. More recent groundwater elevation contour maps (see Section 2.2.4.1, Groundwater Elevation Data) suggest that the Montecito and Arroyo Parida Faults are not effective barriers to groundwater flow; however, accurate portrayal of actual groundwater elevations across the faults have been subject to researcher interpretation and to the limitations of data availability (and data were sparse at times, particularly in Storage Unit 2). See Section 2.2.4.1 for a discussion of groundwater levels and the historical influence of major faults.

Because historical studies and reports, including DWR (2004), have recognized the four MGB storage units, this GSP continues to do so. However, the degree to which the storage units are hydrogeologically independent is considered in establishing sustainability criteria and management areas (Section 2.4).

2.2.3 Principal Aquifers and Aquitards

Water-bearing units in the MGB include the Santa Barbara Formation; the Casitas Formation, which is the primary aquifer; and the alluvium and terrace deposits. The Santa Barbara Formation is thought to be generally confined, although it does not occur extensively throughout the MGB (DWR 2004). The Casitas Formation may be confined in isolated areas in the MGB, such as along the north side of the Arroyo Parida Fault, whereas the alluvium and terrace deposits are mostly unconfined (DWR 2004). The Casitas Formation is graded, with the upper portions of the formation being coarser than the lower portions (MWD 1998). Therefore, wells that are screened throughout the Casitas Formation yield groundwater preferentially from shallower depths. Several parts of the aquifer have shown discontinuous confining or semi-confining clay layers, resulting in laterally discontinuous or inconsistent recharge (GTC 1974).

2.2.3.1 Aquifer Properties

Well logs indicate that many wells are screened across multiple geologic formations, and historical studies often treat the MGB as having a single unconfined aquifer, evaluating aquifer properties by storage unit as opposed to by depth (Slade 1991). Table 2-12 lists aquifer properties by storage unit from several historical sources.

Table 2-12. Aquifer Properties

Storage Unit	Hydraulic Conductivity (Feet/Day)[a]	Specific Yield (%)			
		GTC 1974[b]	*Hoover 1980*[b]	*Slade 1991*[c]	*DWR 1999*[d]
1	1.2	7	4.5	4 to 5	N/A
2	N/A	8	5	4	N/A
3	1.2	8	7.4	4 to 9	N/A
Toro Canyon	1.0	7	6	6	N/A
Average	**N/A**	**N/A**	**6.5**	**6**	**11**

Sources: GTC 1974; Hoover 1980a; Slade 1991; DWR 1999; Dudek 2015a.
Notes: GTC = Geotechnical Consultants Inc.; DWR = Department of Water Resources; N/A = data are not available.
Specific yield is approximately equal to the storativity for unconfined aquifers.
[a] Based on analysis of pumping test results from select wells (Dudek 2015a).
[b] Based on lithologic data from 27 wells located across the Montecito Groundwater Basin.
[c] Based on well lithologic data; assumes higher specific yield for shallower sediments.
[d] Based on lithologic data from 48 boreholes; does not include Toro Canyon Storage Unit.

2.2.3.2 Groundwater in Storage

Historical estimates of groundwater in storage in the MGB are shown in Table 2-13. Estimates from Muir (1968), GTC (1974), and Hoover (1980a) are within approximately 25% of each other. Variations in the geometry calculated for each storage unit and in the determination of specific yield are responsible for the differences (Slade 1991). The Slade (1991) estimates are as much as one order of magnitude smaller than the others. This is mainly because the Slade (1991) estimates are for "usable" groundwater in storage, which Slade (1991) defines as groundwater that is economically recoverable and of sufficient quality for beneficial uses. For the MGB, this includes only the groundwater elevation above which seawater intrusion may occur (Slade 1991). Note that groundwater in storage and usable groundwater in storage fluctuates with groundwater elevation and is thus dependent on the climate and groundwater extraction during the period of calculation.

Table 2-13. Historical Estimates of Groundwater in Storage

Storage Unit	Groundwater in Storage (Acre-Feet)			
	Muir 1968	*GTC 1974*	*Hoover 1980a*	*Slade 1991*[a]
1	67,800	25,000	18,227	8,770
2	N/A	2,600	3,186	730
3	29,000[b]	92,600	81,424	4,990
Toro Canyon	N/A	8,680	9,081	1,620
Total	**97,000**	**128,880**	**111,918 (9,480)[c]**	**16,110**

Sources: Muir 1968; GTC 1974; Hoover 1980a; Slade 1991.
Notes: GTC = Geotechnical Consultants Inc.; N/A = data are not available.
[a] Maximum usable groundwater in storage, based on spring 1983 water levels.
[b] Estimate includes Storage Unit 2.
[c] Value in parentheses is for usable storage that can be economically withdrawn and not result in seawater intrusion.

2.2.3.3 Sustainable Yield

The sustainable yield of the MGB has been estimated by multiple researchers over many decades. The definition and method of determining the sustainable yield (also called "safe" or "perennial" yield) has varied, resulting in varying estimates, and sometimes unequal comparisons. As defined by the SGMA, sustainable yield is "the maximum quantity of water, calculated over a base period representative of long-term conditions in the basin, and including any temporary surplus that can be withdrawn annually from a groundwater supply without causing an undesirable result" (DWR 2016). Previous sustainable yield estimates for the MGB are listed in Table 2-14. An estimate of the sustainable yield based on current understanding of the hydrogeology, water budget, and projected future conditions is described in Section 2.3.7, Quantification of Overdraft.

Table 2-14. Previous Estimates of Sustainable Yield

Storage Unit	Sustainable Yield (Acre-Feet/Year)				
	Muir 1968	*GTC 1974*	*Hoover 1980a*	*Loaiciga 2015*	*County of Santa Barbara 2015a*
1	N/A	N/A	550	545	N/A
2	N/A	N/A	100	38	N/A
3	N/A	N/A	700	409	N/A
Toro Canyon	N/A	N/A	300	130	N/A
Total	**2,500**	**1,200**	**1,650**	**1,122**	**1,350**

Sources: Muir 1968; GTC 1974; Hoover 1980a; Loaiciga 2015; County of Santa Barbara 2015a.
Notes: GTC = Geotechnical Consultants Inc.; N/A = data are not available.

2.2.4 Historical and Current Groundwater Conditions

The following subsections address current and historical conditions related to each of the undesirable results identified under the SGMA, including groundwater elevation, change in storage, seawater intrusion, groundwater quality, land subsidence, groundwater–surface water connectivity, and GDEs.

2.2.4.1 Groundwater Elevation Data

Historical Groundwater Levels

The predominant direction of groundwater flow within the MGB is southward, toward the Pacific Ocean. Groundwater elevations are highest along the northern boundary of the MGB and gradually decrease to near MSL along the southern boundary at the coast.

Historical groundwater elevations indicate a similar flow pattern in the past to what is observed currently. Groundwater elevations in 1961 and 1970 indicate a groundwater flow from north to south in Storage Units 1 and 2 and the Toro Canyon Storage Unit, and a southwestern flow direction in Storage Unit 3 (GTC 1974). The maps also indicate a general north-to-south flow direction along the MGB boundaries, suggesting minimal groundwater exchange with adjacent basins. In 1961 groundwater elevations ranged from a high of 350 feet MSL in the northern part of Storage Unit 1 to a low of −20 feet MSL in the southwestern part of Storage Unit 3 near the coast. Groundwater elevations in 1961 also appear to drop by about 150 feet across the Montecito Fault, coincident with the boundary between Storage Units 2 and 3. Groundwater elevation data were sparse for the Toro Canyon Storage Unit in 1961, but groundwater elevations were approximately 10 to 20 feet MSL in the southern part of the unit near the coast. The contours for 1970 are similar to those for 1961 but indicate that groundwater elevations were slightly higher in Storage Unit 3 in 1970, reaching a low of 0 feet MSL at the coast (GTC 1974).

Groundwater elevation data collected in the winter 1991 indicate that groundwater elevations ranged from about 450 feet MSL in the northern part of Storage Unit 1 to 0 feet MSL throughout Storage Unit 3 and ranged from 140 feet MSL near the center of Toro Canyon Storage Unit to 0 feet MSL along the coast (Slade 1991). Groundwater elevations differed by approximately 120 feet on either side of the Arroyo Parida Fault, or the boundary between Storage Units 1 and 2, but groundwater elevations do not differ across the Montecito Fault, as had been previously reported.

Additional groundwater elevation contour maps were prepared for spring 1995, an above-average water year following a relatively wet period, and fall 2015, a below-average precipitation water year following an extended dry period, using static (non-pumping) groundwater level monitoring data provided by MWD (Figure 2-17, Groundwater Elevation Contours Spring 1995, and Figure 2-18, Groundwater Elevation Contours Fall 2015, respectively). Insufficient data were available to generate contours for the Toro Canyon Storage Unit because there are only two wells with groundwater level data, and the maps are also constrained by a significant lack of data for Storage Unit 2. In spring 1995, groundwater elevations ranged from a high of over 600 feet MSL in the northern part of Storage Unit 1 to a low of about 2 feet MSL in Storage Unit 3 and the Toro Canyon Storage Unit near the coast. In fall 2015, groundwater elevations ranged from a high of over 600 feet MSL in the northern parts of Storage Unit 1 to a low of about −60 feet MSL in the eastern part of Storage Unit 3 and to −2 feet MSL near the coast, thus indicating the potential for seawater intrusion to have occurred. In addition to the apparent pumping-related depression centered around Well 3-12a (Paden 2) located in the eastern part of Storage Unit 3, the fall 2015 contours show several less-pronounced potential pumping depressions in the central part of Storage Unit 1. The contours for spring 1995 and fall 2015 do not indicate a significant vertical change in groundwater elevation across the Arroyo Parida or Montecito Faults; however, groundwater level data are generally lacking for Storage Unit 2 and limited to the two

wells on the western edge of the storage unit. A compilation of groundwater hydrographs for the MGB is included as Appendix E.

Current Groundwater Levels

Current groundwater levels in the MGB were measured in spring and fall 2019 and are shown on Figure 2-19, Groundwater Elevation Contours Spring 2019, and Figure 2-20, Groundwater Elevation Contours Fall 2019, respectively. Measured groundwater elevations in spring 2019 ranged from a high of 739.17 feet MSL in the northern part of Storage Unit 1 (Well 1-43) to a low of −12.29 feet MSL in the eastern part of Storage Unit 3 (Well 3-12a) and to about 0 feet MSL near the coast (Well 3-7) (Figure 2-19). Measured groundwater elevations in fall 2019 were similar to those measured in spring and ranged from a high of 726 feet MSL in Well 1-43 to a low of −12.29 feet MSL in Well 3-12a and to about 0 feet MSL near the coast (Well 3-7) (Figure 2-20).

Several apparent pumping-related depressions were exhibited in the data collected in both spring and fall 2019. In both years, depressed groundwater levels were observed near the center and in the eastern part of Storage Unit 3, where measured groundwater elevations were approximately −12 feet MSL. In addition, several smaller potential pumping-related depressions were observed in the central part of Storage Unit 1. A comparison between the spring and fall 2019 groundwater elevation contours indicates that groundwater levels remained relatively stable throughout the year, with a slight decline in water levels observed in most wells in fall 2019 (Figures 2-19 and 2-20).

Groundwater Level Trends

The earliest available groundwater level data for the MGB are from the early 1940s. Although sparse, data indicate that the period from the late 1940s to the mid-1960s generally represents an MGB-wide low water level period, with the exception of 1959, which according to Muir (1968) was a year that MGB storage was at a maximum (GTC 1974; Upson 1951). During this time, a reversed gradient was present in the southern part of Storage Unit 3 and the Toro Canyon Storage Unit, where water levels were up to −25 feet MSL near the coast (GTC 1974). The depressed groundwater levels persisted in the Toro Canyon Storage Unit through the 1950s and in Storage Unit 3 until the mid-1960s (GTC 1974). Groundwater levels slightly rebounded and stabilized from the late 1960s until the mid-1980s, at which point groundwater levels began dropping rapidly. Beginning in the late 1980s, groundwater levels declined across the MGB, and in 1991 reached the lowest levels recorded in MGB history at that time (Slade 1991). Hydrographs for key indicator wells (wells identified as being representative of groundwater conditions and having the longest and most complete historical records) show that from the late 1980s to the early 1990s groundwater levels declined up to approximately 75 feet in Storage Unit 1 (Well 1-15) and approximately 50 feet in Storage Unit 3 (Well 3-8) (Figure 2-21, Groundwater Levels in Key Indicator Wells). Groundwater level measurements in the principal aquifer in Storage Unit 2 and the Toro Canyon Storage Unit were not available during this time period. This MGB-wide low water level period corresponded with a dry climatic period characterized by 4 years of below-average precipitation coupled with the highest rate of groundwater production ever recorded by MWD at the time, at 532 AF, in 1990.

After the low water level and dry climatic period of the early 1990s, groundwater level data indicate that water levels rebounded in the middle of the 1990s in response to increased precipitation and reduced groundwater pumping. Groundwater levels remained relatively stable through the late 1990s until about the mid-2000s, at which point groundwater extraction rates began to increase again and an extended dry climatic period set in. Over a 12-year period between 2007 and 2019, groundwater levels declined by approximately 70 feet in Storage Unit 1 (Well 1-15), which is equivalent to an average rate of decline of approximately 5.8 feet per year (Figure 2-21). The magnitude and rate of groundwater level decline in the other MGB storage units over the same period was about

half that of Storage Unit 1 or less, with an observed groundwater level decline in Storage Unit 3 of 34 feet, or a rate of 2.8 feet per year (Well 3-8; Figure 2-21).

Data Gaps

Review of geologic information, well completion reports, and existing groundwater elevation data for the MGB suggest that the MGB is largely unconfined and is composed of a single aquifer unit. Therefore, the spatial (vertical) distribution of existing well infrastructure may be adequate to determine the minimum threshold for chronic groundwater lowering. In addition, the lateral distribution suggests that existing wells are adequate to meet SGMA requirements; however, groundwater level data from Storage Unit 2 and the Toro Canyon Storage Unit are limited spatially and/or temporally. In both storage units, only two wells are routinely monitored for groundwater levels, and in the Toro Canyon Storage Unit the length of the monitoring record is limited. Additional groundwater level data in Storage Unit 2 would aid in verifying the degree to which the Arroyo Parida and Montecito Faults act as partial barriers to groundwater flow, and in the Toro Canyon Storage Unit would provide for better spatial characterization of groundwater level trends.

2.2.4.2 Estimated Change in Storage

Estimates of the change of groundwater in storage in the MGB are based on numerical model results from the BNM (Section 2.3.1, Surface Water and Groundwater Model). The BNM estimates that, between 1970 and 2019, groundwater in storage declined by a total volume of approximately 3,400 AF, which corresponds to an average annual decline of approximately 70 AFY and about a 10% decline in total usable storage in the MGB. As described in Section 2.3.4, Change in Annual Volume of Groundwater in Storage, groundwater in storage in the MGB is strongly influenced by climate conditions, declining during periods of drought, and recovering in normal and above normal water years. The net decline in groundwater storage between 1970 and 2019 reflects the drought conditions encountered in the MGB at the end of 2019. Groundwater conditions that correspond to this change in groundwater in storage are described in detail in Section 2.3.

2.2.4.3 Seawater Intrusion

The term "seawater intrusion" is defined by DWR as the advancement of seawater (saline water) into a groundwater supply that results in the degradation of water quality in the basin, and includes seawater from any source (DWR 2016). Under natural conditions, fresh groundwater discharging to the coast prevents seawater from encroaching landward. When groundwater is extracted from a coastal aquifer, the seaward movement of freshwater is reduced and the resultant decrease in hydraulic head[18] can cause the lateral and subsequently vertical encroachment of seawater into the freshwater zones of the aquifer. Seawater intrusion associated with groundwater overdraft has occurred to some degree in many coastal aquifers around the world, as well as the West Coast of the United States.

There have been several hydrogeologic studies (Upson 1951; Muir 1968; GTC 1974; Hoover 1980b; Slade 1987; Loaiciga 2015) of the coastal groundwater basins of southern Santa Barbara County that have considered the issue of seawater intrusion. A few of the studies (GTC 1974; Hoover 1980b; Slade 1987; Loaiciga 2015) have specifically focused on the MGB, while others (Upson 1951; Muir 1968) have discussed conditions in adjacent basins or at the regional scale. The results of the studies that have been completed thus far have generally been inconclusive as to

[18] Hydraulic head is an indicator of the total energy available to move groundwater through an aquifer. Hydraulic head is measured by the height to which a column of water will stand above a reference datum (USGS 2002).

the areal and vertical extent of seawater intrusion, or its occurrence at all, in the MGB. Note that sea level rise associated with climate change may increase the potential for seawater intrusion.[19]

The issue of seawater intrusion in the south coast basins of Santa Barbara County was first considered by Upson (1951), who recognized that the potential for seawater intrusion to occur exists and that such encroachment would doubtless occur if excessive groundwater pumping were to continue; however, the author concluded that there was no evidence of seawater intrusion as of 1946. Upson (1951) noted that, in the early 1940s, groundwater extraction exceeded safe yield in the Goleta and Carpinteria Groundwater Basins.

Muir (1968) revealed that groundwater levels near the coast in the area of Santa Barbara and the western part of the Montecito area had been below MSL since 1960. As a result, seawater had intruded into the surficial aquifer deposits directly adjacent to the coast but had only affected wells less than 50 feet deep and deep wells with improper sanitary seals. Limited groundwater quality data suggested that only the shallow deposits had been affected and that no horizontal migration of seawater had occurred at depth into the deeper water-bearing deposits. Muir (1968) concluded that horizontal migration of seawater into the deeper units of the aquifer was unlikely because there is no direct connection between the deep aquifer units and the ocean due to an offshore fault (i.e., Rincon Creek Fault) that serves as an effective saltwater barrier.

GTC (1974) reported that chloride concentrations measured in several wells located in and adjacent to the MGB suggested water quality degradation but that none of the concentrations were "high enough to prove total and complete sea water intrusion." GTC (1974) surmised that "there exists a narrow zone along the coast into which there has been some horizontal migration of sea water" and concurred with previous investigations that the Rincon Creek Fault is an effective barrier to seawater intrusion into the deeper aquifer units.

Hoover (1980b) acknowledged the work of previous studies that concluded that structural and stratigraphic geologic features effectively seal deeper aquifer deposits and preclude seawater intrusion but noted that recent monitoring by USGS indicated a measurable deterioration of water quality in the deeper deposits of the Santa Barbara Groundwater Basin and the southwestern portion of the MGB (no hydrogeologic barrier between the two basins is believed to exist). However, the author hypothesized that chemical degradation of the deeper water-bearing units would only occur if water levels were lowered substantially below MSL for significant periods of time (5 years or more). Hoover (1980b) also pointed out that poor water quality within the shallow aquifer deposits in the south coast basins is a normal occurrence and is not considered a significant problem.

Slade (1987) reviewed historical MGB well water level and quality data and arrived at the following conclusions concerning seawater intrusion: (i) there are no data on the effectiveness of the offshore Rincon Creek Fault as a continuous barrier to the landward migration of seawater in to the deeper Santa Barbara Formation-type deposits; (ii) the shallow sediments are in hydraulic connection with the ocean because the Rincon Creek Fault is likely only effective as a barrier at depth; (iii) an irregular zone of poor water quality exists along the coast such that wells are typically restricted to depths of 120 to 150 feet or less; (iv) groundwater samples collected from some older and/or shallow wells near the coast have had chloride concentrations upwards of 2,000 milligrams per liter (mg/L); and (v) groundwater elevations in wells near the coast were at or below MSL from the late 1940s until 1970 and have never been higher than 11 feet MSL. Additionally, Slade (1987) recommended that protection measures be implemented, including a 500-foot-wide buffer strip along the coastline where no groundwater extractions would occur and maintaining groundwater above 5 feet MSL to maintain a minimal seaward gradient of the water table (Slade 1987, 1991).

[19] DWR projects sea level rise of 15 centimeters and 45 centimeters by years 2030 and 2070, respectively.

Most recently, Loaiciga (2015) conducted a review of all previous investigations concerning the issue of seawater intrusion in the MGB and also reviewed historical chloride concentrations in groundwater. Loaiciga (2015) found that chloride concentrations between 312 mg/L and 1,220 mg/L have been measured in wells in the MGB, which may constitute evidence of seawater intrusion. Loaiciga (2015) then asserted that there is ample evidence that there is no impervious seawater barrier to the MGB and stressed that water quality and level monitoring in the MGB is inadequate.

DWR requires that seawater intrusion be monitored using chloride concentrations or other measurements convertible to chloride concentrations unless a proxy is used (see Chapter 3). A review of available historical water quality data for wells in the MGB indicates that there are at least nine wells that have had chloride concentrations greater than 250 mg/L (the recommended MCL for California drinking water standards), all of which are located in Storage Unit 3 and two of which are public water supply wells. The nine wells that have had elevated chloride concentrations include the following: Ennisbrook 2, Ennisbrook 5 (4N/26W-17J02S), 4N/27W-13R01S, 4N/26W-19D02S, 4N/26W-20B01S, 4N/26W-20H01S, 4N/26W-19H02S, 4N/26W-19H03S, and 4N/27W-24A01S. Two of the nine wells, 4N/26W-20B01S and 4N/26W-19D02S, have had concentrations over 1,000 mg/L, with measured chloride concentrations of 1,220 mg/L and 2,180 mg/L, respectively. In addition, chloride concentrations measured in samples from a well (4N/27W-24D02S) located to the west of the MGB in the Santa Barbara Groundwater Basin increased historically from 78 mg/L in December 1950 to 2,000 mg/L in March 1978 (Figure 2-22, Groundwater Wells with Elevated Chloride Concentrations).

Based on previous investigations, there is historical evidence of poor groundwater quality in wells located along the coast in the MGB, and particularly in Storage Unit 3. In addition, groundwater elevations in the MGB have at times been depressed along the coast such that the seaward gradient of freshwater may not have been of sufficient magnitude to preclude encroachment of seawater into the MGB. There are varying opinions as to the extent to which the Rincon Creek Fault may act as a barrier to seawater intrusion. The location and hydrogeologic characteristics of the fault/fault zone is not well known and it has been mapped as occurring from a few hundred feet to more than a mile offshore.

Current Seawater Intrusion Conditions

The Montecito GSA received grant funding for several projects related to GSP development and implementation (Section 2.1.2.5, Monitoring Network Grant Programs). The seawater intrusion component of the grant included the designation of five existing wells with which to monitor seawater intrusion (Figure 2-7). These wells were selected, in part based on the availability of limited historical water quality data. Additional data was collected for several months in 2021 with which to establish baseline water quality conditions with respect to seawater intrusion. The samples were analyzed for multiple constituents, including total dissolved solids (TDS), chloride, sodium, bicarbonate, calcium, magnesium, potassium, bromide, iodide, silica, and sulfate. The ionic composition of the groundwater was compared to that of seawater to evaluate the likelihood of seawater intrusion. Historical and current ion concentrations were averaged for comparison to that of typical seawater. The results illustrated in Figure 2-23, Seawater Intrusion Monitoring Wells Water Quality Composition Pie Charts, indicate little similarity between the constituent proportions and concentrations of well water to that of seawater, including chloride and TDS, both of which are significant indicators of seawater intrusion. Piper diagrams are used to further evaluate the occurrence of seawater intrusion and to detect changes in groundwater chemistry that may be indicative of oncoming seawater intrusion (Figure 2-24, Seawater Intrusion Monitoring Wells Water Quality Piper Plots). The diagrams include plots of significant seawater constituent proportions, including magnesium, calcium, chloride, bicarbonate, and sulfate (shown as milliequivalent percentages), for each historical and recent sample as compared to that of seawater, which is represented on each plot. In general, groundwater impacted by a saline source, whether seawater or other

sources of saline water in the aquifer, shows an increasing dominance of chloride relative to sulfate and bicarbonate. As saline water migrates into freshwater aquifers, smaller anions, such as chloride, migrate and mix with fresh groundwater ahead of the main seawater plume. Sodium follows close behind chloride, and due to its high concentration, often exchanges with calcium and magnesium adsorbed to the aquifer solids. The leading part of a saline plume is characterized by elevated concentrations of chloride, calcium, and magnesium relative to sodium, bicarbonate, and sulfate. With arrival of the main saline plume, the cation composition of the impacted water changes such that sodium predominates, and magnesium surpasses calcium (Dudek 2015b). The piper diagrams show no significant recent or historical similarity between well and seawater nor has there been migration of well water quality toward that of seawater.

The ratios of sodium/chloride and chloride/bicarbonate over time were calculated and graphed as an indication of potential incipient seawater (Figure 2-25, Seawater Intrusion Monitoring Wells: Ratio of Chloride [Cl^-] to Bicarbonate [HCO_3^-] Concentrations in Groundwater, and Figure 2-26, Seawater Intrusion Monitoring Wells: Ratio of Sodium (Na^+) to Chloride [Cl^-] Concentrations in Groundwater). Lower sodium/chloride ratios (less than 0.86) and higher chloride/bicarbonate ratios (greater than 1.3) ratios may indicate incipient seawater intrusion (Jones et al. 1999; Korfali and Jurdi 2010).

Except for Well 5, the ratios exhibited by samples from each well do not indicate the presence of seawater intrusion. Some historical and recent samples from Well 5 exhibit ratios that may indicate incipient seawater intrusion, but other factors, such as return flows from local land use, may also influence the ratios. The analyses conducted as an indication of current seawater intrusion conditions are preliminary with additional data needed to constrain the source of the constituents. However, the data suggests a lack of significant historical or current seawater intrusion. Implementation of the seawater intrusion monitoring program described in Section 2.1.2.5 and expanded monitoring in the Toro Canyon Storage Unit will provide the means by which to monitor changes in seawater intrusion indicators and to implement management strategies to prevent potential seawater intrusion.

2.2.4.4 Groundwater Quality

Groundwater quality in the plan area has been monitored routinely since at least the early 1980s, with the coverage and frequency of monitoring increasing over time, as MWD and other public water systems kept up with MGB management activities (MWD 1998). Previously published information on groundwater quality is included in numerous reports, documents, and datasets, including the following:

- **USGS Reports**. USGS published early reports on the MGB hydrogeology, including testing of groundwater quality. More recently, it published a report for a larger south coast study area (all south coastal County basins) based on water quality and ancillary data it collected in 2011 from 23 sites and on water quality data from the SWRCB DDW database for the period between January 24, 2008, and January 23, 2011 (USGS 2016).
- **DWR Reports**. An earlier version of DWR Bulletin 118 provides information on general chemistry within the MGB based on data from MWD from the late 1990s (DWR 2004).
- **MWD Reports**. The 1998 Basin Management Plan provides a description of a general nature regarding threats to water quality and some of the primary constituents of concern in MGB but is based on limited data on TDS and nitrate concentrations collected from samples in the 1970s and the mid-1990s (MWD 1998). Earlier reports from Slade (1984, 1987) and Hoover (1979) analyzed TDS, chloride, and boron concentrations and sodium adsorption ratio as part of the hydrogeologic characterization and delineation of the extent of the usable groundwater in storage for regional reclamation project efforts.

- **County Reports**. The County has published limited summaries and studies of groundwater quality within the background reports for its General Plan (County of Santa Barbara 2012) and for its IRWM Plan (County of Santa Barbara 2019b). The information contained in these reports is focused on groundwater levels, providing general summaries of groundwater quality.
- **Raw Data**. Several agencies, including MWD, DWR, USGS, and SWRCB, manage databases of groundwater quality analysis results for various purposes. This includes GAMA, which compiles groundwater data from multiple sources into its database, as well as the USGS National Water Information System Mapper. Review of these data sources indicated that the spatial (lateral) distribution of wells in Storage Unit 3 is adequate to meet SGMA requirements for water quality monitoring, but there are insufficient water quality data for Storage Unit 1, Storage Unit 2, and the Toro Canyon Storage Unit to fully characterize groundwater quality. Generally, data on water quality is available for only a subset of wells in the MGB, and routine and consistent water quality sampling sufficient to establish trends over time is occurring for an even smaller subset of wells (primarily municipal wells). Data on pertinent groundwater quality constituents are analyzed below.

Besides requiring that treated water supplies be sampled to demonstrate compliance with drinking water quality standards, SWRCB DDW also requires MWD and other water purveyors in the plan area to characterize the source water quality by collecting and analyzing raw water samples from their drinking water systems (including groundwater wells). The standard suite of water quality constituents that are tested for includes major cations and anions (including nitrate as nitrogen[20]), nitrogen, metals (boron, copper, iron, manganese, and zinc), alkalinity, TDS, and physical parameters (electrical conductance, temperature at collection, and pH). Additional constituents are analyzed from certain wells as needed based on location and local water quality issues. Every 3 years, MWD analyzes groundwater samples for additional organic constituents; currently the Amapola, Ennisbrook 2, Ennisbrook 5, Paden 2, and T. Mosby MWD production wells are the most routinely and frequently sampled wells in the plan area.

Summary of Groundwater Quality Standards

Groundwater quality within the plan area is governed by both natural and anthropogenic factors, either of which can cause adverse impacts on groundwater quality, as measured against two major standards. The first consists of Central Coast Basin Plan water quality objectives, which establish both narrative and numeric groundwater quality standards aimed at preserving existing and potential beneficial uses. In the MGB, these beneficial uses consist of agricultural water supply, municipal and domestic water supply, and industrial use (Central Coast RWQCB 2019). For many constituents, the Central Coast Basin Plan incorporates by reference state drinking water standards (described below) as the appropriate water quality objective for groundwater with municipal beneficial use. For agricultural beneficial uses, the Central Coast Basin Plan incorporates water quality standards derived from the University of California Agricultural Extension Service guidelines (Central Coast RWQCB 2019). SWRCB and the Central Coast RWQCB use these Central Coast Basin Plan water quality objectives as a basis for establishing the terms of NPDES permits and WDRs (e.g., effluent limitations, discharge specifications, and receiving water limitation) for point-source (e.g., wastewater treatment discharges) and non-point-source (e.g., urban and agricultural runoff) discharges within the plan area.

The second set of standards consists of California drinking water MCLs administered and enforced by SWRCB DDW under the California Safe Drinking Water Act, as codified in Title 22 of the CCR.[21] The California Safe Drinking Water Act prescribes enforceable primary MCL standards for five major categories of drinking water contaminants:

[20] Note that, by convention, this GSP expresses nitrate in terms of nitrate as nitrogen. "Nitrate," "nitrate-N," "nitrate-nitrogen," and "NO_3-N" all refer to nitrate as nitrogen, with an MCL of 10 mg/L.

[21] An MCL (maximum contaminant level) is the maximum concentration of a contaminant allowed in water delivered to a user of any public water system.

microorganisms, disinfectants and disinfection byproducts, inorganic chemicals, organic chemicals, and radionuclides (i.e., radioactive forms of elements).[22] In addition, secondary MCLs have been established for non-health concerns, based on aesthetic issues such as taste, odor, or color in the water. SWRCB and the U.S. Environmental Protection Agency have established secondary MCLs for at least 15 contaminants. With regard to chemical contaminants that do not have established MCLs, SWRCB establishes notification levels, which are health-based advisory levels. When chemicals are found at concentrations greater than their notification levels, certain reporting requirements apply. In addition, SWRCB has established response levels at two to three times higher than each notification level, at which SWRCB recommends removal of a drinking water source from service to protect public health. SWRCB has established notification levels and response levels for at least 30 constituents.

Summary of Groundwater Quality Conclusions

Based on all sources reviewed, including previous reports and data from MWD, USGS groundwater studies, the County's IRWM Plan, and SWRCB's GAMA database, the groundwater quality in the plan area is generally suitable for agricultural and domestic uses (MWD 1998; DWR 2004; County of Santa Barbara 2019b; SWRCB 2020). Elevated concentrations of TDS, nitrate, manganese, and iron (as identified by concentrations exceeding applicable water quality standards) have been detected in the MGB, but these concentrations have not been persistent over time. Furthermore, release of organic constituents of concern (e.g., gasoline, motor oils, methyl tert-butyl ether/tertiary butyl alcohol /other fuel oxygenates, gasoline) to groundwater have occurred but these releases remain close to the source, and the sites associated with the releases have all received regulatory closure.[23] Regulatory closure means that remediation goals have been successfully met and that residual contamination in soil and groundwater, if any, has been contained and is not spreading. Chloride concentrations are addressed in the previous section on seawater intrusion.

Review of Regulatory Cleanup Sites, Historic Oilfields, and Septic Systems

Both the Department of Toxic Substances Control's EnviroStor database and SWRCB's GeoTracker database were reviewed for information on the nature and status of regulatory cleanup sites located within the plan area. These sites consist of a mix of commercial, industrial, and public land uses, predominantly consisting of automobile service stations along the U.S. Highway 101 corridor and within the Montecito Village area. Figure 2-27, Regulatory Cleanup Program Sites, shows the locations and status of cleanup site cases within the MWD service area, along with the primary potential media of concern (e.g., soil or groundwater) for each. All cleanup site cases where groundwater was identified as a potential medium of concern are labeled on Figure 2-27. All GeoTracker sites in the MGB have received closure from SWRCB in accordance with its low-threat closure policy, indicating that contaminant releases have been remediated and adequately contained (as shown by contaminant plumes that have been either stable or decreasing in extent and concentration). Table 2-15 provides a comprehensive summary of each regulatory cleanup site case in the MGB. The sites that have had the greatest water quality impact consist of leaking underground storage tank sites in the southwest corner of the MGB in and around the Coast Village area in Storage Unit 3. The only closed case that is near a municipal water supply well is in the Montecito Village area (Chevron Station No. 9-1789), where related soil and groundwater investigations found the release to be contained and limited to the area immediately surrounding the dispenser islands, with elevated constituents in groundwater now limited to one monitoring well and with a contaminant extent that is stable or decreasing.

[22] Note that primary drinking water standards established by SWRCB under the California Safe Drinking Water Act are equivalent or more stringent than those set by the U.S. Environmental Protection Agency under the federal Safe Drinking Water Act.

[23] Releases of organic constituents of concern are primarily associated with past and current fuel service stations.

As shown on Figure 2-27, the community of Summerland was historically an oil-producing area and as such contains a high number of inactive, plugged, and/or abandoned oil wells, as shown in the California Department of Conservation's Geologic Energy Management Division (formerly the Division of Oil, Gas, and Geothermal Resources) database of oil and gas wells (CalGEM 2023). Between 1896 and the 1920s, there were as many as 11 piers off the coast for offshore wells; this was the location of the world's first offshore oil wells drilled from piers (CSLC 2011). Since that time, the wells have been removed, capped, and sealed, and the old piers have been removed. Some natural oil seeps are still present, and a small area of seepage thought to be from an inshore oil well (Becker well) was observed at the beach surface in 2011 (CSLC 2011). The California State Lands Commission conducts weekly inspection and monitoring of the Summerland beach area, and Summerland residents report to the County when oil surfaces on the beach or visible oil sheen is in the water (CSLC 2011).

In addition to regulatory cleanup sites and historical oilfields, septic tanks—if in disrepair or otherwise not operating as intended—represent another potential point source of contamination (e.g., nitrogen, bacteria, and pathogens) to the groundwater aquifer. OWTSs are used by residences in the inner rural and rural areas located north of U.S. Highway 101 into the foothills. Parcels range in size from small to very large, with a median area of approximately 2 acres. The poor soils and difficult terrain in the foothills make the siting and use of OWTS challenging. Consequently, Toro Canyon, the Buena Vista and Cold Springs Creek drainages, and Sycamore Canyon were identified as focus areas for the County's Local Agency Management Program for OWTS, which estimates that there could be 876 OWTSs in the MGB (County of Santa Barbara 2015b). Groundwater from the MGB supplies some semi-rural residences, several small public and semi-public water systems, and a small amount of agricultural uses. Title 22 of the CCR requires that state small water systems monitor the bacteriological quality of their water on a quarterly basis. In addition, Chapter 34B of the Santa Barbara County Code requires that the water system operators monitor for nitrates and nitrites once every 3 years. The County Department of Environmental Health Services proposes to use the water quality data from the El Bosque Mutual Water Company water system as part of the Local Agency Management Program's monitoring element for the MGB (County of Santa Barbara 2015b).

Table 2-15. Regulatory Cleanup Site Database Review

Project/Site Name	Site Type/ Cleanup Program	Potential Media of Concern	Potential Contaminants of Concern	Case Status (Date)	Comment
DTSC EnviroStor Database					
AGF & ASF Redistribution Center	Military evaluation (FUDS)	None specified	None specified	Inactive – needs evaluation (7/1/2005)	Current land use is for the Four Seasons Resort.
Toro Canyon Road Elementary	School investigation	Soil	Arsenic, DDD, DDE, DDT	Inactive – withdrawn (11/29/1999)	Initially identified due to historic use of property for citrus orchards. Initial investigation for Carpinteria Unified School District.
Montecito Union Elementary School Investigation	School investigation	No media affected	No contaminants found	Inactive – action required (2/6/2018)	School site investigation for Montecito Union School District. Minor area of OCP found but addressed via confirmation sampling during construction phase.
SWRCB GeoTracker Database					
Equilon Enterprises LLC/Shell	LUST cleanup site	Aquifer used for drinking water supply, soil	Gasoline	Completed – case closed (9/30/2016)	A fuel dispenser leak was discovered in 1999. Site investigations occurred from 2000 through 2013. Air sparge/soil-vapor extraction/dual-phase extraction remedial actions were conducted at the site in 2012 and 2013. Contaminant plume modeling for benzene, MTBE, and TPH-g show that the plumes have been stable or decreasing in extent since 2005. The site was determined to meet the LTCP in 2016.
Hanna Property	LUST cleanup site	Aquifer used for drinking water supply, soil	Gasoline	Completed – case closed (5/19/2011)	The site was formerly occupied by a pool supply business and is currently occupied by a retail outlet. Prior to 2000, the site contained two 1,000-gallon and one 550-gallon gasoline USTs, and a 35-gallon water separator tank. A potential leak was discovered during and after tank removal activities in 2000. Remediation consisted of removal of contaminated soil. Groundwater contamination at the site remained below MCLs for 13 sampling events, and residual soil contamination was determined to be de minimis in nature. The site was determined to meet the LTCP in 2011.

Table 2-15. Regulatory Cleanup Site Database Review

Project/Site Name	Site Type/ Cleanup Program	Potential Media of Concern	Potential Contaminants of Concern	Case Status (Date)	Comment
Chevron ss# 9-1572	LUST cleanup site	Aquifer used for drinking water supply, soil	Gasoline	Completed –- case closed (5/4/2011)	Existing service station with three 10,000-gallon underground gasoline tanks, one 10,000-gallon diesel tank, and one 1,000-gallon used oil tank. Elevated fuel concentrations were discovered during a dispenser upgrade in 1998. Groundwater was initially impacted but have naturally attenuated since impacted soils were removed and disposed of. The site was determined to meet the LTCP in 2011.
Former Montecito Fire Station	LUST cleanup site	Aquifer used for drinking water supply	Gasoline	Completed – case closed (1/7/2010)	The site was reopened as a LUST site in 2003 after fuel oxygenates were detected in an off-site well (MW-5) located at 1476 East Valley Road, where MTBE and TBA were detected. Agency staff reviewed the file and determined that the Former Montecito Fire Station was not the source of the contaminants detected off site, and that further investigation was not warranted.
TOSCO – 76 Station #0535	LUST cleanup site	Aquifer used for drinking water supply, soil	Gasoline	Completed – case closed	The site contains two 12,000-gallon gasoline USTs and one 600-gallon waste oil AST. A release was discovered in 1993 during a product piping failure, and the extent of the release was investigated between 1993 and 2001, in which TPH-g, BTEX, EDC, and fuel oxygenates were detected. Groundwater impacts were determined to be limited to the site and the street immediately downgradient. A pump and treat system and soil vapor extraction began in 2003, and by 2009, confirmation sampling confirmed the absence of COCs above MCLs in groundwater, and the site was determined to meet the LTCP in 2010.
Chevron ss#9-1789	LUST cleanup site	Aquifer used for drinking water supply, soil	MTBE/TBA/other fuel oxygenates, gasoline	Completed – case closed (2/5/2013)	Soils were discovered to be impacted by UST leak during confirmation sampling of tank removal activities in 1997. Subsequently, groundwater was found to be impacted with TPH-g, BTEX, and MTBE. Additional groundwater monitoring wells were

Table 2-15. Regulatory Cleanup Site Database Review

Project/Site Name	Site Type/ Cleanup Program	Potential Media of Concern	Potential Contaminants of Concern	Case Status (Date)	Comment
					installed, some with ORC filter socks to assist in site remediation. Contaminated soils were removed and characterized. Residual impacts were found to be limited to the area immediately surrounding the dispenser islands, the elevated constituents in groundwater are now limited to one monitoring well, and the contaminant extent is stable or decreasing. The site was determined to meet the LTCP in 2013.
Summerland Texaco	LUST cleanup site	Aquifer used for drinking water supply, soil	Gasoline	Completed – case closed	Soils were discovered to be impacted by UST leak during UST removal and upgrade activities in 2000. Impacted soils were removed and disposed of along with 46,000 gallons of groundwater generated by dewatering the tank pit. Three monitoring wells were installed in 2004 and sampled until 2012, confirming that by that time COCs had not been detected. The site was determined to meet the LTCP in 2013.
Montecito Water District	LUST cleanup site	Aquifer used for drinking water supply, soil, soil vapor, well used for drinking water supply	Diesel, gasoline	Completed–– case closed	Two USTs were discovered to have leaked in 1989 during removal activities. Groundwater monitoring activities occurred over 20 years (1990 through 2011), with remediation consisting of soils excavation and disposal event in 1989 (8 cubic yards), soil excavation and aeration in 1992 (80 cubic yards), and soil vapor extraction in 1992–1995 (7,510 pounds). The site was determined to be closed in 2013, as concentrations of 1,2-DCA, EDB, MTBE, TBA, and lead had decreased to below MCLs after remediation.
Historic oil well investigation	Non-case information	Soil	Crude oil	Informational item (8/19/2016)	An area of stained soil at 12 feet bgs was discovered and tested. Santa Barbara County's hazardous materials unit reviewed the testing results and determined that no further action was warranted, unless the extent of the stained soil was discovered to be greater during property development.

Table 2-15. Regulatory Cleanup Site Database Review

Project/Site Name	Site Type/ Cleanup Program	Potential Media of Concern	Potential Contaminants of Concern	Case Status (Date)	Comment
Private Residences (8 individual cases)	LUST/cleanup program sites	Aquifer used for drinking water supply, soil	Gasoline, diesel, heating oil/fuel oil, waste oil/motor/ hydraulic/ lubricating, lead	Completed – case closed (varies)	Private residences, all of which have received case closure following investigation and/or remediation activities. Cases primarily involve issues discovered during property development or redevelopment, such as stained soils, or degraded/leaking USTs/ASTs. Impacts were found to be limited to soil, the affected soils were removed, residual soil concentrations were found to be below MCLs, and the sites were determined to meet the LTCP.

Sources: DTSC 2023; SWRCB 2023.
Notes: DTSC = Department of Toxic Substances Control; FUDS = Formerly Used Defense Sites Database; DDD = dichlorodiphenyldichloroethane; DDE = dichlorodiphenyldichloroethylene; DDT = dichlorodiphenyltrichloroethane; OCP = organochlorine pesticides; SWRCB = State Water Resources Control Board; LUST = leaking underground storage tank; MTBE = methyl tert-butyl ether; TPH-g = total petroleum hydrocarbons as gasoline; LTCP = SWRCB Low-Threat Closure Policy; UST = underground storage tank; MCL = maximum contaminant level; TBA = tertiary butyl alcohol; AST = aboveground storage tank; BTEX = benzene, toluene, ethylbenzene, and xylene; EDC = ethylene dichloride; COC = contaminant of concern; ORC = oxygen release compound; 1,2-DCA = 1,2-dichloroethane (or ethylene dichloride); EDB = ethylene dibromide; bgs = below ground surface.
Site locations are labeled on Figure 2-27.

Groundwater Quality by Constituent

DWR (2004) has characterized the groundwater in the MGB as composed of two chemical types. South of the Arroyo Parida Fault, groundwater has calcium bicarbonate character; however, north of the fault it has sodium sulfate character. TDS concentrations range from 600 to 1,100 mg/L (MWD 1998). Analyses of data from four public supply wells show an average TDS of 698 mg/L in the MGB, with a range of 526 to 778 mg/L (DWR 2004). DWR (2004) also noted that iron and manganese concentrations in wells had exceeded federal standards at the time of the assessment. More recently, an assessment of groundwater quality by USGS (2016) for the whole South Coast Region (consisting of a 48-square-mile study area comprising the MWD along with the Goleta, Foothill, Santa Barbara, and Carpinteria Groundwater Basins) found that inorganic constituents were more prevalent and generally occurred at higher relative concentrations than organic constituents. For inorganic constituents with human health benchmarks, relative concentrations were high in 5.3% of the primary aquifer system and moderate in 32% (USGS 2016). Boron and fluoride were the primary inorganic constituents with human health benchmarks (MCLs) present at high relative concentrations. For inorganic constituents with aesthetic-based benchmarks (California Department of Public Health secondary maximum contaminant levels [SMCLs]), relative concentrations were high in 58% of the USGS study area and moderate in 37%. Iron, manganese, sulfate, and TDS were the inorganic constituents with aesthetic-based benchmarks present at high relative concentrations (USGS 2016).

In contrast to inorganic constituents, organic constituents with human-health benchmarks were not detected at high relative concentrations in the primary aquifer system in the USGS study area. Of the 218 organic constituents analyzed for, 10 were detected, 9 of which had human-health benchmarks. Relative concentrations of organic constituents were moderate in 11% of the primary aquifer system. The volatile organic compounds present at moderate relative concentrations included methyl tert-butyl ether (11%), 1,2-dichloroethane (5.6%), and tetrachloroethene (1.4%, spatially weighted). All pesticides were present at low relative concentrations or not detected. The special interest constituent perchlorate was present at moderate relative concentrations in 50% of the primary aquifer system and at low relative concentrations in 17%. Pharmaceutical compounds and N-nitrosodimethylamine were not detected at concentrations greater than or equal to method detection limits in the Santa Barbara study unit.

In its 1998 GWMP, MWD reported water quality in the MGB as good to moderately good and as having calcium bicarbonate character to the south of the Arroyo Parida Fault and sodium sulfate character to the north of the fault (MWD 1998). In addition, it found that concentrations of iron, manganese, and nitrates that exceeded federal standards, such as during drought periods when less freshwater was available to recharge the aquifer, suggested a link between decreasing groundwater level elevations and declines in groundwater quality, specifically relating to nitrate (MWD 1998).

A review of groundwater quality data in GAMA since the previously discussed assessments indicates that groundwater quality conditions in the MGB have not changed. Table 2-16 presents a review of each contaminant of concern, the comparison concentration value, and the number and percentage of wells that have exceeded the comparison concentration at any time and from any sample within the period of record for the well. Table 2-16 also shows the maximum concentration and the well number and date for each constituent evaluated. Consistent with previous assessments, water quality constituents that have been detected anytime in the past in exceedance of state or federal water quality standards (for both human health and aesthetic/odor benchmarks) include TDS, nitrate, chloride, iron, manganese, boron, sulfate, and fluoride, and in historical cleanup site cases, organic constituents. Many of the wells included in the GAMA database consist of cleanup site monitoring wells drilled for the purpose of characterizing underground storage tank site cases (discussed under Review of Regulatory Cleanup Sites, Historic Oilfields, and Septic Systems), and the organic constituents detected are related to those sites and

not representative of the groundwater occurring throughout the MGB. Elevated metals consist of manganese and iron, although concentrations detected above SMCLs in municipal wells have been brief.

With respect to nitrate and TDS, concentration graphs over time are provided in Figures 3-9 and 3-10 for each of the municipal wells (current and former) in the GAMA database. MWD municipal wells that have exceeded TDS or nitrate concentrations are as follows (SWRCB 2020):

- **Ennisbrook Well No. 2.** The TDS concentration briefly exceeded the SMCL (of 1,000 mg/L) in one sample from January 2014 (nearly 1,500 mg/L) but has otherwise remained below it throughout the period of record (1991 through 2018). Nitrate (as N) concentrations have remained below the MCL (of 10 mg/L) throughout the period of record.
- **Ennisbrook Well No. 5.** The TDS concentration exceeded the SMCL (of 1,000 mg/L) in 2005 and has remained above it ever since, with three exceptions in 2014, 2016, and 2017. Since 2014, TDS concentrations in this well have been in the range of 1,400 to nearly 1,900 mg/L. Nitrate (as N) concentrations have remained below the MCL (of 10 mg/L) throughout the period of record (1991 through 2018).
- **T. Mosby Well.** TDS concentrations have remained below the SMCL (of 1,000 mg/L) throughout the period of record (2017 through 2019). Nitrate concentrations in this well briefly exceeded the MCL (of 10 mg/L) in May 2017 but have otherwise remained below the MCL.
- **Other Municipal Wells.** TDS and nitrate (as N) concentrations in all other municipal wells in the GAMA database (Amapola well, Well 1, Well 1 [coastal], and Paden 2) remained below the SMCLs and MCLs throughout the period of record.

Concentration maps of manganese and iron indicated that several areas of the MGB have at one point or another exceeded MCLs in municipal wells. However, review of municipal wells with exceedances indicates that exceedances either occurred earlier in the period of record, or more recently, for brief, momentary periods (e.g., T. Mosby well, Ennisbrook wells, Amapola well) (SWRCB 2020). It should be noted that MWD treats all raw groundwater to meet applicable water quality standards prior to delivery to customers.

Table 2-16. GAMA Groundwater Quality Monitoring Summary by Constituent (All Years)

Constituent	Number of Wells Sampled	Comp. Conc.	Comp. Conc. Value	Unit	Wells above Comparison Concentration at Any Time		Wells above 1/2 Comparison Concentration at Any Time		Maximum Concentration (Date)	Notes/Comments
					No.	*Percent*	*No.*	*Percent*		
Salts and TDS										
TDS	91	SMCL	1,000	mg/L	33	36.3	86	94.51	3,630 (Well No. USGS-342511119390701 on 1/6/1965)	Highest concentrations in SU 3 in shallow remediation wells, though TDS is also somewhat elevated in SU 1 as well; some municipal wells affected by TDS higher than SMCLs
Nitrate as N	95	MCL	10	mg/L	8	8.4	34	35.79	23.4 (Well No. T0608300630-MW-4A on 2/11/2015)	No clear spatial pattern, though appears lower in SU 1
Chloride	77	SMCL	500	mg/L	8	10.4	13	16.88	2,180 (Well No. USGS-342511119390701 on 1/6/1965)	Concentrated in SU 3
Organic Constituents										
Benzene	119	MCL	1	µg/L	39	32.8	45	37.82	30,000 (Well No. T0608300630-MW-2A on 8/25/2010)	Areas of very high concentrations are around cleanup sites (Chevron, Texaco, and Shell Stations) and have since decreased, though certain areas still exceed MCLs, one near the T. Mosby

Table 2-16. GAMA Groundwater Quality Monitoring Summary by Constituent (All Years)

Constituent	Number of Wells Sampled	Comp. Conc.	Comp. Conc. Value	Unit	Wells above Comparison Concentration at Any Time		Wells above 1/2 Comparison Concentration at Any Time		Maximum Concentration (Date)	Notes/Comments
					No.	*Percent*	*No.*	*Percent*		
										well, but these are in shallow monitoring wells
MTBE	112	MCL	13	µg/L	34	30.4	40	35.71	62,000 (Well No. T0608300545-MW-1 on 8/16/2005)	Areas of very high concentrations are around cleanup sites (Chevron, Texaco, and Shell Stations) and have since decreased, with cleanup site monitoring wells showing a decrease over time to below MCLs
Tetrachloroethene (PCE)	78	MCL	4.85	µg/L	0	0.0	3	3.85	4.85 (Well No. T060833156-- MW3 on 10/4/2006	One-off detection at Hanna Property cleanup site; all other results not detected or <1/2 MCL
Perchlorate	22	MCL	6	µg/L	0	0.0	0	0.00	2.69 (Well No. USGS-342500119370001 on 4/21/2016)	Not detected above 1/2 MCL
Trichloroethene (TCE)	86	MCL	5	µg/L	0	0.0	0	0.00	1.3 (Well No. T0608300630-MW-15A on 3/18/2013)	Not detected above 1/2 MCL
DBCP	81	MCL	0.2	µg/L	0	0.0	0	0.00	Not detected	Not detected
1,2,3-Trichloropropane	82	MCL	0.005	µg/L	0	0.0	0	0.00	Not detected	Not detected

Table 2-16. GAMA Groundwater Quality Monitoring Summary by Constituent (All Years)

Constituent	Number of Wells Sampled	Comp. Conc.	Comp. Conc. Value	Unit	Wells above Comparison Concentration at Any Time		Wells above 1/2 Comparison Concentration at Any Time		Maximum Concentration (Date)	Notes/Comments
					No.	*Percent*	*No.*	*Percent*		
Inorganic Constituents and Trace Metals										
Arsenic	29	MCL	10	µg/L	0	0.0	2	6.90	7 (Ennisbrook Well 02 on 5/25/1994)	No clear spatial pattern
Manganese	33	SMCL	50	µg/L	17	51.5	21	63.64	1,420 (Well No. USGS-342536119370601 on 7/23/1973)	Highest concentrations in USGS monitoring wells with fairly ubiquitous elevated concentrations across the subbasin; concentrations in excess of MCLs in active municipal wells (Ennisbrook 2 and Paden 2) have been brief one-offs
Cr^6	30	HBSL	0.2	µg/L	0	0.0	2	6.67	0.2 (Well Nos. 1 and 2 on 6/6/2003 and 3/17/2003)	No clear spatial pattern
Uranium	13	MCL	20	pCi/L	0	0.0	0	0.00	2.69 (Las Entradas 2 on 7/20/2005)	Not detected above 1/2 MCL
Iron	48	SMCL	300	µg/L	15	31.3	22	45.83	18000 (Well No. USGS-342511119390701 on 1/6/1965)	No obvious spatial pattern, and graphs show sharp, short-lived spikes
Boron	62	NL	1	mg/L	2	3.2	8	12.90	1.11 (Municipal Well No. SB-14 on 2/9/2011)	No clear spatial pattern

Table 2-16. GAMA Groundwater Quality Monitoring Summary by Constituent (All Years)

Constituent	Number of Wells Sampled	Comp. Conc.	Comp. Conc. Value	Unit	Wells above Comparison Concentration at Any Time		Wells above 1/2 Comparison Concentration at Any Time		Maximum Concentration (Date)	Notes/Comments
					No.	*Percent*	*No.*	*Percent*		
Fluoride	64	MCL	2	mg/L	2	3.1	13	20.31	2.37 (Municipal Well No. SB-14 on 2/9/2011)	No clear spatial pattern
Sulfate	101	SMCL	500	mg/L	4	4.0	32	31.68	590 (Well No. T0608300630-MW-5A on 1/7/2010)	No clear spatial pattern, except elevated in shallow wells at cleanup sites

Source: SWRCB 2020, 2023.

Notes: GAMA = Groundwater Ambient Monitoring and Assessment; TDS = total dissolved solids; SMCL = secondary maximum contaminant level; mg/L = milligrams per liter; USGS = U.S. Geological Survey; SU = Storage Unit; MCL = California/Federal maximum contaminant level; µg/L = micrograms per liter; MTBE = methyl tert-butyl ether; DBCP = 1,2-dibromo-3-chloropropane; Cr^6 = hexavalent chromium; HBSL = Health Based Screening Level (cancer or non-cancer health effect); pCi/L = picocuries per liter; NL = notification level.

2.2.4.5 Land Subsidence

Land subsidence resulting from aquifer deformation may be of two kinds: elastic or inelastic. Elastic deformation occurs with the compression and expansion of sediments due to pore pressure changes that occur with fluctuations in water levels (Borchers and Carpenter 2014). Therefore, elastic deformation may be cyclical in nature, corresponding to seasonal groundwater recharge or groundwater extraction. Critically, elastic deformation does not result in permanent loss of pore space. Inelastic deformation results in irreversible land subsidence and is commonly related to water extraction from fine-grained sediments within clay or silt aquitards (Borchers and Carpenter 2014). Permanent land subsidence related to groundwater withdrawal generally occurs in an unconfined aquifer when groundwater elevations drop below the historical range. Land subsidence may result from causes other than withdrawal of groundwater, such as vertical displacement from tectonic forces.

Although subsidence has been largely unmonitored until recently, the MGB is at low risk for subsidence (DWR 2014). In addition, there is little or no documentation of physical evidence of subsidence, such as well casing failure, infrastructure disruption, or earth fissures. The aquifer is mostly unconfined with laterally discontinuous fine-grained layers (Section 2.2.2, Hydrogeologic Conceptual Model, and Section 2.2.3, Principal Aquifers and Aquitards). Inelastic compaction of coarse-grained sediment is usually negligible (Borchers and Carpenter 2014).

InSAR Vertical Displacement Data

Land subsidence data are included in DWR's SGMA Data Viewer. Although data from USGS and DWR extensometers are available for parts of California, none are located near Santa Barbara's south coast or within Santa Barbara County. The SGMA Data Viewer includes vertical displacement data for the MGB derived from InSAR (interferometric synthetic aperture radar). The TRE Altamira InSAR Dataset is collected by the European Space Agency from the Sentinel-1A satellite for California from January 2015 through September of 2019 and processed by TRE Altamira (DWR 2020d). Random sampling of the 100-meter by 100-meter (328-foot by 328-foot) calculation grid cells in the MGB indicate that the vast majority of the MGB has experienced total vertical displacement of less than 0.25 inches of uplift or subsidence during the time period measured (Figure 2-28, Land Subsidence; DWR 2020d). As noted, variations in land surface elevation may result from temporary elastic or tectonic deformation. Available data indicate insignificant subsidence, likely from causes other than inelastic deformation.

2.2.4.6 Groundwater–Surface Water Connectivity

Groundwater and surface water are commonly hydraulically connected. The degree of connectivity plays a significant role in the potential for depletions of interconnected surface water to occur. The primary surface water features in the MGB are streams. In general, streams may be classified as gaining, losing and connected, or losing and disconnected. Stream–aquifer exchanges are controlled by several factors, including stream discharge and stage, the magnitude and distribution of hydraulic conductivities of the streambed and aquifer sediments, streambed thickness and its variation, the hydraulic gradient between the stream and the aquifer, and the geometric/morphological characteristics of the stream channel (USGS 2012). DWR (2016) identifies monitoring of streamflow as a necessary component of the water budget analysis and for evaluation of stream depletions associated with groundwater extractions.

Montecito Creek, Oak Creek, San Ysidro Creek, Romero Creek, and Toro Canyon Creek are all streams within the MGB that have been identified as having a potential connection to groundwater (see Section 2.2.4.7). However, available stream gauge data are limited and cannot be used to quantify stream gains or losses. According to the USGS National

Hydrography Dataset (NHD), all five creeks are classified as intermittent streams[24] within the MGB, with the exception of an approximately 1-mile reach of Toro Canyon Creek within the MGB that is classified as perennial[25] (Figure 2-29, Potential Groundwater-Dependent Ecosystems). Based on the apparent change in stream type from perennial to intermittent near the MGB boundary (see Figure 2-29), all of the creeks potentially have a losing interface coincident with where the underlying geology transitions from primarily bedrock to unconsolidated material.

Montecito Creek is depicted by the USGS NHD as a perennial stream 0.25 miles north of the MGB boundary but enters the MGB as an intermittent stream (Figure 2-29). Stream discharge data recorded since February 2016 at an active gauge on Montecito Creek within the MGB indicate that streamflow has typically ceased during the summer months. Oak Creek is classified by the USGS NHD as an intermittent stream from its origin approximately 0.5 miles north of the MGB boundary to where it enters the Pacific Ocean (Figure 2-29). San Ysidro Creek is listed by the USGS NHD as a perennial stream from its origin to approximately the MGB boundary, where it transitions to an intermittent stream (Figure 2-29). Historical stream discharge data recorded between October 1979 and September 1983 at a gauge (which has since become inactive) located approximately 650 feet upstream and outside of the MGB indicate that streamflow has typically persisted through the summer months. The main stem of Romero Creek is depicted by the USGS NHD as a perennial stream from its origin to approximately the northern MGB boundary, where it transitions to an intermittent stream (Figure 2-29). Toro Canyon Creek is classified by the USGS NHD as a perennial stream from its origin to approximately 1 mile south of the northern MGB boundary, where it transitions to an intermittent stream (Figure 2-29).

As discussed above, existing stream gauge data are limited and cannot be used to quantify the degree of stream–aquifer connectivity within the MGB at this time. The analysis so far has relied on the USGS NHD stream classifications to identify creeks and stream reaches that are perennial as compared to intermittent. To adequately characterize the interaction between groundwater and surface water within the MGB, additional monitoring of groundwater levels and streamflow conditions is needed. With implementation of the grant funded stream gauging program, surface water flow and duration will be gauged in several additional locations and used to categorize the character of the primary drainages (see Section 2.1.2.5). Flow data at these gauges are being logged and will be reported to DWR with each annual and periodic update. Section 3.5, Monitoring Network, explains the proposed actions to evaluate groundwater–surface water interactions and the risk of stream depletion.

2.2.4.7 Groundwater-Dependent Ecosystems

A GDE is a plant and animal community that depends on groundwater for survival (Rohde et al. 2018). GDEs can include wetlands, streams, springs and seeps, and terrestrial vegetation. These communities are especially reliant on groundwater during dry seasons and droughts. GDEs have social, economic, and environmental benefits that include their ability to improve water quality, support biodiversity, and provide places for recreation. Depletion of groundwater levels in the vicinity of GDEs can threaten their existence (Rohde et al. 2018). GDEs are defined under the SGMA as "ecological communities or species that depend on groundwater emerging from aquifers or on groundwater occurring near the ground surface" (23 CCR 351[m]).

Freshwater Species that May Inhabit the Plan Area

The plan area may provide suitable habitat to support a variety of aquatic and terrestrial freshwater species, several of which are listed as threatened, endangered, and/or species of special concern (Appendix F). According to the California Freshwater Species Database version 2.0.9, threatened and/or endangered species that may be found

[24] Stream in which surface flows cease for some duration each year.
[25] Stream in which surface flows persist year-round.

in the plan area include the willow flycatcher (*Empidonax traillii* and *Empidonax traillii brewsteri*), bald eagle (*Haliaeetus leucocephalus*), tidewater goby (*Eucyclogobius newberryi*), Southern California steelhead, salt marsh bird's-beak (*Chloropyron maritimum maritimum*), Gambel's water cress (*Nasturtium gambelii*), and California red-legged frog (*Rana draytonii*) (TNC 2023). While these databases identify habitat that may support these species, additional studies are required to characterize their current presence in the MGB and the degree to which they rely on groundwater.

Overview of the Natural Communities Commonly Associated with Groundwater Dataset within the Plan Area

Groundwater is critical to sustaining springs, wetlands, and perennial flow (baseflow) in streams as well as to sustaining vegetation such as phreatophytes that directly tap groundwater. In response to the SGMA, the Natural Communities Commonly Associated with Groundwater (NCCAG) dataset was provided by DWR and The Nature Conservancy (TNC) as a reference dataset and starting point for GSAs to review and validate the mapped features and supplement the dataset as necessary with the GSA's understanding of local surface water hydrology, groundwater conditions, and geology within the groundwater basin (Rohde et al. 2018).

The Montecito GSA has prepared a GDE analysis using the NCCAG tools as described here and in Appendix F. It is included in this GSP as an initial step toward identifying and sustainably managing GDEs. The tools provided, in conjunction with existing data, are inadequate to accurately describe the location, type, and health of groundwater-dependent vegetation and habitat. Relevant data gaps within the MGB include surface water flow and shallow groundwater elevations proximal to creeks and potential GDEs. Therefore, the Montecito GSA has not yet set sustainable management criteria for GDEs and plans to reassess the available data and establish sustainable management criteria following implementation of relevant projects and management actions during GSP update (Section 2.1.2.5 and Chapter 3).

The NCCAG provides methods to evaluate vegetation health based on remote sensing of greenness and moisture content. It does not distinguish between factors impacting GDE health, including moisture availability related to climate trends, perched groundwater (which is not impacted by groundwater extraction), surface water flow, irrigation runoff, and atmospheric humidity. Nor does the NCCAG address potential steelhead habitat that may occur within the MGB (Section 3.2.6, Depletions of Interconnected Surface and Groundwater – Undesirable Results). An additional source of uncertainty is watershed and vegetation response to the 2017 Thomas Fire and January 2018 debris flow, which significantly altered the topography and occurrence of GDEs in the MGB, specifically along creek corridors.

The NCCAG dataset is composed of 48 publicly available state and federal agency mapping datasets, including, but not limited to, the following: VegCAMP, the Vegetation Classification and Mapping Program, California Department of Fish and Wildlife; CALVEG, Classification and Assessment with Landsat of Visible Ecological Groupings, U.S. Department of Agriculture Forest Service; NWI V 2.0, National Wetlands Inventory (Version 2.0), U.S. Fish and Wildlife Service; FVEG, Fire and Resources Assessment Program, California Department of Forestry and Fire Protection; USGS NHD; and Mojave Desert Springs and Waterholes (Mojave Desert Spring Survey). After the previously described vegetation, wetland, seeps, and springs data were compiled into the NCCAG dataset, data were screened to exclude vegetation and wetland types less likely to be associated with groundwater and retain types commonly associated with groundwater (Rohde et al. 2018).

Within the MGB, the NCCAG dataset identified 48 individual vegetation communities and 8 wetland communities that may depend on groundwater (polygons). Figure 2-29 shows the aerial extent of the communities, and Table 2-17 provides a summary of the communities by vegetation/wetland type.

Table 2-17. Summary of NCCAG Dataset within the MGB

Natural Community Commonly Associated with Groundwater	Number of Polygons	Acres
Vegetation Dataset		
Coast Live Oak	46	508.9
Riparian Mixed Hardwood	2	14.2
Total	**48**	**523.1**
Wetland Dataset		
Palustrine, Forested, Seasonally Flooded	6	16.0
Riverine, Unknown Perennial, Unconsolidated Bottom, Semi-permanently Flooded	2	0.8
Total	**8**	**16.8**

Source: DWR 2020e.
Notes: NNCAG = Natural Communities Commonly Associated with Groundwater; MGB = Montecito Groundwater Basin.

The predominant phreatophyte species identified within the MGB is coast live oak (*Quercus agrifolia*), and the predominant wetland type is palustrine, forested, seasonally flooded (Table 2-17 and Figure 2-29). Together, these two vegetation/wetland types account for approximately 97% of the ecosystems that may rely on groundwater within the MGB. The remaining approximately 3% of NCCAG-mapped communities include riparian mixed hardwood vegetation and riverine, unknown perennial, unconsolidated bottom, semi-permanently flooded wetland communities (Table 2-17 and Figure 2-29).

Methods for Identifying Groundwater-Dependent Ecosystems

Due to the extent of individual vegetation/wetland units identified in the NCCAG dataset, individual communities were aggregated into larger GDE evaluation units by watershed, constituting six evaluation units in total. Individual vegetation/wetland communities within each GDE evaluation unit were characterized by reviewing the NCCAG dataset alongside available measured groundwater elevations, aerial photographs, lithologic data, and Landsat[26] data aggregated by TNC. TNC used Landsat data to calculate historical variations in the Normalized Derived Vegetation Index (NDVI) and Normalized Derived Moisture Index (NDMI) for the period 1985 to 2018 (Klausmeyer et al. 2019). These indices provide a quantitative measure of vegetation greenness and moisture content during prolonged dry periods. Long-term variations in the NDVI and NDMI may act as a proxy for vegetation health. Groundwater elevation measurements, aerial photographs, lithologic data, and NDVI and NDMI indicators were reviewed following the general guidelines outlined by TNC (Rohde et al. 2018). Vegetation/wetland communities were characterized as priority potential GDEs or potential GDEs. Vegetation/wetland communities were characterized as priority potential GDEs if the NDVI and/or NDMI were positively correlated (correlation coefficient[27] greater than or equal to 0.6) with groundwater levels in the principal aquifer (groundwater levels at the closest representative monitoring point [RMP] well with a long-term data record) and groundwater levels measured at nearby wells (less than 1 kilometer from the vegetation/wetland community) have been shallower than 36 feet bgs.

[26] The Landsat mission is the longest running satellite monitoring program used to capture space-based images of the Earth's surface every 16 days. Landsat is managed by NASA and records visible, near-infrared, middle-infrared, and thermal wavelengths reflected from the Earth's surface. TNC aggregated this data to generate NDVI and NDMI.

[27] The correlation coefficient is a measure of the strength of the linear relationship between two variables. The correlation coefficient assumes values ranging between +1 and -1, with 0 indicating no relationship, +1 indicating a perfect positive linear relationship, -1 indicating a perfect negative linear relationship. Generally, correlation coefficient values between 0 and ±0.3 indicate a weak linear relationship, values between ±0.3 and ±0.7 indicate a moderate linear relationship, and values between ±0.7 and ±1.0 indicate a strong linear relationship.

This criterion for groundwater depth is based on the reported maximum rooting depth for coast live oak (Steinberg 2002). Alternatively, vegetation/wetland communities were characterized as potential GDEs if the NDVI and/or NDMI were not correlated with groundwater levels, the community persisted during periods when underlying groundwater levels were much deeper than 36 feet bgs, the source of water sustaining the community was not easily identifiable, groundwater levels underlying the community have not been measured, or vegetation health indices were not available. Some exceptions to the above characterization criteria were made on a case-by-case basis, such as in areas where groundwater levels are regularly less than 36 feet bgs and where the thickness of the alluvial deposits that make up the principal aquifer are known to be thin. Depth to groundwater was the primary metric used to characterize the vegetation and wetland communities.

Summary of Groundwater-Dependent Ecosystem Characterization

This section describes the results of the GDE characterization in the MGB. Data supporting the characterization of each unit is described in detail in Appendix F. Due to the existence of significant data gaps in relevant indicators within the MGB, this analysis is preliminary, provided as a starting point for the potential establishment of GDE sustainable management criteria with the 5-year GSP update.

A total of 25 communities identified by the NCCAG dataset were characterized as priority potential GDEs (highlighted polygons in Figure 2-29). The communities consist of coast live oak and riparian mixed hardwood vegetation. The priority potential GDEs are located along Montecito, Oak, Romero, and San Ysidro Creeks. Vegetation health trends are positively correlated with groundwater levels, and/or groundwater levels underlying the communities have frequently been less than 36 feet bgs (e.g., Wells 1-15, 1-21, 1-31, 1-49, 3-2, and 3-23 in Appendix E). Groundwater may support these vegetation communities, and there is potential for the communities to be impacted by groundwater pumping.

A total of 31 communities identified by the NCCAG dataset were characterized as potential GDEs (non-highlighted polygons in Figure 2-29). The communities consist of coast live oak; riverine, unknown perennial, unconsolidated bottom, semi-permanently flooded; and palustrine, forested, seasonally flooded vegetation and wetland communities. The communities are characterized as potential GDEs because (i) vegetation health trends are not correlated with groundwater levels or vegetation health indices are not available; (ii) groundwater levels beneath the communities are generally greater than 36 feet bgs and the communities are in areas with relatively shallow depth to bedrock (see Figure 2-30, Measured and Estimated Depth to Bedrock in the Montecito Groundwater Basin) where groundwater is not actively extracted from the principal aquifer; and/or; (iii) there is limited available groundwater level data to characterize groundwater conditions underlying the communities. These communities may be supported by areal precipitation and intermittent surface flows emanating from the contributing watershed. Further characterization of these communities and their potential dependence on groundwater through the GSP implementation period is warranted (see Section 3.5.7.3, Description of Steps to Fill Data Gaps).

2.3 WATER BUDGET

This section of the GSP presents the historical, current, and projected water budget analysis for the MGB. The water budget prepared for this GSP is designed to "provide 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 volume of water stored" (23 CCR 354.18)

The historical water budget was prepared for the 45-year period from water year 1970 through the end of water year 2014; the current water budget was prepared for the 5-year period from water year 2015 through water year

2019; and the projected water budgets were prepared for the 50-year period from water year 2020 through the end of water year 2069 (23 CCR 354.18[c][2][B]). Water years are defined as October 1 through September 30 of the following year (e.g., the 2018 water year begins on October 1, 2017, and ends on September 30, 2018). Individual components of the water budget are described in units of AF or AFY.

Estimates of the individual components of the water budgets for the historical, current, and projected conditions in the MGB are based on simulation results from the BNM. The BNM includes a watershed model and groundwater flow model that simulates the effects of native and non-native water supplies and demands on groundwater conditions across the MGB. The watershed model and groundwater model are loosely coupled by extracting estimates of stream flow and precipitation recharge from the watershed model and using these outputs as inputs to the groundwater model. Use of the BNM to develop water budgets for the MGB facilitates spatial and temporal characterization of basin inflows, outflows, and changes in storage by water year type and water supply reliability (23 CCR 354.18 [c][2]). An overview of the BNM is provided in Section 2.3.1.

Sections 2.3.2, Inflow to Groundwater System, and 2.3.3, Outflow from Groundwater System, provide an overview of the sources of groundwater recharge and discharge in the MGB. These sections also provide a general description of how each groundwater recharge/discharge source is represented in the BNM and provide an estimate of the average annual quantities throughout the historical period as well as an estimate of the historical sustainable yield. In addition, these sections also provide a description of previous estimates of average annual water budget components. Quantitative assessments of the historical, current, and projected water budgets are provided in Section 2.3.4 and are accompanied by tabular and graphical representations of the historical, current, and projected water budgets included in Appendix G.

2.3.1 Surface Water and Groundwater Model

The BNM is a numerical flow model that simulates surface water and groundwater processes across the MGB and the contributing watershed that drains to the MGB. Surface water processes are simulated using the USGS modular modeling code, Precipitation Runoff Modeling System (PRMS). Groundwater processes are simulated using the USGS finite-difference modeling code, MODFLOW-NWT. These two codes are loosely coupled by extracting estimates of groundwater recharge and surface water flows from the PRMS module and using these model estimates as inputs to the MODFLOW-NWT model.

The PRMS and MODFLOW models of the BNM were developed using a coincident model grid that extends from the northern boundary of the contributing watershed to the coastal boundary between the MGB and Pacific Ocean, covering the entire extent of the B118 basin boundary for the MGB (Figure 2-31, BNM Active Model Domain and Primary Watershed Features). The model was built using a 131 row by 169 column rectilinear grid with nodes spaced 229 feet apart to simulate surface water and groundwater fluxes. The grid is oriented in the north–south direction with the lower left corner located at an easting and northing of 6,055,221.7579 and 1,975,663.687 feet relative to the California State Plane NAD 83 Zone 5 coordinate system.

The BNM was designed to evaluate water supplies, demands, and changes in storage in the MGB throughout the historical (October 1, 1969–September 30, 2014), current (October 1, 2014– September 30, 2019), and projected periods (October 1, 2020–September 30, 2069). The PRMS model of the BNM utilizes a daily time step to capture variations in climatic conditions that drive watershed processes, and the MODFLOW model of the BNM utilizes a monthly time step to simulate groundwater conditions across the MGB. The daily time step outputs from the PRMS model are averaged over the monthly timescale and used as inputs to the MODFLOW model.

Calibration of the PRMS and MODFLOW models was conducted separately using a combination of automated calibration tools and manual calibration techniques. The PRMS model was calibrated to potential evapotranspiration (PET) measurements collected at the CIMIS station located in Santa Barbara and daily streamflow measurements collected at the San Ysidro gauge located directly north of the MGB boundary (Figure 2-6). The MODFLOW model was calibrated to groundwater elevation measurements collected from 27 wells that are monitored as part of MWD's groundwater monitoring program.

2.3.1.1 BNM Watershed Model (PRMS)

Watershed processes simulated by PRMS as part of the BNM include precipitation, ET, surface water runoff, and soil zone processes. Variation in both the rate and location of each process is controlled by local climatic conditions, land surface properties, and soil characteristics.

Data characterizing land surface properties, soil characteristics, and climatic conditions were aggregated from a combination of measured and geospatial datasets. Industry standard geospatial datasets used during the development of the BNM included LANDFIRE data for vegetation coverage, National Land Coverage Database data for the distribution of impervious land coverage, soil maps from the United States Department of Agriculture SSURGO and STATSGO databases, and land surface elevations from the National Elevation Dataset 10-meter digital elevation model (Gardner et al. 2018). These data were mapped onto the BNM grid and were used to generate estimates of PRMS-specific parameters that constrain surface water runoff properties, surface water flow directions, vegetation coverage and ET demands, and soil zone storage and conductance. Modeled climatic conditions in the BNM were characterized using a network of precipitation and climate measurement stations located across the MGB and contributing watershed.

Simulation results from the PRMS model of the BNM provide estimates of three key quantities that constrain native groundwater supplies and demands in the MGB: the volumes and rates of surface water runoff across the watershed, the volumes and rates of precipitation infiltration, and the ET demands.

2.3.1.1.1 Surface Water Runoff

The BNM simulates precipitation at the grid-cell level and performs a water balance calculation that meets the ET demands, fills surface depressions and plant canopy storage, and allows for precipitation to infiltrate into the underlying soils. Precipitation that is in excess of these demands is routed downhill to adjacent model cells as surface runoff before discharging to the stream segment that drains the local sub-watershed.

In addition to runoff derived from excess precipitation, the PRMS module of the BNM allows water stored in the soil zone to discharge to ground surface and contribute to local runoff. This occurs when land surface topography changes such that the elevation of the soil water column is higher than the elevation of the neighboring model cell. The direction of surface water and soil water flow is constrained by the local topography of the watershed. Flow directions were calculated in the BNM using the USGS Cascade Routing Tool software (Henson et al., 2013).

The total summation of precipitation excess and soil zone discharges to land surface was used to generate estimates of streamflow inputs for the MODFLOW model of the BNM. To do this, the daily time step outputs were extracted from PRMS and averaged over the monthly timescale to generate inputs for the MODFLOW streamflow routing (SFR) package. The SFR packages simulate streamflow processes in MODFLOW by routing surface runoff to downstream segments, where surface water can either recharge groundwater, be consumed by ET, or be fed by groundwater discharging to land surface.

2.3.1.1.2 Volumes and Rates of Precipitation Infiltration

Precipitation was simulated in the BNM using precipitation measurements collected at six climate measurement stations located across the Montecito Watershed (Figure 2-31; Table G-1). Precipitation measured at these climate stations was mapped across the BNM grid using internally computed regressions between daily precipitation and elevation. The linear regression between precipitation and elevation at each model cell was calculated using measured data from the two precipitation measurement stations located at the most similar elevations to the land surface elevation of each cell. Figure 2-32, Climate Measurement Stations and Corresponding Reference Stations used in the BNM, shows the reference climate station associated with each cell in the BNM.

Precipitation that is not evaporated, stored in surface depressions or the vegetation canopy, or lost to surface runoff will infiltrate into soils that underlie land surface. Once in the soil zone, water can flow downhill to neighboring model cells, discharge to land surface, be consumed by ET, or recharge the groundwater aquifer. The soil zone is a key link between surface water and groundwater processes in the BNM. The rate and relative magnitude of each process is influenced by local topography and soil characteristics.

Soil zone characteristics were constrained in the BNM using the United States Department of Agriculture SSURGO and STATSGO databases. These databases provide estimates of soil composition, available water holding capacity, saturated hydraulic conductivity, and soil depth across the Montecito Watershed. The United States Department of Agriculture databases estimate these soil properties over much larger spatial scales than the BNM grid and therefore do not capture local variability that may affect infiltration rates. To account for this, the soil-zone parameters generated using this data were used as initial estimates of soil properties and were adjusted during model calibration.

2.3.1.1.3 Evapotranspiration

The BNM estimates ET demands across the Montecito Watershed using a modified Jensen-Haise formulation for PET. This formulation estimates PET based on average air temperature, solar radiation, and two empirical parameters that incorporate the effects of altitude, vapor pressure, and plant coverage (Markstrom et al. 2015).

Average air temperatures in the BNM were constrained using daily values of minimum and maximum temperature measured at the National Oceanic and Atmospheric Administration Santa Barbara climate station (station ID: GHCND:USC00047902; Figure 2-6). Minimum and maximum daily air temperature were mapped across the BNM domain using monthly temperature adjustment factors calculated using PRISM monthly normal temperature minimum and maximum datasets.

Coefficients of the modified Jensen-Haise equation that incorporate the effects of altitude, vapor pressure, and plant coverage on PET were adjusted during calibration of the PRMS model. Calibration of PRMS-estimated PET was preformed using PET data collected at the CIMIS climate measurement station located in Santa Barbara (CIMIS Station ID: 107).

2.3.1.2 BNM Groundwater Model (MODFLOW-NWT)

The BNM uses MODFLOW-NWT, a newton formulation of MODFLOW-2005 that improves numerical representation of unconfined aquifers, to characterize the effects of groundwater supplies, demands, and interactions with adjacent basins on groundwater conditions in the MGB. These processes are constrained by locally measured aquifer properties, boundary interactions, and anthropogenic stresses, as well as native stresses, such as stream

flow and precipitation recharge, estimated by the PRMS model of the BNM. Boundary conditions in the MODFLOW model of the BNM change at the monthly timescale.

Groundwater flow processes in the BNM are simulated using a three-layer model that extends vertically downward from land surface to depths exceeding 1,000 feet bgs (Figure 2-30). The principal aquifer, which consists of the Casitas Formation, Santa Barbara Formation, and alluvial and terrace deposits (Section 2.2.3), is represented using the upper two model layers; the thickness and lateral extent of the principal aquifer, as represented in the BNM, was determined through the use of geologic maps, previously developed cross-sections (GTC 1974), and by identifying the contact between water-bearing materials and bedrock from 95 lithologic logs. The lithologic logs and geologic maps did not provide sufficient information to vertically differentiate between the Casitas Formation, Santa Barbara Formation, and younger alluvial and terrace deposits. The multilayer approach to representing the principal aquifer was selected to better represent vertical gradients across the MGB that result from depth-discrete groundwater extractions, infiltration of surface water and precipitation, and interactions with the underlying bedrock. Groundwater conditions in the BNM were simulated in MODFLOW using convertible model layers.

2.3.2 Inflow to Groundwater System

2.3.2.1 Recharge from Rainfall Infiltration

Direct recharge from precipitation is a significant source of recharge to the MGB. The BNM simulates precipitation recharge through a loose coupling between groundwater recharge estimates extracted from the PRMS model of the BNM and surface infiltration inputs applied to the unsaturated zone processes simulated by the MODFLOW model of the BNM. Applying these groundwater recharge estimates to the unsaturated zone rather than directly to the water table incorporates the natural time delay between precipitation events and corresponding groundwater recharge.

During the period from water year 1970 through water year 2014, simulation results from the BNM indicate that the MGB received approximately 6,000 AFY of precipitation recharge (Table G-2). Average annual precipitation recharge was highest in Storage Unit 1, which was recharged with approximately 2,940 AFY of precipitation (50% of the average annual precipitation recharge to the MGB). Precipitation recharge in Storage Unit 2, Storage Unit 3, and the Toro Canyon Storage Unit averaged approximately 600 AFY, 1,350 AFY, and 860 AFY, respectively (Table G-3).

Estimates of precipitation recharge computed by the BNM are higher than historical estimates of precipitation recharge to the MGB. These historical estimates were based on simplified empirical models that relate deep percolation to cumulative rainfall for Ventura County watersheds (DPW 1933) and do not directly incorporate the local soil and land surface characteristics across the MGB. Using this approach, Hoover (1980a) estimated that, of the approximately 9,800 AF of precipitation that falls on the MGB in an average year, approximately 500 AF recharge the aquifer. Muir (1968) estimated average recharge from rainfall for the periods 1868 to 1964, 1944 to 1964, and 1949 to 1959, concluding an estimated average recharge for the MGB of 1,570 AFY. The MGB area used by Muir (1968) for this calculation was approximately 30% smaller than that for the MGB as currently defined by DWR.

2.3.2.2 Mountain Front Recharge

The south face of the Santa Ynez Mountains, directly north of the MGB, is mapped by the U.S. Department of Agriculture as Rock Outcrop–Maymen Complex (Rb and MbH; Figure 2-33, Soils and Recharge Areas Map). These areas are characterized by 50% to 100% sloping, unweathered bedrock underneath several inches of sandy loam with very high runoff (Hydrologic Soil Group D; USDA 2020). In addition, the MGB is structurally bound on the east

and west by outcrops of the Monterey Shale (TM), Rincon Formation (Tr), and Sespe Formation (Tsp; Figure 2-12a). Precipitation that falls on these bedrock outcrops may recharge the MGB via subsurface underflows.

Simulation results from the BNM indicate that the MGB receives approximately 430 AFY of mountain front recharge (Table G-2). Approximately 200 AFY, or 50% of the total mountain front recharge, occurred via underflows from the Santa Ynez Mountains into Storage Unit 1 and the Toro Canyon Storage Unit. Approximately 230 AFY of mountain front recharge occurred via underflows from the outcrops of Monterey and Rincon Formations on the eastern boundary of the MGB and along Ortega Ridge, which separates Storage Units 2 and 3 from the Toro Canyon Storage Unit (Table G-3).

2.3.2.3 Creek Recharge

Watersheds along the south coast of Santa Barbara County are largely "flashy" in nature, having low or no flow for much of the year and reaching high or flood-stage flows for short periods with intense storms and saturated conditions. The amount of recharge from a creek is most accurately estimated as the difference between flow at gauges located near the creek's entry to the groundwater basin and where it discharges from the basin. Such flow data is largely lacking for the MGB (see Section 3.5.7.2, Identification of Data Gaps). The Montecito GSA is currently implementing grant-funded projects that will provide for gauging of some of the MGB's largest creeks, thereby providing more accurate future estimates of recharge in the MGB (see Section 2.1.2.5).

Despite the lack of measured stream flow data, stream characteristics and soil properties in the MGB suggest that surface water readily infiltrates into the primary aquifer of the MGB (Figure 2-33). For example, surface water flows in Montecito Creek are characterized by the USGS as perennial within the Santa Ynez Mountains and intermittent within the MGB boundary. The soils that underly Montecito Creek are highly transmissive (Figure 2-33), which suggests that much of the perennial flow reaching the boundary of the MGB percolates to the water table, providing recharge to the MGB. Oak Creek, San Ysidro Creek, and Romero Creek have similar flow and soil characteristics, suggesting that creek flows through these drainages provide a significant source of recharge to the MGB.

Infiltration of creek flow is estimated to be the largest source of recharge to the MGB (Table G-2). These estimates of creek recharge were extracted from the MODFLOW model of the BNM. As previously noted, estimates of streamflow inputs to the MODFLOW model of the BNM were based on average monthly flows extracted from the PRMS model of the BNM. The BNM simulates surface water–groundwater interactions using the MODFLOW SFR package.

Results from the MODFLOW model indicate that the MGB historically received an average of approximately 6,890 AFY of creek recharge (Table G-2). These recharge values are strongly correlated to water year type, with the BNM indicating that the MGB received an average of approximately 5,100 AFY and 8,100 AFY of creek recharge during critically dry and wet water years, respectively (Table G-2).

Numerical model results from the BNM indicate that approximately 50% of the creek recharge to the MGB occurs in Storage Unit 3 (Table G-3). This portion of the MGB is characterized by shallower topographic changes than the higher-elevation storage units that lie along the base of the Santa Ynez Mountains.

Stream flows within the watershed are actively measured by County division of Public Works using one gauge located along Montecito Creek (Figure 2-6). This gauge was designed to measure peak flows during large storms and historical stream flow measurements are of variable quality and uncertain. Because these data are uncertain, they were not used during model calibration.

In addition to the Montecito Creek gauge, stream flows were historically measured within the Montecito Watershed along San Ysidro Creek (Figure 2-6; USGS Gauge 11119660 San Ysidro Creek). Stream flows were measured along San Ysidro creek at this gauge between October 1, 1979, and September 29, 1983. Stream flows simulated in the BNM were calibrated to flows measured at this gauge during the 3-year period from 1980 through 1983. The relatively short period of record available for model calibration indicates that simulated surface water flows, and corresponding model estimates of creek recharge, are uncertain.

2.3.2.4 Inflow from Consolidated Rock

The consolidated sedimentary rock that delineates the MGB bottom contains groundwater in fractures, joints, and bedding planes that contribute recharge to the unconsolidated sediments of the MGB (GTC 1974). In some parts of the MGB, and in the foothills to the north of it, some wells extract groundwater from bedrock, mainly from the sandstones of the Sespe and Coldwater Formations (Hoover 1979). Yields from wells completed in these formations are generally very low and inconsistent (GTC 1974). The quantity of inflow contributed to the unconsolidated formations of the MGB depends, in part, on the groundwater elevation in the MGB.

The BNM simulates groundwater interactions with the consolidated rock using a general head boundary condition that allows groundwater to flow out of, or into, the consolidated rock based on the simulated groundwater elevation within the principal aquifer. The elevation of the general head boundary conditions was held constant throughout the simulation and was equal to the elevation of the contact between the principal aquifer and consolidated rock. The general head boundary conductance was adjusted as part of the MODFLOW model calibration.

Results from the BNM indicate that the MGB received an average of approximately 600 AFY of recharge from consolidated rocks that underly the MGB (Table G-2). This estimate is similar to previous estimates of 250 AFY (Hoover 1979) and 300 AFY (Muir 1968) that are based on simplified aquifer and hydraulic gradient assumptions that neglect local variations in groundwater conditions and aquifer materials across the MGB.

The BNM indicates that most of the recharge from underlying consolidated rocks occurs in Storage Unit 1, where groundwater elevations change dynamically with water year type (Table G-2). The BNM indicates that Storage Unit 1 is recharged with approximately 300 AFY of water that originates from bedrock underlying the MGB. The BNM indicates that recharge from the underlying consolidated rock provided approximately 115 AFY, 60 AFY, and 100 AFY to Storage Unit 2, Storage Unit 3, and the Toro Canyon Storage Unit, respectively.

2.3.2.5 Irrigation Return Flow

There are several factors that influence the quantity of recharge from irrigation return flow. Primary among them is land use. Irrigation occurs in the MGB with residential landscaping, agriculture, and turf, such as that used for golf courses and cemeteries. Climate influences the amount of irrigation that is needed for a particular plant type through precipitation amount and frequency and temperature. In addition, methods of irrigation have become more efficient over time, resulting in a reduction in applied water and therefore a reduction in return flow to the aquifers. With increased awareness of the need for water conservation due to recent droughts, plant types in the MGB have likely become more drought tolerant.

MWD maintains historical estimates of water sales within its service area dating back to water year 1950. These historical estimates of water sales were mapped onto the BNM grid and applied as a specific flux recharge source using the MODFLOW WEL package. The water delivery volume was scaled at each model grid by assuming that 80% of the total delivery was used for outdoor applications, and 15% of the water used for outdoor purposes infiltrated

beyond the soil zone, providing a source of recharge to the MGB. These estimates of outdoor water usage and corresponding infiltration volumes are based on MWD records and estimates of irrigation use. Based on this approach, it is estimated that irrigation return flows provided approximately 430 AFY of recharge to the MGB.

2.3.2.6 Septic System and System Loss Return Flow

There are approximately 920 parcels in the MGB that have septic wastewater disposal systems (Figure 2-34, Parcels with Septic System). Based on an estimated 86 gallons per person per day and 2.4 people per household, there is a potential for about 212 AFY of return flow from septic systems effluent.[28]

Recharge from septic systems was modeled in the BNM by mapping the parcels with septic (Figure 2-34) onto the BNM grid. The average 212 AFY recharge rate was distributed uniformly across each parcel and applied as a specified flux recharge boundary condition using the MODFLOW WEL package. Recharge from septic system return flows are incorporated into the "Return Flows" category of Table G-2.

MWD regularly tracks "water losses," a category that encompasses meter inaccuracies, undocumented/ unauthorized releases, flushing of reservoirs or system lines, water main breaks, and fire hydrant use in addition to leaking water mains and service lines. In sum, these sources are estimated to amount to about 10% of MWD's supply (MWD 2017). Of these categories, only leaking water mains and service lines are likely to have the potential to recharge groundwater. In 2015, total water losses were approximately 390 AF. Given the small percentage of total water losses that are likely attributable to leaking water mains and service lines, recharge from this source is considered negligible. Accordingly, total water losses from MWD's water delivery system were not incorporated as a source of recharge in the BNM.

2.3.2.7 Groundwater Exchange with Adjacent Basins

The MGB is hydraulically connected along its southeastern and southwestern boundaries to the Santa Barbara Groundwater Basin and Carpinteria Groundwater Basin (Figure 2-31). Along these boundaries, it is possible for the MGB to gain or lose groundwater to the adjacent basins. Where groundwater flow is mainly southward and parallel to the boundaries, the water exchange is limited or negligible. The direction of groundwater flow in these areas may change over time in response to natural sources of discharge or recharge and where localized groundwater recharge and discharge occurs.

The BNM simulates groundwater exchanges between the MGB and adjacent basins using general head boundary conditions. Groundwater exchanges across the general head boundaries are calculated by the MODFLOW model and depend on the user-specified boundary conductance, user-specific boundary head, and internally calculated groundwater elevation within the MGB boundary. Groundwater elevations along these general head boundaries were held constant throughout time and equal to the average groundwater elevation measured at nearby groundwater monitoring wells. Along the jurisdictional boundary between the MGB and the Santa Barbara Groundwater Basin, a constant groundwater elevation of 5 feet MSL, which is equal to the mean elevation measured at Well 4N27W13R01S, was used for the general head boundary. Along the jurisdictional boundary between the MGB and the Carpinteria Groundwater Basin, a constant groundwater elevation of 3 feet MSL, which is equal to the mean elevation measured at Well 4N26W23A02S, was used for the general head boundary.

[28] Indoor water use estimated from winter water use (lowest water use time of year, when irrigation is unlikely). People per household for the period from 2014 to 2018 is from the U.S. Census Bureau (2020) QuickFacts.

Results from the BNM indicate that approximately 5 AFY and 90 AFY of groundwater flow into the MGB from the Santa Barbara Groundwater Basin and Carpinteria Groundwater Basin, respectively. Combined, these two sources of recharge account for less than 1% of the average annual recharge to the MGB. These results are consistent with groundwater elevation contour maps that suggest the primary direction of flow near these jurisdictional boundaries is north to south (Figures 2-17 through 2-20).

2.3.2.8 Groundwater Exchange with Seawater at the Coast

The MGB is hydraulically connected to the Pacific Ocean along its southern boundary (Figure 2-31). Groundwater elevations that drop below MSL may provide the potential for seawater intrusion into the MGB. In the MGB, historical studies have postulated that a near-shore fault zone precludes significant seawater intrusion into the MGB. Section 2.2.4.3 summarizes the historical information and conclusions regarding seawater intrusion in the MGB, and Section 3.2.3 explains what is known about the current state of seawater intrusion and the proposed actions to evaluate the occurrence and risk of seawater intrusion.

Groundwater interactions with the Pacific Ocean were modeled in the BNM using a general head boundary condition. Model cells that were directly adjacent to the Pacific Ocean were given a constant head value equal to the freshwater head equivalent of seawater. The freshwater head equivalent was calculated by multiplying the principal aquifer thickness by 0.025, which represents the relative density difference between seawater and freshwater (USGS 2003). The implementation of this boundary condition allows water to enter the MGB when simulated groundwater elevations in Storage Unit 3, the Toro Canyon Storage Unit, and Summerland drop below MSL, and allows water to flow out of the model domain when groundwater elevations are higher than MSL.

Results from the BNM indicate that approximately 40 AFY of seawater enters the MGB from the Pacific Ocean (Table G-2). The BNM indicates that the majority of this occurs at depth in the southwestern portion of Storage Unit 3, where the principal aquifer is approximately 1,000 feet thick. The 40 AFY of seawater flux into the MGB accounts for less than 1% of the total inflows to the MGB and is within the uncertainty of the model.

2.3.3 Outflow from Groundwater System

2.3.3.1 Groundwater Extraction

Groundwater extraction has fluctuated significantly over time in response to land use, climate, and water supply sources. Private groundwater extractions are thought to have generally declined from the 1920s, prior to the formation of MWD, to the late 1970s due to the availability of additional water sources, including Jameson Reservoir (completed in 1930) and Cachuma Reservoir (completed in 1953). Additionally, the availability of SWP water beginning in 1997 helped MWD offset groundwater supplies with imported water. With increased development of the MGB and restrictions on the use of MWD-supplied water during drought periods, including 1986 to 1991 and 2011 to 2017, construction of groundwater wells and extraction of groundwater by private parties increased (Figure 2-35, Groundwater Wells Drilled Pre- vs. Post-2015, and Figure 2-36, Groundwater Well Locations and Well Density per Square Mile). Such extractions include those by private water companies, agricultural operations, and institutional and private landscaping. Non-municipal groundwater extractions have been largely unmetered or unreported, and estimates of their magnitude have all required indirect methods.

Number of Groundwater Wells

County code requires that all new wells be permitted through the Environmental Health Department. The County's ordinance requires standards that meet or exceed state standards (Santa Barbara County Well Standards Ordinance No. 5046). Although most wells have been permitted prior to construction, accurately determining the number of currently functioning wells at any particular time is difficult. Historical estimates of the number of wells include 368 total wells in 1979, 93 of which were active production wells (Hoover 1980a), and 535 active production wells in 2014 (Dudek 2017).

To estimate the number of currently producing wells located in the MGB, and those close enough to impact groundwater conditions in the MGB aquifer, data from all available sources were collected, processed, reviewed for redundancy and accuracy, and entered into the project data management system. Sources from which data were collected included the following:

- DWR well completion database
- County Environmental Health Services well permit and completion files
- MWD records
- Historical consultant reports and databases

Results of the data acquisition and processing are shown on Figure 2-36. The total number of wells in the MGB is estimated to be 908, some of which are presumed to be inactive. The number of active wells in the MGB was estimated using the analysis described in the section below. The MGB Data Management System contains the well database, which will be continuously reviewed and updated throughout the GSP implementation to incorporate site reconnaissance data and information on newly constructed wells.

Groundwater Extraction Estimates

Historical groundwater extractions were estimated for the period from water year 1950 through 2019 as part of this GSP development and development of the BNM. This analysis builds on previous estimates of historical extraction rates that utilized historical imported water supplies, land use type, and estimates of irrigated acreage (Hoover 1980a; Dudek 2017). However, unlike previous studies, estimates of groundwater extractions for development of the GSP and BNM were designed to estimate extraction volumes on a well-by-well basis.

To perform this analysis, a detailed review of district records, Santa Barbara Environmental Health Services' well completion report database, and DWR's well completion report database was performed to identify wells that might be constructed and active within the MGB boundaries. Based on this review, wells were then mapped onto the MGB using site reconnaissance information or data available on well completion reports and permits. These wells were then joined to the Assessor's Parcel layer to identify irrigated land that each well may be providing water for.

Irrigation demands at each parcel were specified by aggregating County Land Use data into six land use categories (Table G-4). Water use factors were assigned to each parcel based on this land use categorization (Table G-4) and were based on regional CIMIS data, local knowledge, and regional estimates of agricultural land water use (DWR 2021a).

In September 2020, DWR contracted Quantum Spatial Inc. to generate estimates of irrigated land coverage within the MWD service area boundaries. Estimates of irrigated land acreage were generated using remote satellite data and advanced machine learning techniques to identify irrigable area within single-family and multifamily residential

parcels (Quantum Spatial Inc. 2020). These estimates of irrigable area were combined with the water use factors to generate estimates of total water demand for each parcel containing a groundwater well. The estimated groundwater extraction rate at each well was calculated by computing the difference between the parcel's irrigation demand and MWD's estimated delivery to each parcel. Groundwater wells were assumed to be inactive when MWD's deliveries met the parcel's irrigation demands.

Table G-5 summarizes the results from this analysis and demonstrates that groundwater extractions from privately owned wells compose most extractions within the MGB. Between 1970 and 2015, private wells have accounted for between 54% and 95% of the total extractions in the MGB. Private well extractions steadily increased from 1970 through 2014, averaging approximately 340 AFY in the 1970s and 900 AFY between 2000 and 2014 (Table G-5). In water year 2014, results from this analysis suggest that approximately 360 privately owned wells actively extracted groundwater within the MGB. Like the trends in private well extractions, groundwater extractions by MWD steadily increased between water year 1970 and water year 2014. In the 1970s, MWD extracted an average of approximately 100 AFY; between water years 2000 and 2014, MWD extracted approximately 310 AFY (Table G-5).

Estimates of groundwater extractions presented in Table G-5 include production volumes from wells located within the MGB boundary that may be screened across both the principal aquifer and the underlying consolidated rocks. Groundwater extractions from the underlying consolidated materials may indirectly effect groundwater conditions within the principal aquifer of the MGB by impacting vertical gradients between the two geologic materials; these effects are simulated by the BNM using the general head boundaries discussed in Section 2.3.2.4.

To account for wells screened across both the principal aquifer and consolidated rocks, groundwater extractions within the BNM were simulated using the MODFLOW Multi-Node Well (MNW2) package. The MODFLOW MNW2 package allows the user to specify well construction details and automatically adjusts pumping within the well as the well screen becomes desaturated. The implementation of this package provides further refinement of the production well estimates presented in Table G-5 and facilitates estimates of groundwater extractions that occur only from the principal aquifer throughout time.

Groundwater production from within the principal aquifer of the MGB is presented in Table G-2**.** The extraction volumes presented here are lower than the total volumes presented in Table G-5 because they do not include groundwater extractions from the consolidated rocks that underly the MGB. Over the period from 1970 through 2014, results from the BNM indicate that an average of approximately 720 AFY of groundwater was extracted from the MGB.

Previous Estimates of Groundwater Extractions within the MGB

Historical extraction estimates have been made by various researchers for MGB and climate conditions at that time. MWD extractions were mostly measured and documented and are therefore known with a high degree of certainty, although some inconsistencies in reported extraction volumes for certain years have been observed. Extractions from private entities were all estimated using indirect methods. Such methods generally include water demand calculations based on land use category, acreage, and water use factor (i.e., crop coefficient). Table 2-18 shows extraction estimates from historical studies. Previous estimates of groundwater production from the MGB are in general agreement with the estimates used to simulate groundwater extractions in the BNM.

Table 2-18. Previous Estimates of Groundwater Extraction

Year	Source	Groundwater Extraction (AFY)		
		MWD	*Private*[a]	*Total*[a]
1929	Hoover 1980a	N/A	N/A	1,658
1954	Hoover 1980a	0[b]	N/A	1,322
1961	Hoover 1980a	0	N/A	872
1974	GTC 1974	110[c]	300	410
1979	Hoover 1980a	187	458	645
1980–1990	Slade 1991	N/A	N/A	936[d]
2011–2015	Dudek 2017	421[e]	2,001	2,422

Source: Hoover 1980a; GTC 1974; Slade 1991; Dudek 2017.
Notes: AFY = acre-feet per year; MWD = Montecito Water District; N/A = data are not available; GTC = Geotechnical Consultants Inc.
[a] All values are estimated.
[b] GTC (1974) reports MWD groundwater extraction totaled 102 acre-feet in 1954; however, Hoover (1980a) and MWD report 0 acre-feet.
[c] MWD reports groundwater extraction totaled 47 acre-feet in 1974.
[d] Average for period from 1980 to 1990.
[e] Average for period from 2011 to 2015.

2.3.3.2 Groundwater Exchange with Seawater at the Coast

Results from the BNM indicate that groundwater outflow to the Pacific Ocean is a significant source of groundwater discharge from the MGB. Between water years 1970 and 2014, the BNM indicates that an average of approximately 6,650 AFY of groundwater discharged to the Pacific Ocean (Table G-2). This accounts for approximately 45% of the total groundwater outflows from the MGB.

2.3.3.3 Groundwater Discharges to Creeks

Groundwater in the MGB discharges to Romero Creek, Montecito Creek, Oak Creek, San Ysidro Creek, Picay Creek, Toro Canyon Creek, and their contributing creeks, when underlying groundwater elevations are above the bottom elevation of each stream channel. Groundwater conditions that cause this are influenced by local pumping, climatic conditions, upstream creek leakage, and interactions with the underlying consolidated rocks.

Groundwater discharges to creeks in the MGB were estimated by the BNM. As discussed in Section 2.3.2.3, the BNM simulates surface water–groundwater interactions using the MODFLOW SFR package. Creek leakage and groundwater discharges to creeks are calculated during each monthly stress period in the BNM using computed groundwater elevations, stream stages, and calibrated values of streambed conductance.

The BNM estimates that an average of approximately 3,390 AF of groundwater discharged to creeks annually from the MGB (Table G-2). Historically, this accounted for approximately 23% of the total groundwater outflows from the MGB. The BNM indicates that most of these discharges occur in Storage Units 2 and 3 (Table G-3). As noted in Section 2.3.2.3, the limited availability and lack of quality streamflow measurements within the MGB affect the quantitative assessment of the BNM's representation of surface water–groundwater interactions in the MGB. Accordingly, the BNM-estimated groundwater discharges to creeks are a large source of uncertainty in the BNM-estimated water budget for the MGB.

2.3.3.4 Groundwater Discharges to Land Surface

The principal aquifer in the MGB is characterized by thin alluvial deposits where the MGB boundary intersects outcrops of the Sespe, Rincon, and Monterey Formations (Figure 2-12a). These deposits have relatively low storage capacity. Periods of elevated precipitation recharge to these deposits can lead to simulated groundwater elevations in the BNM that exceed land surface elevation and create locally ponded groundwater on land surface. The BNM treats this water as saturation-excess, or Dunnian, runoff. Groundwater that discharges to land surface under these conditions is routed downstream to the local stream segments where it either recharges the MGB or flows out to the Pacific Ocean.

Results from the BNM indicate that approximately 2,790 AFY of groundwater discharged to land surface as saturation-excess runoff (Table G-2). Approximately 30% of this occurred in Storage Unit 1, which is dynamically stressed with the largest fluxes of precipitation recharge (Table G-3).

2.3.3.5 Groundwater Outflows to Adjacent Basins

As discussed in Section 2.3.2.7, Groundwater Exchange with Adjacent Basins, the MGB is hydraulically connected to varying degrees with the Santa Barbara Groundwater Basin and Carpinteria Groundwater Basin (Figure 2-31). The BNM estimates that an average of approximately 250 and 230 AFY of groundwater flowed out of the MGB to the Santa Barbara Groundwater Basin and Carpinteria Groundwater Basin, respectively (Table G-2). Compared to the simulated inflows, the BNM indicates that approximately 245 AFY and 140 AFY of groundwater flows out of the MGB to the Santa Barbara Groundwater Basin and Carpinteria Groundwater Basin, respectively (Table G-2).

2.3.3.6 Groundwater Outflows to Consolidated Rock

As discussed in Section 2.3.2.4, Inflow from Consolidated Rock, groundwater stored in the principal aquifer of the MGB is hydraulically connected, to varying degrees, with groundwater stored within the fractures and joints of the underlying consolidated rocks. These interactions are simulated in the BNM using general head boundary conditions, which allow the direction, magnitude, and location of groundwater exchanges between the bedrock and alluvium to change depending on the simulated groundwater elevations in the principal aquifer.

The BNM estimates that an average of approximately 475 AFY of groundwater flows out of the MGB into the consolidated rocks that underlie the MGB (Table G-2). Of this, approximately 250 AFY occurs in Storage Unit 1, which receives the largest volume of precipitation recharge in the MGB and is composed of alluvium that is relatively thin along the northern boundary of the MGB. The combination of large precipitation recharge and thin alluvium leads to steep vertical gradients that drive dynamic interactions between bedrock and groundwater in the principal aquifer.

2.3.4 Change in Annual Volume of Groundwater in Storage

Historical annual changes in groundwater in storage were calculated by the BNM from water year 1970 through water year 2014. Estimates of the annual change in groundwater in storage were extracted from the BNM using the B118 basin boundary shown in Figure 2-1. Historical change in groundwater in storage is presented over the entire historical period and further aggregated by water year type. Water year type definitions are provided in Section 2.2.1.1, Precipitation.

2.3.4.1 Change in Annual Volume of Groundwater in Storage

Throughout the 45-year historical record, the BNM estimates that groundwater in storage declined by an average of approximately 130 AFY (Table G-2).

The BNM estimates that groundwater in storage decreased by an average of approximately 1,300 AFY in critically dry water years and increased by an average of 3,300 AFY in wet water years. During dry and below normal water years, the BNM estimates that groundwater in storage declined by approximately 2,000 AFY and 800 AFY. The correlation between water year type and simulated change in storage demonstrates the strong link between climatic variations and groundwater conditions in the MGB.

Figure 2-37, Change in Groundwater in Storage and Annual Groundwater Extractions (WY 1970-2019) in the MGB, shows the historical cumulative change in groundwater in storage in the MGB. Between water years 1970 and 1983, groundwater in storage fluctuated annually between a surplus of groundwater in storage of approximately 750 AF and a deficit of approximately 4,700 AF. Between water years 1983 and 1990, precipitation recharge was approximately 40% lower than the long-term average (Table G-2), which resulted in a declining limb in the cumulative change in storage curve. In water year 1990, groundwater in storage was approximately 5,500 AF lower than conditions at the start of water year 1970. Precipitation recharge between 1990 and 1998 was approximately 33% higher than the long-term average, which resulted in a general increasing trend in the cumulative change in storage. In water year 1998, the BNM indicates that there was approximately 1,400 AF groundwater storage surplus compared to conditions at the beginning of water year 1970.

Between water years 2012 and 2014, precipitation recharge to the MGB averaged approximately 2,000 AFY, or 33% of the long-term average (Table G-2). Over this same period, groundwater production gradually increased to a historical-high groundwater extraction rate of approximately 1,500 AFY in water year 2014. Between water years 2012 and 2014, groundwater in storage declined by approximately 6,000 AF (Figure 2-37).

2.3.5 Quantification of Historical, Current, and Future Water Budget

Each GSP is required to include an accounting of the total annual volume of surface water and groundwater entering and leaving the basin during historical, current, and projected conditions (23 CCR 354.18). Historical conditions for the plan area were defined using data for the period between water years 1970 and 2014. Current conditions for the plan area were defined using data for the period between water years 2015 and 2019. The projected water budgets were prepared for the 50-year period from the water years 2020 and 2069. Summaries of the historical, current, and projected water budgets are provided in Section 2.3.5.1, Quantification of Historical Water Budget; Section 2.3.5.2, Quantification of Current Water Budget; and Section 2.3.5.3, Quantification of Future Water Budget.

2.3.5.1 Quantification of Historical Water Budget

Title 23, Section 354.18(c)(2), of the CCR states that "historical water budget information shall be used to evaluate availability and reliability of past surface water supply deliveries and aquifer response to water supply and demand trends relative to water year type." The water budget discussed in this section provides a historical accounting of surface water availability, groundwater inflows, groundwater outflows, and corresponding changes to the volume of groundwater in storage between the water years 1970 and 2014. Estimates of the individual water budget components are based on simulation results from the BNM.

Table G-6 tabulates the water year type distribution between water years 1970 and 2014 in the MGB. Climate during this 45-year period was generally dry, with 24 out of the 45-year historical record characterized as "below normal," "dry," and "critically dry" water year types. Over the same period, 21 water years were characterized as "above normal" or "wet" water year types.

Historical Surface Water Availability

Surface water has historically accounted for an average of approximately 85% of the total water supplied to MWD's service area (Tables G-5 and G-7). Surface water supplies consist of locally and regionally derived supplies, such as Cachuma Lake, Jameson Lake, and diversions from Fox Creek and Alder Creek, as well as imported SWP water purchased by MWD as a member of the CCWA (MWD 2017). MWD's full annual Table A allocation is 3,300 AFY (MWD 2017).

In addition to these sources of surface water, MWD also purchases supplemental SWP water to augment water supplies to its service area. These supplemental purchases require an exchange of equal or greater purchase volumes to the SWP over a 10-year period (MWD 2017). At the end of 2014, MWD's water debt as part of this program was 2,721 AF (MWD 2017).

Table G-7 shows historical surface water availability to the MGB. Between 1970 and 2014, locally and regionally derived surface water supplies have provided an average of approximately 4,500 AF of water to MGB. Of this, approximately 52% was from Lake Cachuma and approximately 33% from Jameson Reservoir (Table G-7).

Table G-7 demonstrates that regional and locally derived surface water supplies were relatively consistent during dry, below normal, above normal, and wet water years. During critically dry water years, surface water supplies to the MGB averaged approximately 3,500 AFY, which is approximately 20% lower than the historical average surface water supplies to the MGB.

MWD began importing SWP water to the MGB in water year 1999 (Table G-7). Since then, MWD has imported an average of approximately 900 AFY of SWP water to augment water supplies in its service area. Imported water volumes are highly variable with a maximum importation volume of 2,582 AF in water year 2008 and a minimum importation volume of 0 AF in water years 2001, 2006, and 2011. SWP water importations were highest during critically dry water years, when MWD imported an average of approximately 2,300 AFY (Table G-7).

Inflows to Groundwater System

Between water years 1970 and 2014, the BNM estimates that groundwater in the MGB was recharged at an average rate of approximately 14,660 AFY (Table G-2; Figure 2-38, Groundwater Budget [WY 1970-2019] for the MGB). Average annual groundwater recharge varied by water year type: during critically dry water years, the BNM estimates that the MGB was recharged at an average rate of approximately 9,100 AFY, and during wet water years, the BNM estimates that the MGB was recharged at an average rate of approximately 24,100 AFY (Table G-2).

The largest sources of groundwater recharge were creek recharge and precipitation recharge. Combined, these two sources recharge the MGB at an average rate of 12,900 AFY, providing approximately 87% of the total recharge to the MGB. Both recharge sources are correlated with water year type. During critically dry water years, the BNM estimates that creek flows and precipitation recharged the MGB at an average rate of approximately 5,000 AFY and 2,300 AFY, respectively. During wet water years, the BNM estimates that creek flows and precipitation recharged the MGB at an average rate of approximately 8,100 AFY and 14,000 AFY, respectively (Table G-2).

Recharge from irrigation return flows and septic system leaching provided an average of approximately 650 AF of recharge to the MGB annually (Table G-5). Recharge from these two sources is not strongly correlated with water year type and reflects the relatively consistent water supplies delivered by MWD to customers within the MGB boundary.

During the 1970–2014 period, the MGB received approximately 1,100 AFY of recharge from adjacent basins, mountain front recharge, and exchanges with the underlying consolidated rocks (Table G-2). Exchange between the alluvium and underlying consolidated rocks was the largest source of recharge via subsurface exchanges. Historically, these exchanges provided approximately 600 AF of recharge annually and were largest during dry water year types (Table G-2).

Outflows from Groundwater System

Between water years 1970 and 2014, the BNM estimates that approximately 14,800 AF of groundwater was removed from the MGB annually (Table G-2). The BNM estimates that average annual outflows were correlated with water year type: during critically dry water years, the BNM estimates that approximately 10,500 AFY of groundwater was removed from the MGB, and during wet water years, the BNM estimates that approximately 20,800 AFY of groundwater was removed from the MGB.

The BNM estimates that the largest source of groundwater outflows occurred via groundwater discharges to the Pacific Ocean. Over the 45-year historical period, the BNM estimates that approximately 6,700 AFY of groundwater flowed out of the MGB to the Pacific Ocean; historically, this accounted for approximately 45% of the total groundwater outflows from the MGB (Table G-2). The BNM estimates that groundwater discharges to the Pacific Ocean are correlated with water year type: during critically dry water years, the BNM estimates that approximately 4,400 AFY of groundwater flows out of the MGB to the Pacific Ocean, and during wet water years, the BNM estimates that approximately 8,700 AFY of groundwater flows out of the MGB to the Pacific Ocean (Table G-2).

The second largest source of groundwater outflows from the MGB occurs in the form of groundwater discharges to creeks. Between water years 1970 and 2014, the BNM estimates that approximately 3,400 AF of groundwater discharged from the MGB to overlying creeks (Table G-2). The BNM estimates that these groundwater–surface water interactions were correlated with water year type and resulted in average loss of 4,900 AFY of groundwater during wet water years (Table G-2). Results from the BNM indicate that approximately 30% of the average annual groundwater losses to creeks occurs in Storage Unit 3 (Table G-3).

Results from the BNM indicate that saturation-excess runoff and subsurface exchanges with adjacent basins and underlying consolidated rocks historically resulted in approximately 4,000 AF of groundwater losses annually (Table G-2). Of these sources, saturation-excess runoff and groundwater exchanges with underlying consolidated rocks are most strongly correlated with water year types. During wet water years, when precipitation rates exceeded 150% of the long-term average, the BNM suggests that approximately 4,700 AFY of groundwater was removed from the MGB as surface runoff and approximately 770 AFY infiltrated into the underlying consolidated rocks (Table G-2).

Results from the BNM indicate that approximately 720 AF of groundwater was extracted from the principal aquifer of the MGB annually (Table G-2). Groundwater extractions from the MGB have increased throughout the historical period, from an average of approximately 300 AFY in the 1970s to an average of approximately 1,000 AFY during water years 2004 through 2014 (the last 10 years of the historical period; Table G-2). The long-term average of 720 AFY reflects the gradual transition from historical low production volumes of approximately 250 AFY in 1970 to historical high production volumes of approximately 1,500 AFY in water year 2014. As noted in Section 2.3.3.1, Groundwater Extraction, these extraction rates are less than the estimated total extractions from wells completed

within the MGB boundary due to wells located near the bedrock outcrops being completed across the alluvium and into the underlying bedrock. Historically, groundwater extractions from the MGB were correlated with water year type, with the highest extraction rates occurring during critically dry and dry water year types (Table G-2).

Change in Groundwater Storage

Throughout the historical period, the BNM estimates that groundwater in storage declined at an average annual rate of approximately 130 AFY (Table G-2). This resulted in a total cumulative loss of groundwater in storage of approximately 5,900 AF between water years 1970 and 2014 (Table G-2; Figure 2-37).

Results from the BNM indicate that change in groundwater in storage in the MGB is correlated with water year type. During critically dry, dry, and below normal water year types, the BNM estimates that groundwater in storage declined at average rates of approximately 1,400, 2,000, and 800 AFY, respectively. During above normal and wet water year types, the BNM estimates that groundwater in storage in the MGB increased at an average rate of approximately 500 and 3,400 AFY, respectively.

2.3.5.2 Quantification of Current Water Budget

Climate during the water year 2015–2019 period was generally dry, with 3 out of the 5 water years characterized as dry or critically dry. During this period, water year precipitation averaged approximately 80% of the long-term historical average and ranged from 48% of the long-term average (water year 2015 and water year 2019) to 135% of the long-term average (water year 2017).

Surface Water Availability

Table G-8 shows surface water supplies to the MGB between water years 2015 and 2019. During this period, locally and regionally derived surface water supplies have provided an average of approximately 1,400 AF of water to MGB. This is approximately 70% lower than the historical availability of surface water to the MGB (Table G-7 and Table G-8).

The largest decline in surface water availability compared to historical conditions is associated with the availability of local and regional surface water supplies. Between water years 2015 and 2019, MWD imported an average of approximately 770 AFY of surface water from the Cachuma Reservoir and an average of approximately 300 AFY of surface water from the Jameson Reservoir. This is approximately 70% lower than historical surface water availability from the Cachuma Reservoir and approximately 80% lower than historical surface water availability from the Jameson Reservoir (Table G-8).

Between water years 2015 and 2019, MWD imported an average of approximately 1,900 AFY of SWP water to the MGB (Table G-8). This is approximately 1,000 AFY more than the historical average importations by MWD (Table G-7). MWD imported the largest volume of water to the MGB in water year 2018, a critically dry water year during which surface water from the Cachuma Reservoir was not available for delivery to the MGB (Table G-8).

Inflows to Groundwater System

Between water years 2015 and 2019, the BNM estimates that groundwater in the MGB was recharged at an average rate of approximately 11,200 AFY (Table G-9). This is approximately 3,400 AFY, or 25%, lower than the historical average annual recharge rate to the MGB.

Similar to historical conditions, largest sources of groundwater recharge to the MGB were creek recharge and precipitation recharge. Combined, these two sources recharge the MGB at an average rate of 9,800 AFY, providing over 85% of the total recharge to the MGB. Because water years 2014 through 2019 were drier than the long-term average, precipitation recharge and creek recharge were approximately 1,300 and 1,800 AFY lower than the historical recharge rates, respectively (Table G-9 and Table G-2).

The decline in surface water supplies during the current conditions period led to a reduction in the average annual recharge from irrigation return flows and septic system discharges compared to historical conditions. Between water years 2015 and 2019, the MGB was recharged at an average rate of approximately 380 AFY, which is approximately 210 AFY less than historical conditions. Similarly, groundwater recharge from bedrock exchanges and interactions with adjacent basins was approximately 900 AFY of recharge to the MGB, which is approximately 220 AFY less than historical conditions (Table G-9).

Outflows from Groundwater System

Between water years 2015 and 2019, the BNM estimates that approximately 10,700 AF of groundwater discharged from the MGB annually (Table G-9). This is approximately 4,000 AFY less than historical rates and is primarily attributed to a reduction in groundwater discharges to the Pacific Ocean (Table G-9 and Table G-2). Over the 5-year current condition period, the BNM estimates that an average of approximately 4,400 AF of groundwater discharged from the MGB to the Pacific Ocean annually (Table G-9), which is approximately 2,300 AFY less than historical conditions due to historical drought conditions.

The reduction in surface water supplies under current conditions corresponds with an increase in groundwater production from the MGB. Between water years 2015 and 2019, approximately 1,400 AFY of groundwater was extracted from the MGB, which is approximately twice the historical average groundwater extraction rate (Table G-9). Groundwater extractions peaked in the water year 2017, which corresponds with the water year with the lowest surface water supply in the MGB.

Results from the BNM indicate that saturation-excess runoff and subsurface exchanges with adjacent basins and underlying consolidated rocks historically resulted in approximately 2,600 AF of groundwater losses annually (Table G-9). Of these sources, saturation-excess runoff and groundwater exchanges with underlying consolidated rocks provided the largest source of groundwater discharges.

Change in Groundwater Storage

Between water years 2015 and 2019, the BNM estimates that groundwater in storage increased at an average annual rate of approximately 500 AFY (Table G-9).

2.3.5.3 Quantification of Future Water Budget

Each GSP is required to include projected water budgets "to estimate future baseline conditions of supply, demand, and aquifer response to Plan implementation, and to identify uncertainties of these projected water budget components" (23 CCR 354.18[c][3]). To assess these future conditions, the projected water budgets are required to utilize a 50-year projection horizon that incorporates the most recent land use and population data and projected water demands and surface water availability and shall be used to evaluate the potential impacts of climate change on basin operations.

Two future scenarios were assessed using the BNM as part of this GSP preparation: a Future Baseline scenario and (a Climate Change scenario. These scenarios were developed to project groundwater conditions in the MGB based on anticipated total water supplies, demands, and climatological uncertainties. Projects were not simulated in either the Future Baseline or Climate Change scenario because available data indicates that the MGB is not currently experiencing undesirable results (Chapter 3). The assumptions used to develop each scenario are described below, in Section 2.3.5.3.1.

2.3.5.3.1 Projected Water Budget Assumptions

Simulated Climate Conditions

Future groundwater conditions in the MGB were simulated using the hydrologic record measured from October 1, 1969, through September 30, 2019 (e.g., water years 1970 through 2019). This period of the hydrologic record is the same as that assessed during the historical and current condition periods (Sections 2.3.5.1 and 2.3.5.2) and represents long-term average conditions in the basin. Over this 50-year period from 1970 to 2019, the MGB received an average of approximately 16.2 inches of precipitation annually,[29] and the daily minimum and maximum temperatures averaged 51ºF and 71ºF, respectively. For the Future Baseline simulation, daily measurements of precipitation, minimum temperature, and maximum temperature were used to simulate climate for the water year 2020 to 2069 period.

To simulate the effects of climate change in the Climate Change scenario, DWR's 2070 central tendency climate change factors were applied to the 1970–2019 precipitation and temperature measurements. These change factors are monthly precipitation and ET adjustment factors that represent the average simulated effects of climate change based on 20 different global climate projections (DWR 2018b). Application of DWR's 2070 central tendency change factors to the 1970–2019 measured hydrology resulted in an average increase of approximately 0.3 inches of rain to the MGB annually and caused minimum and maximum temperatures to increase, on average, 5°F. This results in a slightly wetter but warmer climate simulated in the Climate Change scenario compared to the Future Baseline scenario.

Land Use, Community Buildout

Land use and population growth have remained relatively consistent since formation of MWD in 1921 (MWD 2021). Over the 5-year period from 2016 through 2020, MWD estimated that the total population within its service area, which extends beyond the MGB, increased by approximately 150 persons (MWD 2020). This is approximately equal to a 0.25% increase in population growth annually.

As a conservative estimate of population growth for water demand forecasting, MWD assumed that future growth within its service area would occur at a rate of 0.4% annually (MWD 2021). As stated in the 2020 UWMP, this assumes that 420 of the 500 buildable lots remaining in MWD's service area are used for single-family and multifamily residences. Population growth is anticipated to result in an average annual increase in water demand of approximately 0.5% (MWD 2021). MWD anticipates being able to meet these water demands during normal water years (MWD 2021).

[29] Based on data measured at National Oceanic and Atmospheric Administration climate station located in Santa Barbara (Station ID: GHCND: USC00047902)

These estimates of increasing water demand due to projected community buildout are incorporated into the simulated groundwater production rates simulated in both future scenarios (e.g., see Simulated Water Demands – Groundwater Demands).

Simulated Water Demands

Surface Water Availability and Demands

As part of their 2020 UWMP, MWD projected the anticipated surface water supply availability as part of a Drought Reliability Assessment. This assessment provided estimates of surface water supply availability during a 5-year drought period that ranged from approximately 3,500 to 5,100 AFY. During the recent drought encountered between water years 2011 and 2019, surface water supplies to MWD ranged between approximately 5,900 AF in water year 2012 to approximately 2,900 AF in water year 2017 (Tables G-7 and G-8). These ranges of surface water supplies are similar to those projected to be available during the 5-year Drought Reliability Assessment prepared by MWD.

To provide a conservative estimate of surface water availability throughout the 50-year GSP planning and implementation horizon, it was assumed that approximately 3,300 AFY of surface water supplies would be imported by MWD and served within the boundaries of the MGB for both the Future Baseline and Climate Change scenarios. This is at the low-end of the anticipated surface water availability (MWD 2020) but is equal to the average surface water supplies available to the MGB during the period from water year 2015 to water year 2019 (Table G-8).

Groundwater Demands

Future groundwater production rates in both future scenarios were based on the average 2015–2019 groundwater production from the MGB. Groundwater extractions by MWD, the sole municipal water provider in the MGB, were increased at a rate 0.5% annually to reflect the anticipated increase in water demands within the MGB (MWD 2020). This results in a maximum extraction rate by MWD of approximately 650 AF in water year 2069, which falls within the historical annual extraction rates utilized by MWD (Tables G-2 and G-9).

For the Future Baseline scenario, groundwater production via private wells were held constant at the 2015–2019 average annual groundwater extraction rate. These rates were held constant throughout the simulation because private well production is not anticipated to be affected by increasing demands that result from future community buildout. The average 2015–2019 extraction rate is approximately 45% higher than the historical average and reflects the recent increase in new groundwater well construction and utilization in the MGB (Tables G-2 and G-9).

To account for the increasing ET demands in the Climate Change scenario, groundwater production rates were adjusted using DWR's 2070 central tendency ET change factors. These change factors were applied differentially depending on well use type, according to the following criteria:

- **Private wells:** Private wells are used within the MGB predominantly to support landscape irrigation, small water systems, and small-scale agricultural. Because the majority of the groundwater pumped from these wells supports irrigation, 100% of the monthly groundwater production from each private well was multiplied by DWR's 2070 central tendency ET change factors.
- **Non-potable MWD Wells:** MWD operates six groundwater production wells that extract groundwater for the MGB to support irrigation. Groundwater pumped from these wells is not used as a source of potable water

supply. Accordingly, 100% of the monthly groundwater production from each non-potable MWD-operated well was adjusted by DWR's 2070 central tendency ET change factors.

- **Potable MWD Wells:** MWD operates six groundwater production wells that supplement potable water supplies. Groundwater pumped from these wells is blended with MWD's surface water supplies and delivered throughout the MGB via MWD's potable water distribution network. MWD estimates that approximately 78% of the water served through their potable water distribution network is used outdoors to support landscape irrigation. Based on this data, 78% of the monthly pumping from all MWD-operated potable groundwater wells was adjusted by DWR's 2070 central tendency ET change factors.

The application of DWR's 2070 central tendency ET change factors to pumping in the Climate Change scenario, as described above, resulted in an approximately 7% increase in the average annual future groundwater production rate from the MGB compared to the Future Baseline scenario.

2.3.5.3.2 Future Baseline Scenario

This section describes projected water budgets from the BNM for the Future Baseline scenario. Individual water budget components are described in terms of annual average water budget components in units of AF or AFY. The assumptions used to develop this scenario are described in Section 2.3.5.3.1.

Inflows to Groundwater System

Between water years 2020 and 2069, the BNM estimates that groundwater in the MGB will be recharged at an average rate of approximately 14,500 AFY (Table G-11). This is approximately equal to the historical average annual recharge rate to the MGB (Table G-13). Similar to historical conditions, the largest sources of groundwater recharge to the MGB were creek recharge and precipitation recharge. Combined, these two sources are estimated to recharge the MGB at an average rate of 12,800 AFY, providing approximately 90% of the total recharge to the MGB.

Similar to precipitation recharge and creek recharge, inflows from mountain front recharge, bedrock recharge, return flows, and the surrounding groundwater basin are projected to be approximately equal to historical conditions (Table G-13).

Outflows from Groundwater System

Between water years 2020 and 2069, the BNM estimates that approximately 14,500 AF of groundwater will be discharged from the MGB annually (Table G-11). This is approximately 300 AFY less than the historical average groundwater discharge rate (Table G-13). Over the 50-year projection horizon, the BNM estimates that approximately 6,000 AFY of groundwater will discharge to the Pacific Ocean, which is approximately 700 AFY lower than the historical average discharge rate (Table G-13). The 700 AFY reduction in groundwater discharges to the Pacific Ocean is due to the approximately 700 AFY projected increase in groundwater production compared to the historical period (Table G-13). Underflows with the adjacent Carpinteria and Santa Barbara Basins are estimated to be similar to historical conditions (Table G-13), which suggests that anticipated future demands in the MGB are not likely to adversely affect the ability of an adjacent basin to achieve and/or maintain sustainability (23 CCR 350.4).

Results from the BNM indicate that saturation-excess runoff and subsurface exchanges with adjacent basins and underlying consolidated rocks historically resulted in approximately 3,800 AF of groundwater losses annually (Table G-2). Of these sources, saturation-excess runoff and groundwater exchanges with underlying consolidated rocks

provided the largest source of groundwater discharges. These discharge rates and sources are similar to the historical period (Table G-13).

Change in Groundwater Storage

Under the Future Baseline conditions, the BNM estimates that groundwater in storage will increase at an average rate of approximately 35 AFY (Table G-11). This is within the uncertainty of the numerical model. Therefore, it is anticipated that groundwater in storage will remain stable in the MGB throughout the 50-year implementation horizon (Figure 2-39, Historical, Current, and Projected Change in Groundwater in Storage [WY 1970-2069] in the MGB).

2.3.5.3.3 Climate Change Scenario

This section describes projected water budgets from the BNM for the Climate Change scenario. Individual water budget components are described in terms of annual average water budget components in units of AF or AFY. The assumptions used to develop this scenario are described in Section 2.3.5.3.1.

Inflows to Groundwater System

Between water years 2020 and 2069, the BNM estimates that groundwater in the MGB will be recharged at an average rate of approximately 14,300 AFY (Table G-11). This is approximately 300 AFY less than the historical average, which largely reflects the reduction of creek recharge in the MGB (Table G-13). Under the simulated Climate Change scenario, the largest sources of groundwater recharge to the MGB remain creek recharge and precipitation recharge. Combined, these two sources are estimated to recharge the MGB at an average rate of 12,800 AFY, providing approximately 90% of the total recharge to the MGB.

Precipitation recharge and creek recharge, inflows from mountain front recharge, bedrock recharge, return flows, and the surrounding groundwater basin are projected to be approximately equal to historical conditions (Table G-13).

Outflows from Groundwater System

Between water years 2020 and 2069, the BNM estimates that approximately 14,300 AF of groundwater will be discharged from the MGB annually (Table G-11). This is approximately 500 AFY less than the historical average groundwater discharge rate (Table G-13). The lower-than-historical discharge rate is partially attributable to the lower-than-average recharge rates that result from the warmer climate projected across the MGB. Throughout this period, groundwater production from the MGB is estimated to average approximately 1,600 AFY, which is approximately 900 AFY, or 125%, higher than the estimated historical production rate in the MGB (Table G-13).

Under the projected Climate Change scenario, the BNM estimates that approximately 5,800 AFY of groundwater will discharge to the Pacific Ocean, which is approximately 800 AFY lower than the historical average discharge rate (Table G-13). The 800 AFY reduction in groundwater discharges to the Pacific Ocean is largely due to the increase in groundwater production compared to the historical period (Table G-13). Like the Future Baseline scenario, underflows with the adjacent Carpinteria and Santa Barbara Basins are estimated to be similar to historical conditions (Table G-13). The similarity in subsurface exchanges with adjacent basins suggests the effects of climate change in the MGB are not likely to adversely affect the ability of an adjacent basin to achieve and/or maintain sustainability (23 CCR 350.4).

Results from the BNM indicate that saturation-excess runoff and subsurface exchanges with adjacent basins and underlying consolidated rocks historically resulted in approximately 3,700 AF of groundwater losses annually (Table G-9). Of these sources, saturation-excess runoff and groundwater exchanges with underlying consolidated rocks provided the largest source of groundwater discharges. These discharge rates and sources are similar to the historical period (Table G-13).

Change in Groundwater Storage

Under the Future Baseline conditions, the BNM estimates that groundwater in storage will increase at an average rate of approximately 38 AFY (Table G-11). This is within the uncertainty of the numerical model. Therefore, it is anticipated that groundwater in storage will remain stable in the MGB throughout the 50-year implementation horizon. The similarity in simulated change in storage between the Future Baseline and Climate Change scenarios indicate that, under the simulated conditions, the MGB is not anticipated to experience overdraft conditions regardless of the climate conditions encountered in the MGB (Figure 2-39).

2.3.6 Discussion of Model Calibration and Uncertainties

The BNM was calibrated using groundwater elevation measurements collected at 25 wells across the MGB (model documentation forthcoming). Calibration wells were selected based on their construction information, record of measurement, and confidence in historical measurement accuracy. Proper usage of the BNM is largely informed by the model's ability to reproduce historical groundwater levels at these 25 wells. For the period from 1970 through 2019, the normalized model error[30] is approximately 6%. A common modeling guideline for assessing model calibration is that the normalized model error should be less than 10% (e.g., SWRCB 2021). The 6% normalized model error indicates that the BNM provides sufficient description of the MGB's response to pumping, climate, and interactions with the surrounding environments. However, because the simulated water levels are influenced by the representation of uncertain model inputs, the resulting estimates of water budgets, sustainable yield, and sustainable management criteria are inherently uncertain.

To assess the influence of model input uncertainty on model predictions, a global sensitivity analysis of the BNM was performed by generating 1,250 random realizations of the original calibrated model and post-processing results from these model runs to characterize the fraction of predictive uncertainty attributable to key model inputs. This analysis focused on quantifying the influence of modeled aquifer properties (aquifer conductivities and storage properties, streambed characteristics, etc.) on overall predictive uncertainty. Results from the global sensitivity analysis indicate that the BNM is most sensitive to hydraulic conductivity[31] and specific yield[32] values defined for Storage Unit 1 and the young alluvial deposits that follow creek channels and fan out across Storage Unit 3. These properties are well constrained by pump test data; the fact that the highest-sensitivity parameters are well constrained by measured data increases confidence in the BNM's use to develop water budgets, estimate the sustainable yield, and inform sustainable management criteria for the MGB.

Following these two parameters, the BNM is most sensitive to the estimated conductance[33] of the Arroyo Parida Fault, hydraulic conductivity of Storage Unit 2, and conductance of creek channel bottoms along Oak Creek, Montecito Creek, Romero Creek, and San Ysidro Creek. The lack of groundwater elevation measurements or pump

30 Model error is calculated using the root mean square error between measured groundwater elevations and simulated groundwater elevations extracted from the BNM. The normalized model error is calculated by dividing the root mean square error by the range in groundwater elevations measured in the MGB.

31 The aquifer's capacity to transmit groundwater.

32 The ease with which an aquifer releases groundwater.

33 The ease with which groundwater passes through a fault zone.

test data in Storage Unit 2 limits direct characterization of both the conductance of the Arroyo Parida Fault and the hydraulic conductivity of Storage Unit 2. Similarly, the lack of historical stream flow measurements in the MGB largely limits characterization of surface water–groundwater interactions across the MGB and corresponding estimates of creek bed conductance. Accordingly, these properties are identified as data gaps that would benefit from additional data acquisition throughout GSP implementation.

In addition to characterizing the fraction of model uncertainty attributable to each model input, the 1,250 random realizations were used to characterize model uncertainty associated with predictions of average annual change in storage and average annual flow across the MGB's boundary with the Pacific Ocean. Uncertainty in these estimates was quantified by calculating the mean and standard deviation of each model output across all 1,251 model realizations (e.g., the original calibrated model and the 1,250 random realizations). Analysis of uncertainty in average annual change in groundwater in storage and net flux of groundwater to the Pacific Ocean yielded confidence intervals of -130 ± 34 AFY[34] and -6,600 ± 3,100 AFY,[35] respectively. Based on this, a conservative estimate of average annual change in groundwater storage between water years 1970 and 2019 is a decline of approximately 160 AFY. Similarly, a conservative estimate of the net discharge of groundwater to the Pacific Ocean is approximately 3,500 AFY. Importantly, this conservative estimate for discharge of groundwater to the Pacific Ocean indicates that historical groundwater conditions in the MGB were not conducive to seawater intrusion.

2.3.6.1 Discussion of Simulated Drawdown

Results from the BNM indicate that the largest sources of groundwater recharge to the MGB are precipitation recharge and infiltration of surface water flows through creek beds (Section 2.3.1). Combined, these two sources have provided an average of approximately 90% of the total recharge to the MGB (Section 2.3.5.1). The model estimates of precipitation and creek recharge are based on simulation results from the watershed model module of the BNM, which is constrained with very limited data characterizing stream flows and surface water–groundwater interactions across the MGB. As a result, these components of recharge are subject to a high degree of uncertainty (Section 2.3.1).

A result of the uncalibrated surface water inflows and precipitation recharge is a bias in the simulated groundwater elevations that locally limit the BNM's ability to reproduce measured groundwater elevation declines during drought. This bias is most prevalent in the northern parts of Storage Unit 3, adjacent to the Montecito Fault. In this part of the MGB, the BNM underestimates groundwater level declines by up to approximately 60 feet (e.g., at the Ennisbrook 5 well). An assessment of the numerical model results suggest that this is likely the result of elevated stream flows entering the MGB. These modeled stream flows are extracted directly from the largely uncalibrated watershed module of the BNM.

The Montecito GSA is currently implementing a project to better characterize surface water flows in the MGB. Data from this project will inform future model updates of the BNM and will be incorporated into the numerical model during the first 5-years of GSP implementation. The Montecito GSA plans to reassess the estimates of native recharge and influence of model-predictions of drought-related groundwater elevation decline.

34 Negative value denotes a decline in the volume of groundwater in storage.
35 Negative value denotes a discharge of groundwater to the Pacific Ocean.

2.3.7 Quantification of Overdraft

The GSP Emergency regulations require that the water budget "include a quantification of overdraft over a period of years during which water year and water supply conditions approximate average conditions" if the MGB is found to be experiencing overdraft (23 CCR 354.18). Groundwater overdraft is defined in DWR Bulletin 118 as follows:

> The condition of a groundwater basin in which the amount of water withdrawn by pumping exceeds the amount of water that recharges the basin over a period of years during which the water supply conditions approximate average conditions.. (DWR 2021b)

Groundwater elevation measurements and numerical model results indicate that the volume of groundwater in storage generally fluctuate in response to wet and dry climate cycles. For example, during the drought in the late 1980s through the early 1990s, groundwater elevations declined by as much as 50 to 100 feet, then recovered back to historical average conditions in response to the wet period of the mid- to late-1990s (e.g., see Wells 1-3, 1-10, 1-13, 3-8, 3-9, 3-15, etc.; Appendix E). Similar to the drought in the late 1980s through the early 1990s, groundwater elevations showed significant declines during the period from 2011 to 2016, a period where average annual precipitation was 78% of the long-term average. While groundwater elevations have stabilized below historical average levels in localized regions of the MGB near the northern extent of the MGB (e.g., Wells 1-5, 1-8, and 1-32), groundwater elevation measurements generally demonstrate that groundwater levels have recovered in response to the above normal and wet water years of 2017 and 2019 (e.g., Wells 1-3, 1-11, 1-18, 3-2, 3-12a, 3-26; Appendix E). This recovery is reflected in the numerical model results from the BNM, which indicates that groundwater in storage has declined at an average rate of approximately 70 AFY between 1970 and 2019, which is close to the range of predictive uncertainty in the BNM (Section 2.3.6, Discussion of Model Calibration and Uncertainties).

2.3.8 Estimate of Sustainable Yield

Title 23, Section 354.18, of the CCR requires that each GSP develop an estimate of the sustainable yield using information and data presented in the water budget for the MGB. SGMA legislation defines the sustainable yield as the "maximum quantity of water, calculated over a base period representative of long-term conditions in the basin and including any temporary surplus, that can be withdrawn annually from groundwater supply without causing undesirable results" (CWC Section 10721). Undesirable results are defined under the SGMA as significant and unreasonable impacts to six different indicators:

- Chronic lowering of groundwater levels
- Reduction of groundwater in storage
- Degradation of water quality
- Land subsidence
- Depletion of interconnected surface water
- Seawater intrusion

Each of these sustainability indicators is applicable to the MGB and will be monitored through implementation of this GSP (see Chapter 3 for discussion). However, as noted in Sections 2.2.4.4, 2.2.4.6, and 2.2.4.7, data gaps exist in the MGB that limit quantitative characterization of the extent to which groundwater usage in the MGB impacts water quality degradation and depletion of interconnected surface waters. These data gaps are currently being reduced through grant-funded projects and re-evaluation of the Montecito GSA's monitoring network and

schedule. Because the historical relationship between these two indicators and groundwater pumping is not well defined, the historical and current condition water budgets extracted from the BNM were used to develop an estimate of the safe yield of the MGB, which is defined as "the maximum quantity of water which can be withdrawn annually from groundwater supply without causing a gradual lowering of groundwater levels resulting in the eventual depletion of supply" (EDF and New Current 2018).

Groundwater usage in the MGB is estimated to have increased throughout the historical period from approximately 300 AF in 1970 to a maximum of approximately 1,700 AFY in 2016. Over the 10-year period from 2010 through 2019, groundwater usage showed response to local climate conditions but is more reflective of anticipated usage in the MGB. This 10-year period of the climate record includes dry, normal, and above normal water years (Tables G-2 and G-9) and was, therefore, used as the base period for calculation of the historical safe yield of the MGB.

During the 2010–2019 period, groundwater production from the MGB averaged approximately 1,250 AFY. Over this same period, the BNM estimates that groundwater in storage increased by approximately 60 AFY. Adding these two values together leads to an estimate of safe yield for the MGB of approximately 1,310 AFY. Based on the historical data presented in this chapter, this estimate of historical safe yield is also protective of seawater intrusion to the MGB.

2.3.8.1 Estimate of Future Sustainable Yield

The BNM was used to project groundwater conditions in the MGB through water year 2069 (Section 2.3.5.3). Under the Climate Change scenario, groundwater production in the MGB is estimated to average approximately 1,600 AFY, which is higher than historical production and reflects anticipated community buildout and increasing irrigation demands that result from climate change. Despite the higher-than-historical groundwater production rates, results from the Climate Change scenario indicate that undesirable results are not anticipated to occur when groundwater is produced from the MGB at 1,600 AFY (see discussion in Chapter 3). Because of this, the future sustainable yield of the MGB is estimated to be approximately 1,600 AFY. The fact that the future sustainable yield is higher than the historical safe yield reflects the fact that the BNM predicts that large volumes of groundwater discharge to the Pacific Ocean annually and the fact that climate change is anticipated to lead to an increase in average annual precipitation in the MGB.

As noted in Section 2.3.6, the numerical model results are subject to uncertainty due to model-generated estimates of precipitation recharge and creek flows. These uncertainties are reflected not only in the model estimates of surface water–groundwater interactions, but also in the annual rate of groundwater discharges to the Pacific Ocean. The Montecito GSA is currently implementing projects to reduce data gaps associated with these model estimates and plans to incorporate these data into future model revisions. Accordingly, the model-estimated future sustainable yield will be re-evaluated as the BNM is revised to incorporate these data and as part of the periodic GSP evaluations.

2.3.9 Surface Water Available for Groundwater Recharge or In-Lieu Use

MWD has initiated several programs and feasibility studies for the purpose of planning for long-term reliability and diversity of water supplies. Existing water supplies in the MGB are described in Section 2.1.3.3, Urban Water Management Plan. In addition to the water supplies described in Section 2.1.3.3, the Montecito GSA is evaluating opportunities to utilize and deliver recycled water in-lieu of groundwater production. Additional water may be

available through SWP water and Northern California programs and local reservoir operations modification (Bachman 2007).

MWD's diverse water supply portfolio, which includes local surface water, imported water, desalination water, and local groundwater, is anticipated to provide sufficient supply to satisfy demands in normal and single dry-year conditions (MWD 2021). The projected water supplies and demands were incorporated into the future scenarios and estimates of future groundwater demands on the MGB (Section 2.3.5.3). Groundwater demands may vary in the future in response to recycled water availability. The effects of these new water supplies on groundwater demands and corresponding groundwater conditions will be evaluated throughout GSP implementation as projects develop in the MGB.

2.3.9.1 Recycled Water

MWD commissioned studies for the use of recycled water (Woodard & Curran 2018; Carollo 2022) and the potential to augment groundwater supplies using such water (GSI 2020). Recycled water sources considered were the Montecito Sanitary District, the City of Santa Barbara, and the Summerland Sanitary District. Non-potable, indirect potable, and direct potable reuse alternatives were considered. The indirect potable reuse scenarios considered were all for groundwater augmentation using aquifer storage and recovery wells. Two areas of the MGB in Storage Unit 1 and Storage Unit 3 were determined to have potential for low injection rates during drought conditions when water levels are low (approximately 35 AFY and 75 AFY, respectively). However, the cost, uncertainty, and low yield of such a project suggest a low feasibility. Direct potable reuse options were evaluated but were considered to be infeasible due to the current absence of regulations and potential high costs. Non-potable reuse projects for irrigation of cemeteries and golf courses were the preferred alternatives, yielding up to about 450 AFY (Woodard & Curran 2018).

In 2022, Carollo Engineers (Carollo) completed the Enhanced Recycled Water Feasibility Study (Carollo 2022). The study performed a detailed analysis of four potential recycled water projects including one non potable reuse project and three potable reuse projects. The study established the top ranked project as a regional indirect potable reuse project involving advanced purification of treated wastewater at the Montecito Sanitary District and its injection into the Carpinteria Groundwater Basin for short-term storage before use. The next steps suggested in the study include groundwater modeling, environmental review and preliminary (30%) design. Attached to the study are nine technical memoranda that inform the study and its conclusion.

The Montecito GSA plans to perform a complete environmental review and prepare a preliminary (30%) design of this indirect potable reuse project as part of early GSP implementation (Section 4.2.4, Develop/Implement Recharge Projects). As part of this early-design phase, the Montecito GSA anticipates evaluating near-term and long-term benefits to groundwater storage and demands in the MGB. Because this project is in early-design and conceptualization phases, the potential impacts were not incorporated in the future scenarios developed for this GSP. As the project is further developed, future model and GSP evaluations will incorporate project details and benefits, as appropriate, into characterization of future groundwater demands and sustainable yield.

2.3.9.2 Ocean Desalination

MWD has a 50-year water supply agreement with the City of Santa Barbara that will provide MWD with 1,430 AFY of potable water irrespective of hydrologic conditions. This agreement is made possible by the City's operation of its Charles E. Meyer Desalination Plant (Section 2.1.3.3). Water deliveries in accordance with this agreement began in January 2022.

2.3.9.3 Imported Water

Supplemental Water Purchases

MWD has historically leveraged SWP infrastructure to compensate for reduced water supplies during drought conditions. Supplemental water may be purchased from other state water contractors (MWD 2017). This allows the flexibility for MWD to supplement local supplies when needed and return water when a surplus exists. However, in accordance with their goal of reducing reliance on SWP water, MWD has no plans to leverage supplemental water purchases in the future.

Groundwater Banking Programs

Additional imported water supply flexibility is afforded by opportunities to take and store water from groundwater banking programs throughout the state. Such programs typically require the recovery of less water than was initially banked to account for losses and compensation. MWD has historically banked groundwater with the Dudley Ridge Water District and has been a partner in the Semitropic Water Storage District Groundwater Banking Program since 2017. The program allows MWD 4,500 AF of storage with guaranteed recovery of 1,500 AFY, with a 10% leave-behind. As of the beginning of 2019, MWD had banked 900 AF with the Semitropic Water Storage District Groundwater Banking Program and planned to bank at least 1,000 AF for the year (MWD 2019).

2.4 MANAGEMENT AREAS

The Montecito GSA intends to manage the MGB as a whole and, therefore, has not defined specific management areas as part of this GSP. The need to develop management areas and manage the MGB on a more localized basis will be re-evaluated throughout GSP implementation.

2.5 REFERENCES CITED

Baca, B.R. 1992. *Groundwater Thresholds Manual for Environmental Review of Water Resources in Santa Barbara County*. County of Santa Barbara, Resource Management Department. Revised and updated August 20, 1992.

Bachman, S. 2007. *Montecito Water District Future Water Demand and Water Supply Options*. March 2007.

Borchers, J.W., and M. Carpenter. 2014. *Land Subsidence from Groundwater Use in California*. Summary Report. Prepared by Luhdorff & Scalmanini Consulting Engineers with support from the California Water Foundation. April 2014.

CalGEM (California Geologic Energy Management Division). 2023. "Well Finder" [online mapping application]. California Department of Conservation. https://www.conservation.ca.gov/calgem/Pages/WellFinder.aspx.

Carollo Engineers (Carollo). 2022. *Montecito Sanitary District & Montecito Water District Enhanced Recycled Water Feasibility Analysis, Executive Summary.* Draft Final. November 2022.

CCRB (Cachuma Conservation and Release Board). 2020. "About Us." Accessed May 3, 2020. https://www.ccrb-board.org/.

CCWA (Central Coast Water Authority). 2017. *2015 Urban Water Management Plan and Errata Sheet for Minor Corrections to the Central Coast Water Authority 2015 Urban Water Management Plan (UWMP).* December 21, 2017. https://ccwa.specialdistrict.org/files/6a6a228bd/2015-CCWA-UWMP.pdf.

CCWA. 2020. *FY 2020-21 Budget*. April 2020. https://www.ccwa.com/files/bc5f3acce/FY2020-21Budget.pdf.

Central Coast RWQCB (California Regional Water Quality Control Board – Central Coast Region). 2019. *Water Quality Control Plan for the Central Coastal Basin*. State Water Resources Control Board. June 2019.

CGS (California Geologic Survey). 2002. "California Geomorphic Provinces Note 36." Revised December 2002.

CIMIS (California Irrigation Management Information System). 1999. "Reference Evapotranspiration Zones" [map]. https://cimis.water.ca.gov/Content/pdf/CimisRefEvapZones.pdf.

CIMIS. 2019. CIMIS Station Reports. Accessed October 2019. https://cimis.water.ca.gov/WSNReportCriteria.aspx.

COMB (Cachuma Operations and Maintenance Board). 2019. "History." Accessed July 23, 2019. https://www.cachuma-board.org/.

County of Santa Barbara. 1995. *Montecito Community Plan Update*. County of Santa Barbara, Resource Management Department. September 15, 1992; text updated through December 1995.

County of Santa Barbara. 2004. *Toro Canyon Plan*. County of Santa Barbara, Planning and Development, Comprehensive Planning Division. December 2004.

County of Santa Barbara. 2009a. "Conservation Element: Groundwater Resources Section." In *Santa Barbara County Comprehensive Plan*. Adopted 1994; republished May 2009.

County of Santa Barbara. 2009b. "Environmental Resource Management Element (ERME)." In *Santa Barbara County Comprehensive Plan*. Adopted 1980; republished May 2009.

County of Santa Barbara. 2010. "Conservation Element." In *Santa Barbara County Comprehensive Plan*. Adopted 1979, amended August 2010.

County of Santa Barbara. 2012. *Santa Barbara County 2011 Groundwater Report*. County of Santa Barbara, Public Works Department, Water Resources Division, Water Agency. May 1, 2012.

County of Santa Barbara. 2014. *Summerland Community Plan*. County of Santa Barbara, Planning and Development Department, Long Range Planning Division. Adopted May 2014; certified by the California Coastal Commission June 9, 2016.

County of Santa Barbara. 2015a. *Long Term Supplemental Water Supply Alternatives Report*. Prepared by RMC in association with Water Systems Consulting Inc. December 2015.

County of Santa Barbara. 2015b. *Onsite Wastewater Treatment Systems, Local Agency Management Program*. County of Santa Barbara, Public Health Department, Environmental Health Services. Published 2014; revised July 21, 2015.

County of Santa Barbara. 2018. *Environmental Thresholds and Guidelines Manual*. County of Santa Barbara, Planning and Development Department. March 2018.

County of Santa Barbara. 2019a. "Daily & Monthly Rainfall." https://www.countyofsb.org/3407/Daily-Monthly-Rainfall.

County of Santa Barbara. 2019b. *Santa Barbara County Integrated Regional Water Management Plan*. Prepared by Dudek. Santa Barbara, California: Dudek. July 2019.

County of Santa Barbara. 2019c. Land Use Designation Geographic Information System Dataset. Accessed October 2019. https://www.arcgis.com/home/webmap/viewer.html?webmap=fa3545a29dac49aeacc81669b956e3e5&extent=-120.9142,34.093,-118.9408,35.4355.

County of Santa Barbara. 2019d. *Coastal Land Use Plan*. County of Santa Barbara, Planning and Development Department. Adopted 1982; republished June 2019.

CSLC (California State Lands Commission). 2011. "Summerland Oil Field." PowerPoint Presentation by S. Curran. September 1, 2011. http://slc.ca.gov/Meeting_Summaries/2011_Documents/09-01-11/Items_and_Exhibits/87ExhA.pdf.

DPW (California Department of Public Works). 1933. *Ventura County Investigation*. Division of Water Resources, Bulletin No. 46. Sacramento: California State Printing Office.

DTSC (Department of Toxic Substances Control). 2023. "EnviroStor" [database]. https://www.envirostor.dtsc.ca.gov/.

Dudek. 2015a. *Montecito Groundwater Basin Recharge Feasibility Study*. Prepared for Heal the Ocean, Montecito Water District, and Montecito Sanitary District. September 2015.

Dudek. 2015b. *Water Well Aquifer Study.* Prepared for the City of San Clemente. July 2015

Dudek. 2017. *Independent Analysis of the Montecito Groundwater Basin Prioritization*. June 2017.

DWR (California Department of Water Resources). 1981. *Water Well Standards*. State of California, Bulletin 74-81. December 1981.

DWR. 1991. *California Well Standards*. Bulletin 74-90 (Supplement to Bulletin 74-81). June 1991.

DWR. 1999. *Evaluation of Groundwater Overdraft in the Southern Central Coast Region, Part 2*. Technical Information Record SD-99-2. November 1999

DWR. 2004. "Groundwater Basin Description for the Montecito Groundwater Basin." *California's Groundwater*. DWR Bulletin 118. Updated February 27, 2004. https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Bulletin-118/Files/2003-Basin-Descriptions/3_049_Montecito.pdf.

DWR. 2014. *Summary of Recent, Historical, and Estimate Potential for Future Land Subsidence in California*.

DWR. 2015. *California Climate Science and Data for Water Resources Management*. June 2015.

DWR. 2016. *Best Management Practices for the Sustainable Management of Groundwater–Water Budget BMP*. December 2016.

DWR. 2018a. *Guidance Document for Groundwater Sustainability Plan – Stakeholder Communication and Engagement*. January 2018.

DWR. 2018b. *Guidance Document for the Sustainable Management of Groundwater: Guidance for Climate Change Data Use During Groundwater Sustainability Plan Development*. July 2018.

DWR. 2019. "Notices to State Water Project Contractors 2019." https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/State-Water-Project/Management/SWP-Water-Contractors/Files/NTC_2019_022221.pdf.

DWR. 2020a. *Sustainable Groundwater Management Act 2019 Basin Prioritization, Process and Results*. May 2020.

DWR. 2020b. DWR SGMA Data Viewer–Boundaries, Bulletin 118 Groundwater Basins (2018). Accessed March 24, 2020. https://sgma.water.ca.gov/webgis/?appid=SGMADataViewer#boundaries.

DWR. 2020c. Disadvantaged Communities Mapping Tool. https://gis.water.ca.gov/app/dacs/.

DWR. 2020d. DWR SGMA Data Viewer–Land Subsidence, Land Subsidence Layers and TRE Altamira Displacement Point Data. Accessed April 23, 2020. https://sgma.water.ca.gov/webgis/?appid=SGMADataViewer#landsub.

DWR. 2020e. NC Dataset Viewer—Natural Communities Commonly Associated with Groundwater (NCCAG) Dataset. Accessed September 2020. https://gis.water.ca.gov/app/NCDatasetViewer/#.

DWR. 2021a. "Agricultural Water Use Data 2006-2010" [dataset]. https://data.cnra.ca.gov/dataset/3b6df6f6-a13b-4d22-b60b-f4fd29f79b22?.

DWR. 2021b. "Appendix B. Glossary." In *California's Groundwater Update 2020.* Bulletin 118. November 2021. https://data.cnra.ca.gov/dataset/calgw_update2020/resource/84e2f12d-43e8-4c12-8ad7-a14c4f9c5652.

DWR. 2023. "State Water Project, Historical Table A Allocations, Water Years 1996-2023." April 20, 2023.

EDF and New Current (Environmental Defense Fund and New Current Water and Land LLC). 2018. *Groundwater Pumping Allocations under California's Sustainable Management Act: Considerations for Groundwater Sustainability Agencies*. July 2018.

Gardner, A.M., C.G. Morton, J.L. Huntington, R.G. Niswonger, and W.R. Henson. 2018. "Input Data Processing for the Integrated Hydrologic Model GSFLOW." *Environmental Modelling and Software.* https://doi.org/10.1016/j.envsoft.2018.07.020.

GSI (GSI Water Solutions). 2020. *Groundwater Augmentation Feasibility Analysis for the Montecito Groundwater Basin*. January 2020.

GTC (Geotechnical Consultants Inc.). 1974. *Hydrogeologic Investigation of the Montecito Ground Water Basins, County of Santa Barbara, California*. Prepared for Montecito Water District. Burbank, California. January 1974.

Harden, D. 2004. *California Geology*. 2nd ed. Upper Saddle River, New Jersey: Pearson Prentice Hall.

Henson, W.R., R.L. Medina, C.J. Meyers, R.G. Niswonger, and R.S. Regan. 2013. "CRT - Cascade Routing Tool to Define and Visualize Flow Paths for Grid-based Watershed Models." U.S. Geological Survey Techniques and Methods 6-D2.

Hoover, M.F. 1979. "Delineation of Montecito Basin Evaluation of Recharge to Basin from Consolidated Rocks, Montecito Water District." April 18, 1979.

Hoover, M.F. 1980a. *Safe Yield Evaluation of the Montecito Basin and Toro Canyon Area for the Montecito Water District*. March 21, 1980.

Hoover, M.F. 1980b. "Hydrogeologic Summary of the Carpinteria, Montecito, and Santa Barbara Water District Service Areas for Santa Barbara Regional Water Reclamation Study (Appendix D–CH2M Hill Project Report)." March 19, 1980.

Jones, B., A. Vengosh, E. Rosenthal, and Y. Yechieli. 1991. "Geochemical Investigations." In *Seawater Intrusion in Coastal Aquifers*, 51. Dordrecht, Netherlands: Kluwer Academic Publishers.

Klausmeyer, K.R., T. Biswas, M.M. Rohde, F. Schuetzenmeister, N. Rindlaub, I. Housman, and J.K. Howard. 2019. "GDE Pulse: Taking the Pulse of Groundwater Dependent Ecosystems with Satellite Data." https://gde.codefornature.org.

Korfali, S.I., and M. Jurdi. 2010. "Deterioration of Coastal Water Aquifers: Causes and Impacts." *European Water* 29: 3–10.

Loaiciga, H.A. 2015. *Geotechnical/Hydrologic Evaluation of Three Proposed Groundwater Wells in the Coastal Sub-Basin (Storage Unit 3) of the Montecito Groundwater Basin Santa Barbara County, California*. November 1, 2015.

Muir, K.S. 1968. *Ground-Water Reconnaissance of the Santa Barbara–Montecito Area, Santa Barbara County, California*. Geological Survey Water-Supply Paper 1859-A. Prepared in cooperation with the Santa Barbara County Water Agency.

MWD (Montecito Water District). 1998. *Groundwater Basin Management Plan for the Montecito Water District*. November 1998.

MWD. 2005. *Montecito Water District Water Supply Optimization Plan*. Prepared by S. Bachman and J. Ahlroth. June 2005.

MWD. 2007. *Montecito Water District Future Water Demand and Water Supply Options*. Prepared by S. Bachman. March 2007.

MWD. 2017. *Urban Water Management Plan 2015 Update*. Prepared by Michael Baker International. Adopted May 16, 2017.

MWD. 2018. *Groundwater Elevation Monitoring Plan for Montecito Groundwater Basin #3-49*. March 12, 2018.

MWD. 2019. *Montecito Water District Memorandum–Quarterly Drought and Water Supply Update*. July 23, 2019.

MWD. 2021. *Final 2020 Urban Water Management Plan*. Prepared by Zanjero and Tully & Young. June 2021.

NOAA (National Oceanic and Atmospheric Administration). 2019. NCEI GIS Mapping [database]. Accessed October 2019. https://www.ncei.noaa.gov/maps/daily-summaries/.

Pierce, D.W., J.F. Kalansky, and D.R. Cayan. 2018. *Climate, Drought, and Sea Level Rise Scenarios for California's Fourth Climate Change Assessment*. Technical Report CCCA4-CEC-2018-006. California Energy Commission. August 2018.

Quantum Spatial Inc. 2020. *Montecito Water District, California Department of Water Resources, Landscape Area Estimates Project*. September 30, 2020.

Rohde, M.M., S. Matsumoto, J. Howard, S. Liu, L. Riege, and E.J. Remson. 2018. *Groundwater Dependent Ecosystems under the Sustainable Groundwater Management Act: Guidance for Preparing Sustainability Plans*. San Francisco: The Nature Conservancy. January 2018.

SBCGJ (Santa Barbara County Grand Jury). 2016. *Santa Barbara County Grand Jury Report, Lake Cachuma – Protecting a Valuable Resource*. Accessed July 23, 2019. https://sbcgj.org/general-information/final-reports-responses-2015-2016/.

Slade, R.C. 1984. *Hydrogeologic Assessment of Bedrock Water Well Sites within the Montecito Water District for Montecito Water District, Santa Barbara, California*. August 1984.

Slade, R.C. 1987. *Hydrogeologic Assessment Proposed Water Augmentation Measures Item No. 4–Seaward Migration of Groundwater for Montecito Water District*. August 5, 1987.

Slade, R.C. 1991. *Original Report and Addendum Hydrogeologic Assessment Determination of Groundwater in Storage within the Montecito Water District for Montecito Water District*. October 18, 1991.

Steinberg, Peter D. 2002. "Quercus agrifolia." In *Fire Effects Information System*. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory. Accessed September 2020. https://www.fs.usda.gov/database/feis/plants/tree/queagr/all.html.

SWRCB (State Water Resources Control Board). 2018. *OWTS Policy, Water Quality Control Policy for Siting, Design, Operation and Maintenance of Onsite Wastewater Treatment Systems*. Adopted June 19, 2012; updated April 2018. https://www.waterboards.ca.gov/water_issues/programs/owts/.

SWRCB. 2019a. *Water Quality Control Plan for Ocean Waters of California: California Ocean Plan*. Established 1972; revised 2019. https://www.waterboards.ca.gov/plans_policies/.

SWRCB. 2019b. "Stormwater Multiple Application and Report Tracking System (SMARTS) Resources." Accessed November 2019. https://www.waterboards.ca.gov/water_issues/programs/stormwater/smarts/.

SWRCB. 2020. Groundwater Quality Data Filtered to the Montecito Groundwater Basin. GAMA Groundwater Information System. Accessed May 2020. https://gamagroundwater.waterboards.ca.gov/gama/gamamap/public/.

SWRCB. 2023. "GeoTracker" [database]. https://geotracker.waterboards.ca.gov/.

TNC (The Nature Conservancy). 2023. California Freshwater Species Database v2. https://www.scienceforconservation.org/products/california-freshwater-species-database.

Upson, J.E. 1951. *Geology and Ground-Water Resources of the South-Coast Basins of Santa Barbara County, California*. Geological Survey Water-Supply Paper 1108.

U.S. Census Bureau. 2020. "QuickFacts: Montecito CDP, California." People per household from 2014 to 2018. Accessed June 20, 2020. https://www.census.gov/quickfacts/fact/table/montecitocdpcalifornia/HSD310218#HSD310218.

USDA (U.S. Department of Agriculture). 2020. Web Soil Survey. USDA, Natural Resources Conservation Service, Soil Survey Staff. Accessed May 1, 2020. https://websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey.aspx.

USGS (U.S. Geological Survey). 2002. *Ground-Water-Level Monitoring and the Importance of Long-Term Water-Level Data*. US Geological Survey Circular 1217. Accessed November 23, 2020. https://pubs.usgs.gov/circ/2001/circ1217/html/contents.html.

USGS. 2003. *Geohydrology, Geochemistry, and Ground-water Simulation-Optimization of the Central and West Coast Basins, Los Angeles County, California*. Prepared in cooperation with the Water Replenishment District of Southern California.

USGS. 2012. *Streamflow Depletion by Wells–Understanding and Managing the Effects of Groundwater Pumping on Streamflow*. US Geological Survey Circular 1376. Groundwater Resources Program. Reston, Virginia: USGS.

USGS. 2016. *Status of Groundwater Quality in the Santa Barbara Study Unit, 2011: California GAMA Priority Basin Project*. Scientific Investigations Report 2016-5112. Prepared in cooperation with the California State Water Resources Control Board. Reston, Virginia: USGS.

USGS. 2019. National Water Information System: Mapper. Accessed October 2019. https://maps.waterdata.usgs.gov/mapper/index.html.

USGS. 2020. "U.S. Geologic Survey Quaternary Faults Web Application." Accessed March 20, 2020. https://www.arcgis.com/apps/webappviewer/index.html?id=5a6038b3a1684561a9b0aadf88412fcf.

USGS. 2023. "StreamStats" [web application]. https://www.usgs.gov/streamstats.

Woodard & Curran. 2018. *Recycled Water Facilities Plan, Montecito Water District*. Los Angeles, California: Woodard & Curran. November 2018.

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Legend

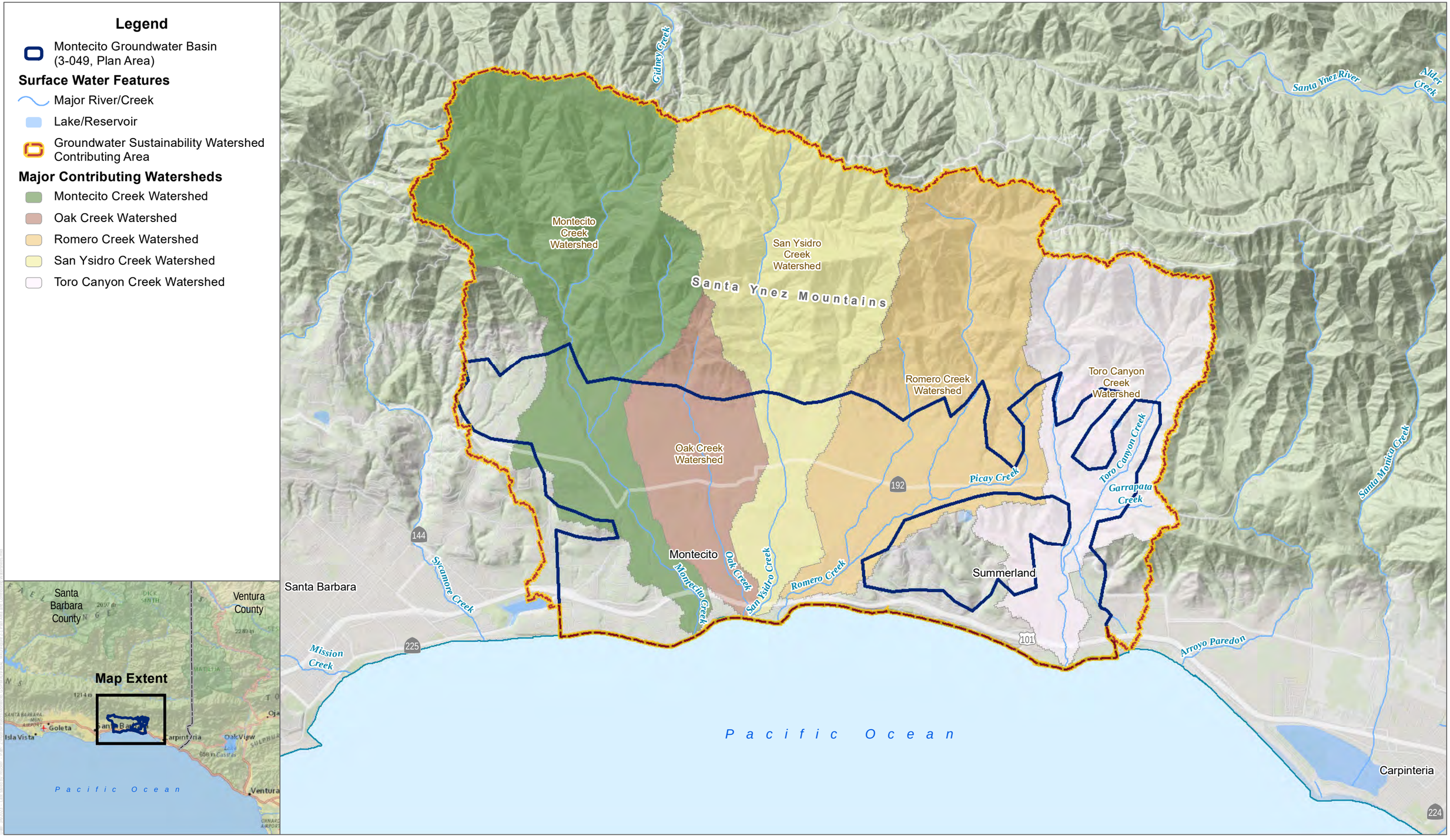
- Montecito Groundwater Basin (3-049, Plan Area)

Surface Water Features

- Major River/Creek
- Lake/Reservoir
- Groundwater Sustainability Watershed Contributing Area

Major Contributing Watersheds

- Montecito Creek Watershed
- Oak Creek Watershed
- Romero Creek Watershed
- San Ysidro Creek Watershed
- Toro Canyon Creek Watershed



DATUM: NAD 1983 DATA SOURCE: ESRI; DWR; USGS; StreamStats

DUDEK

0 1 2 Miles

FIGURE 2-1

Plan Area and Contributing Watersheds

Montecito Groundwater Basin Groundwater Sustainability Plan

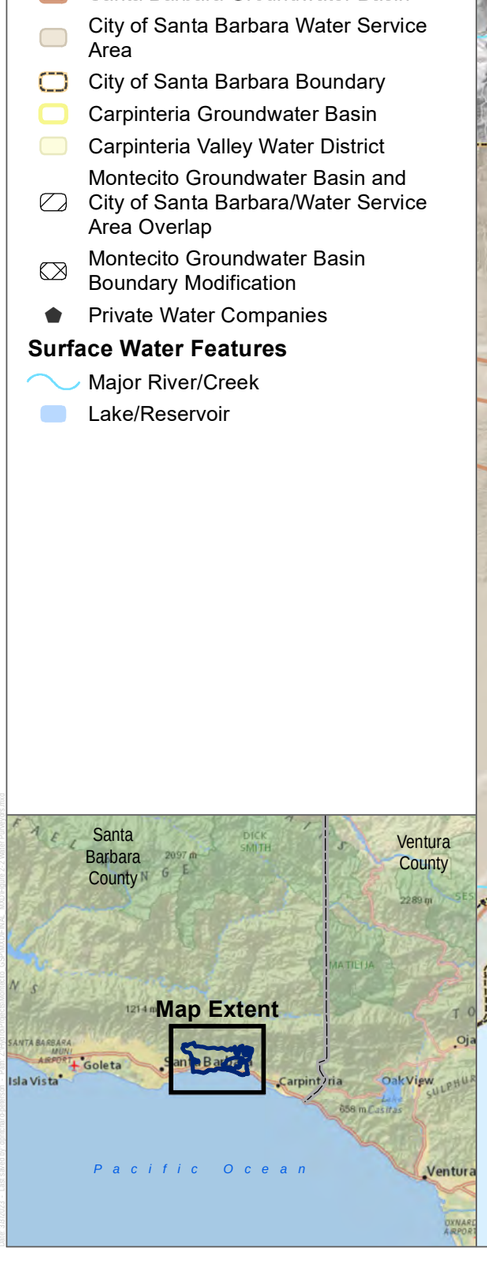
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Legend

- Montecito Groundwater Basin (3-049, Plan Area)
- Montecito Water District
- Santa Barbara Groundwater Basin
- City of Santa Barbara Water Service Area
- City of Santa Barbara Boundary
- Carpinteria Groundwater Basin
- Carpinteria Valley Water District
- Montecito Groundwater Basin and City of Santa Barbara/Water Service Area Overlap
- Montecito Groundwater Basin Boundary Modification
- Private Water Companies

Surface Water Features

- Major River/Creek
- Lake/Reservoir





DATUM: NAD 1983 DATA SOURCE: ESRI; DWR; USGS; County of Santa Barbara

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FIGURE 2-2

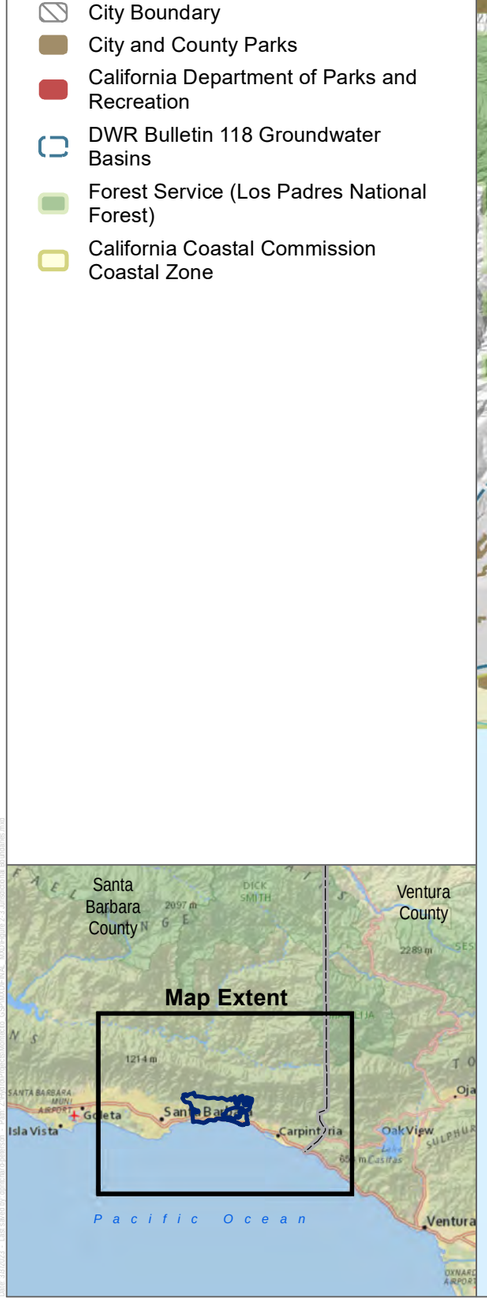
Water Purveyors within and Adjacent the Groundwater Sustainability Agency Boundary

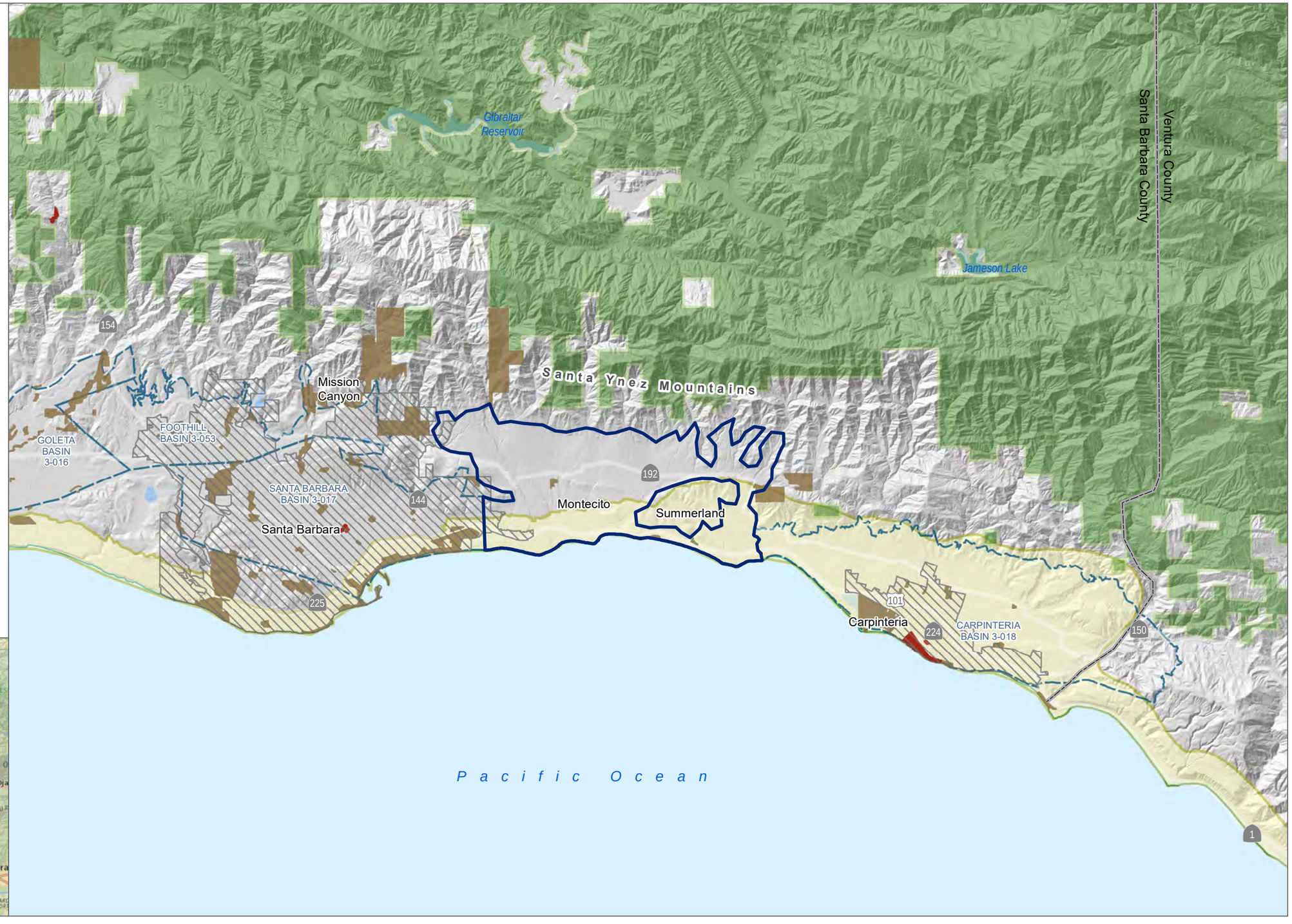
Montecito Groundwater Basin Groundwater Sustainability Plan

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Legend

- Montecito Groundwater Basin (3-049, Plan Area)
- City Boundary
- City and County Parks
- California Department of Parks and Recreation
- DWR Bulletin 118 Groundwater Basins
- Forest Service (Los Padres National Forest)
- California Coastal Commission Coastal Zone





DATUM: NAD 1983 DATA SOURCE: ESRI; DWR; USGS; County of Santa Barbara

DUDEK

0 2 4 Miles

FIGURE 2-3

Jurisdictional Boundaries

Montecito Groundwater Basin Groundwater Sustainability Plan

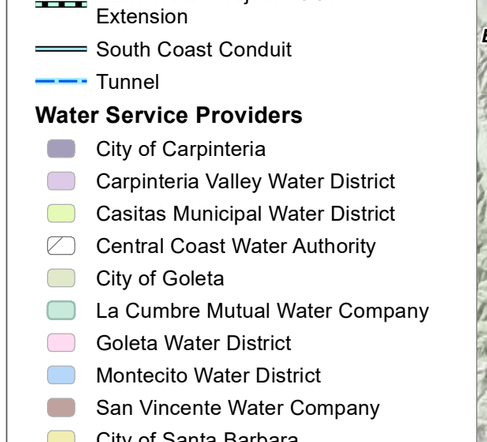
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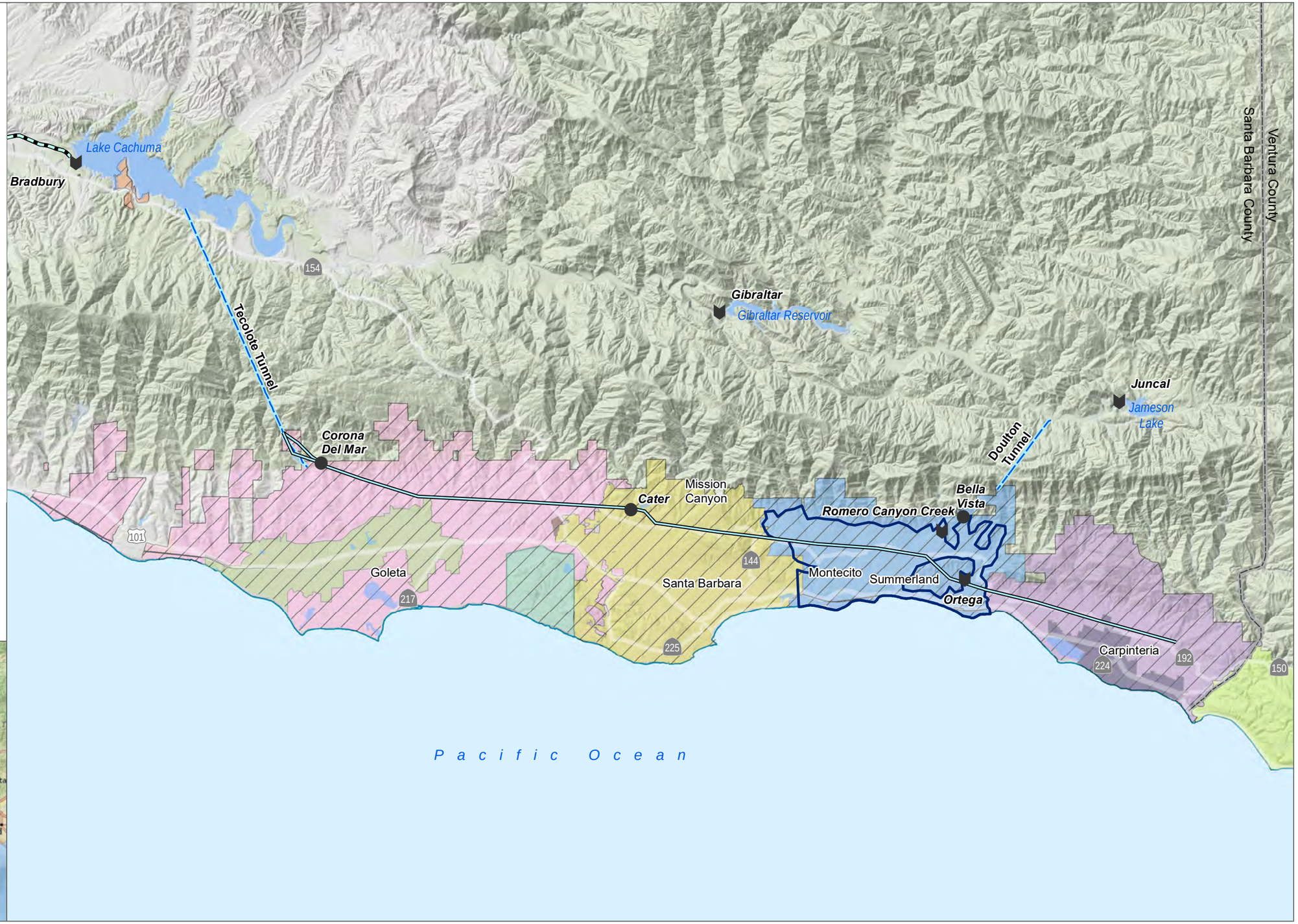
Legend

- Montecito Groundwater Basin (3-049, Plan Area)
- Lake/Reservoir
- Dam
- Water Treatment Plant
- State Water Project - CCWA Extension
- South Coast Conduit
- Tunnel

Water Service Providers

- City of Carpinteria
- Carpinteria Valley Water District
- Casitas Municipal Water District
- Central Coast Water Authority
- City of Goleta
- La Cumbre Mutual Water Company
- Goleta Water District
- Montecito Water District
- San Vincente Water Company
- City of Santa Barbara
- Santa Ynez River Water Conservation District, Improvement District No. 1





DATUM: NAD 1983 DATA SOURCE: ESRI; DWR; County of Santa Barbara

DUDEK

0 2 4 Miles

FIGURE 2-4

Water Infrastructure Map

Montecito Groundwater Basin Groundwater Sustainability Plan

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Legend

- Montecito Groundwater Basin (3-049, Plan Area)

Montecito Basin Storage Units

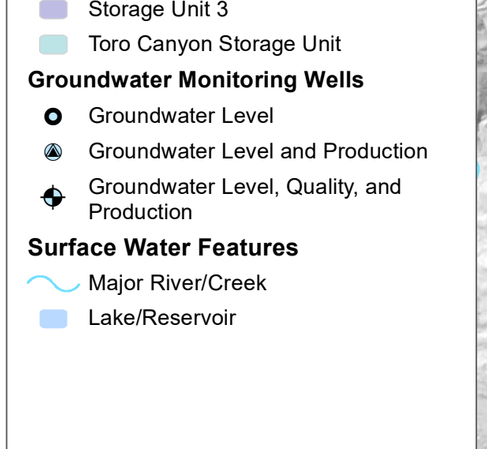
- Storage Unit 1
- Storage Unit 2
- Storage Unit 3
- Toro Canyon Storage Unit

Groundwater Monitoring Wells

- Groundwater Level
- Groundwater Level and Production
- Groundwater Level, Quality, and Production

Surface Water Features

- Major River/Creek
- Lake/Reservoir



DATUM: NAD 1983 DATA SOURCE: ESRI; DWR; USGS; County of Santa Barbara; Montecito Water District

DUDEK

0 0.5 1 Miles

FIGURE 2-5

Existing Groundwater Monitoring Network

Montecito Groundwater Basin Groundwater Sustainability Plan

INTENTIONALLY LEFT BLANK

Legend

- Montecito Groundwater Basin (3-049, Plan Area)
- Major River/Creek

Weather Station

- CIMIS
- NOAA
- County

Streamgage

- Active
- Inactive

Estimated Average Annual Precipitation, Inches

- < 18
- 18 - 20
- 20 - 22
- 22 - 24
- 24 - 26
- 26 - 28
- 28 - 30
- 30 - 32
- 32 - 34
- 34 - 36
- 36 - 38
- > 38
- Precipitation Contours (2-Inch)



Gibraltar Dam (#230)
El Deseo Ranch (#255)
KTYD (#227)
Montecito (USRCMNC)
Cater Treatment Plant (#229)
Botanic Garden (#321)
Santa Barbara 1.9 NE (US1CASB4)
Stanwood Fire Station (#228)
Santa Barbara (No. 107)
Santa Barbara Caltrans (#335)
Santa Barbara (#234)
Santa Barbara (USC47902)
Santa Barbara City College (#474)
San Ysidro
Cold Springs Debris Basin (#210)
Montecito
Montecito (#325)
Summerland (#328)
Doulton Tunnel (#231)
Jameson Dam (#232)
Juncal Dam (USC44422)
Edison Trail (#252)
Carpinteria Fire Station (#208)
Carpinteria USFS (#383)
Pacific Ocean
Gidney Creek
Mono Creek
North Fork Juncal Creek
Santa Ynez River
Alder Creek
Morse Creek
San Roque Creek
Cieneguitas Creek
Montecito Creek
Oak Creek
San Ysidro Creek
Romero Creek
Picay Creek
Toro Canyon Creek
Arroyo Paredon
Santa Monica Creek
Carpinteria Creek
Franklin Creek
Arroyo Burro
Mission Creek
Sycamore Creek
28
30
36
34
32
154
192
144
20
225
101
224
26
24
22

DATUM: NAD 1983 DATA SOURCE: ESRI; DWR; USGS; County of Santa Barbara; NOAA; CIMIS; PRISM

DUDEK

0 1 2 Miles

FIGURE 2-6

Weather Stations and Average Annual Precipitation in the Plan Area (1981-2010)

Montecito Groundwater Basin Groundwater Sustainability Plan

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Legend

- Montecito Groundwater Basin (3-049, Plan Area)
- Groundwater Level and Quality
- Seawater Intrusion Monitoring Well

Stream Gaging Stations

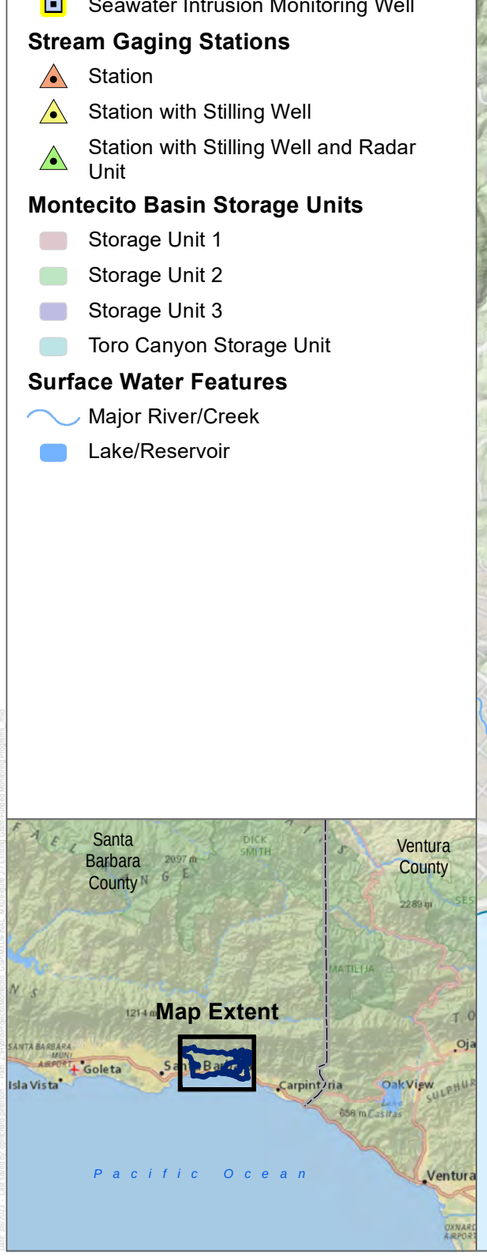
- Station
- Station with Stilling Well
- Station with Stilling Well and Radar Unit

Montecito Basin Storage Units

- Storage Unit 1
- Storage Unit 2
- Storage Unit 3
- Toro Canyon Storage Unit

Surface Water Features

- Major River/Creek
- Lake/Reservoir





DATUM: NAD 1983 DATA SOURCE: ESRI; DWR; USGS; County of Santa Barbara

DUDEK

0 0.5 1 Miles

FIGURE 2-7

Existing Grant-Funded Monitoring Programs

Montecito Groundwater Basin Groundwater Sustainability Plan

INTENTIONALLY LEFT BLANK

Legend

- Montecito Groundwater Basin (3-049, Plan Area)
- Montecito Basin Storage Units

Current Land Use Designations

- Agriculture
- Commercial
- Community Facility
- Educational Facility
- Industrial
- Institutional
- Mountainous Area
- No Jurisdiction
- Recreation
- Residential
- Transportation Corridor
- Utility

Surface Water Features

- Major River/Creek
- Lake/Reservoir



Gibraltar Rd
E Mountain Dr
Bella Vista Dr
Storage Unit #1
Park Ln
Hot Springs Rd
Barker Pass Rd
Camino Viejo Rd
Alston Rd
Storage Unit #2
San Ysidro Rd
San Ysidro Creek
Sheffield Dr
192
Ladera Ln
Buell Reservoir
Toro Canyon Creek
Garrapata Creek
Picay Creek
Ortega Reservoir
Montecito
Olive Mill Rd
Montecito Creek
Oak Creek
Romero Creek
Ortega Hill Rd
Summerland
S Salinas St
Sycamore Creek
Andree Clark Bird Refuge
Coast Village Rd
Storage Unit #3
N Jameson Ln
225
101
Toro Canyon Storage Unit
Toro Canyon Rd
Pacific Ocean

DATUM: NAD 1983 DATA SOURCE: ESRI; DWR; USGS; County of Santa Barbara (2019c)

DUDEK

0 0.5 1 Miles

FIGURE 2-8

Current Land Use

Montecito Groundwater Basin Groundwater Sustainability Plan

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Legend

- Montecito Groundwater Basin (3-049, Plan Area)
- Lake/Reservoir

Cities

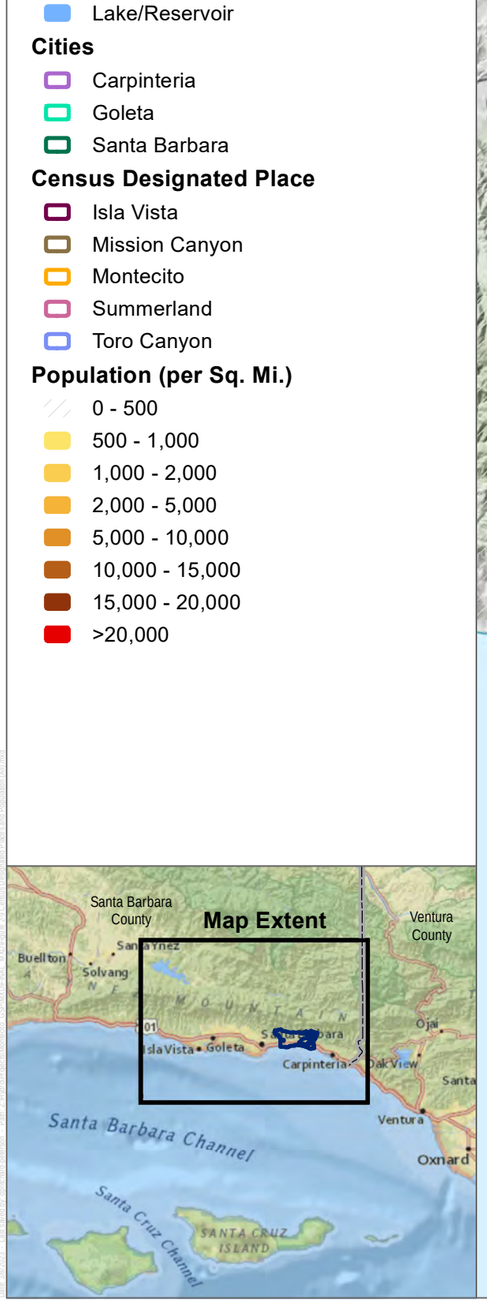
- Carpinteria
- Goleta
- Santa Barbara

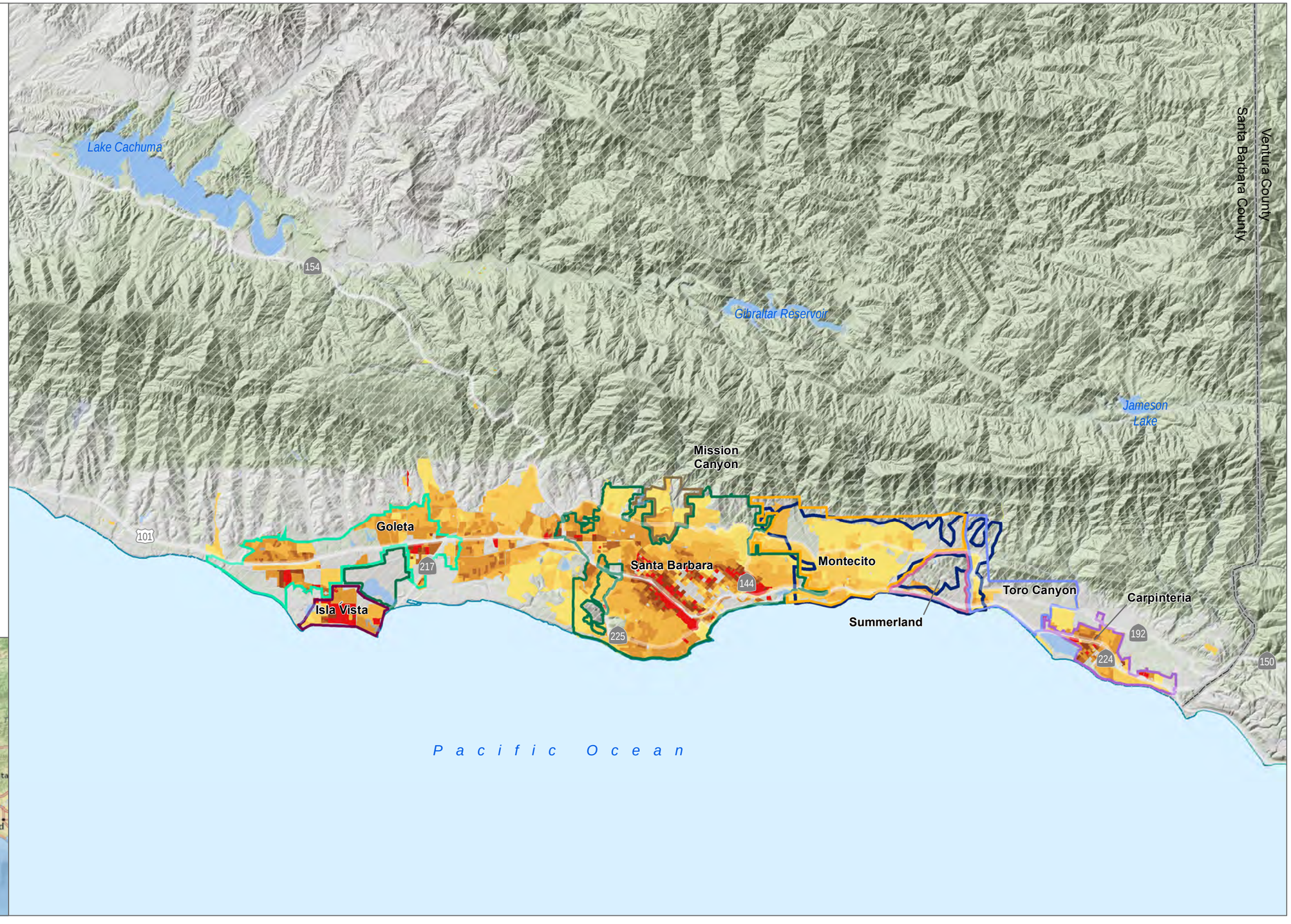
Census Designated Place

- Isla Vista
- Mission Canyon
- Montecito
- Summerland
- Toro Canyon

Population (per Sq. Mi.)

- 0 - 500
- 500 - 1,000
- 1,000 - 2,000
- 2,000 - 5,000
- 5,000 - 10,000
- 10,000 - 15,000
- 15,000 - 20,000
- >20,000





DATUM: NAD 1983 DATA SOURCE: ESRI; County of Santa Barbara; Census 2017

DUDEK

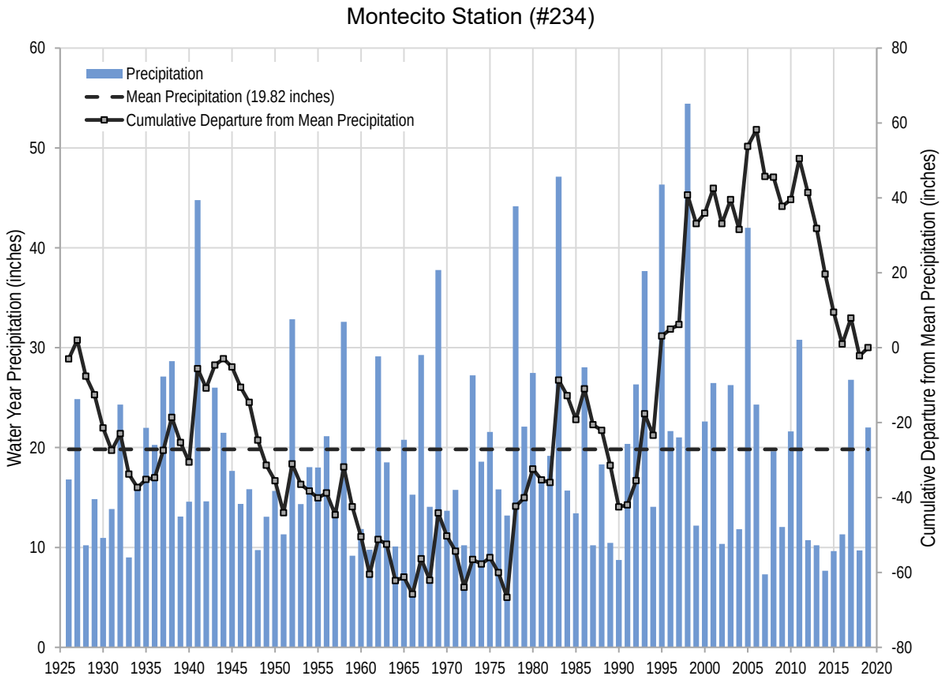
0 2 4 Miles

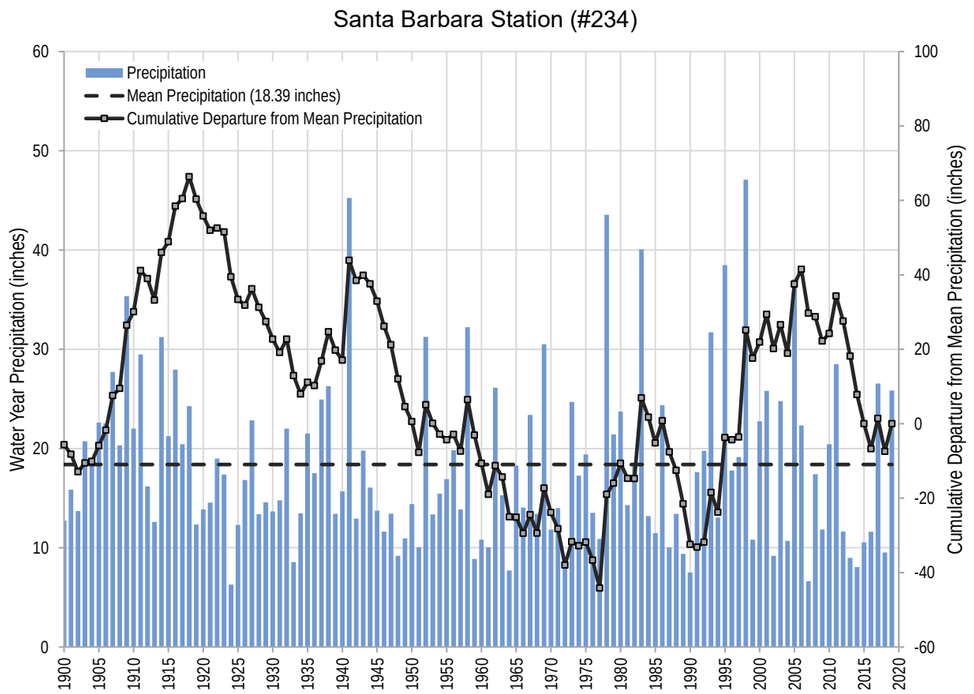
FIGURE 2-9

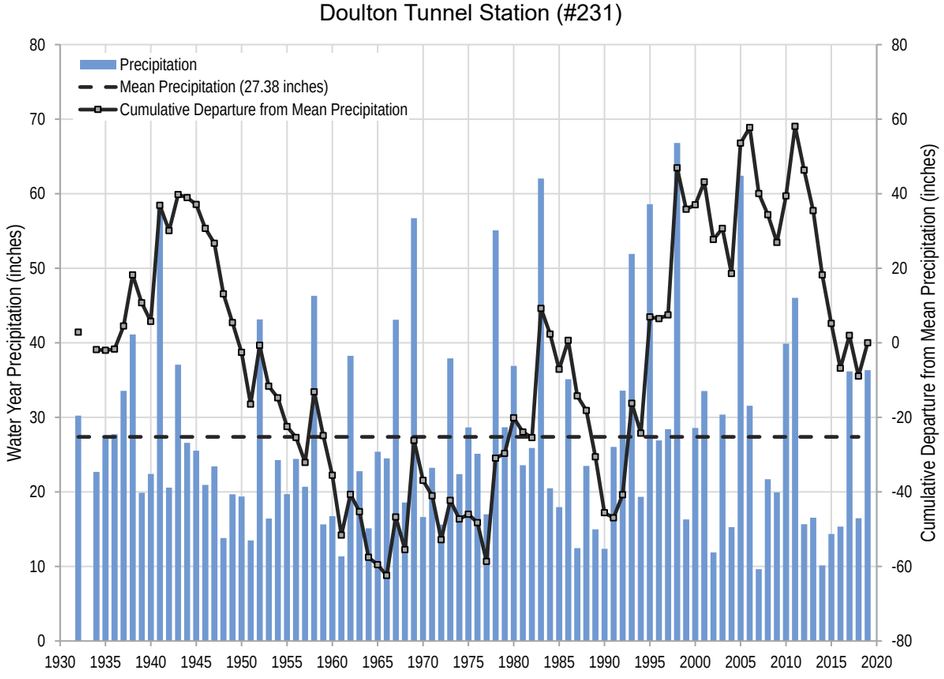
Census-Designated Places and Population

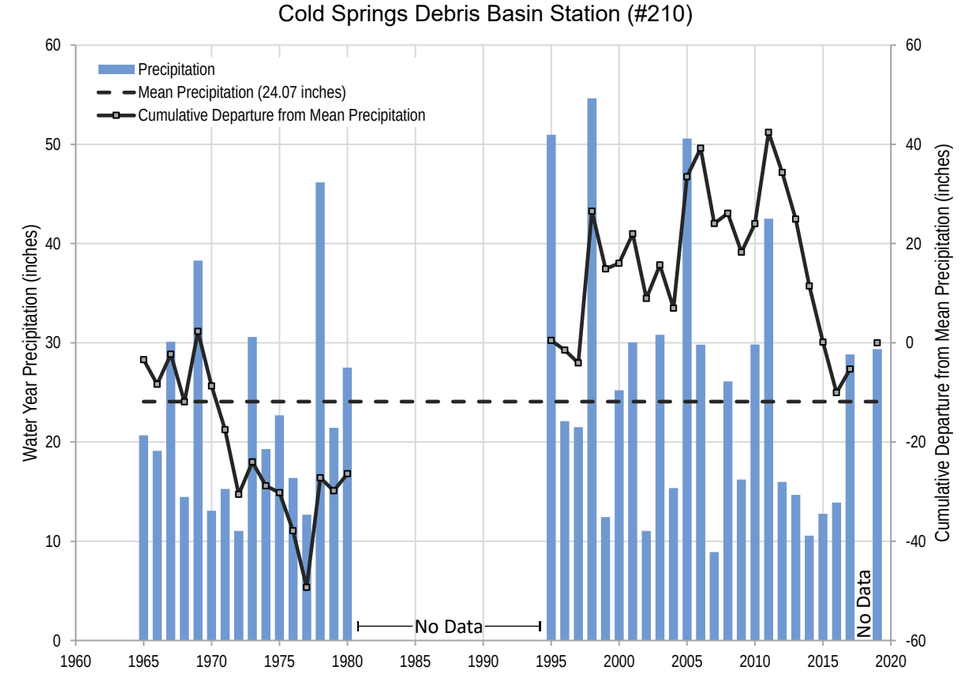
Montecito Groundwater Basin Groundwater Sustainability Plan

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SOURCE: County of Santa Barbara

NOTE: Water year is October 1 through September 30

FIGURE 2-10

Water Year Precipitation

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Montecito Hydrogeologic Conceptual Model

LEGEND

- Montecito Groundwater Basin
- Storage Unit #1
- Storage Unit #2
- Storage Unit #3
- Toro Canyon Storage Unit
- Creeks
- Quaternary Faults
- Cachuma/State Water Project
- Consolidated Rock Interface
- Water table
- Well

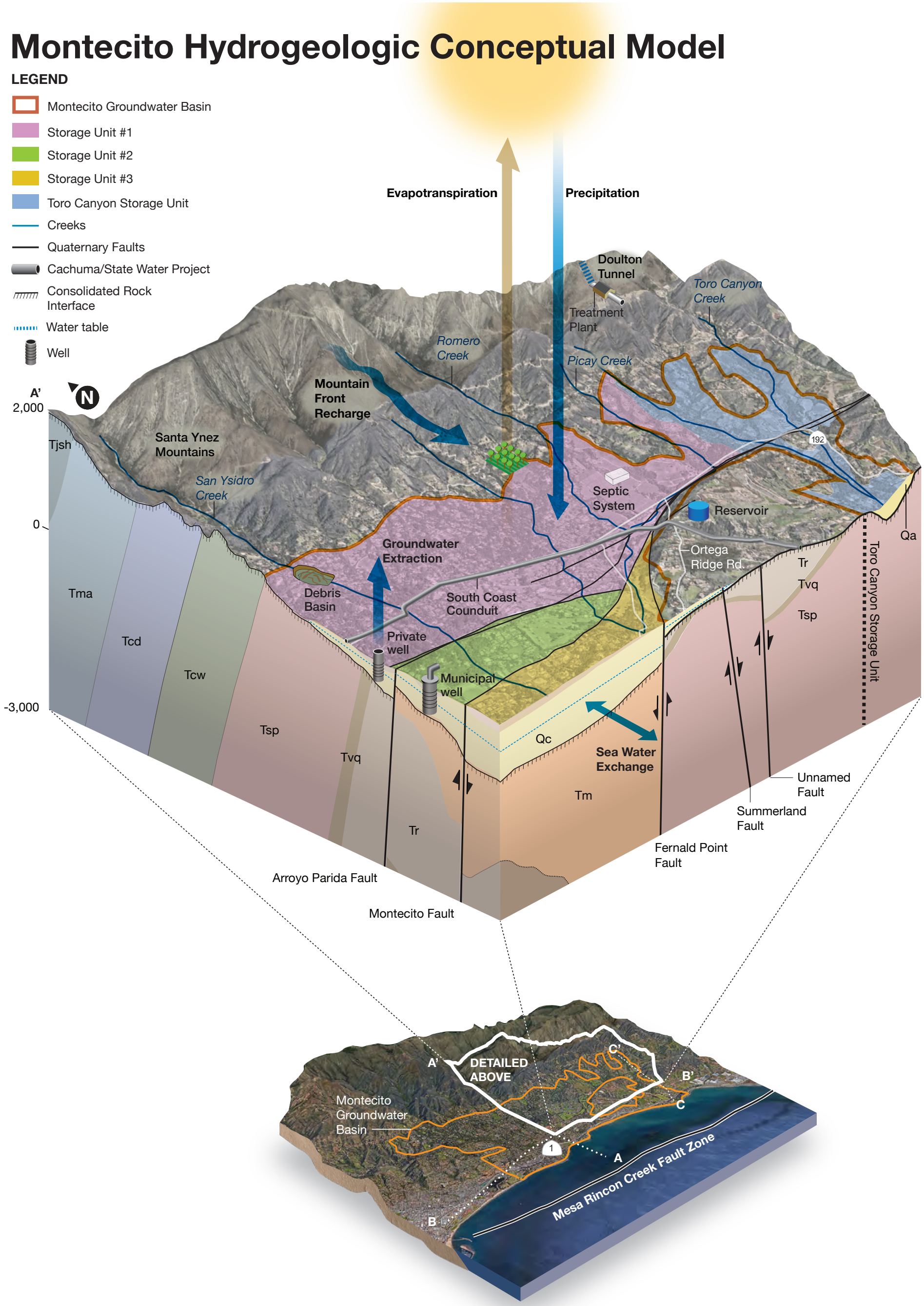


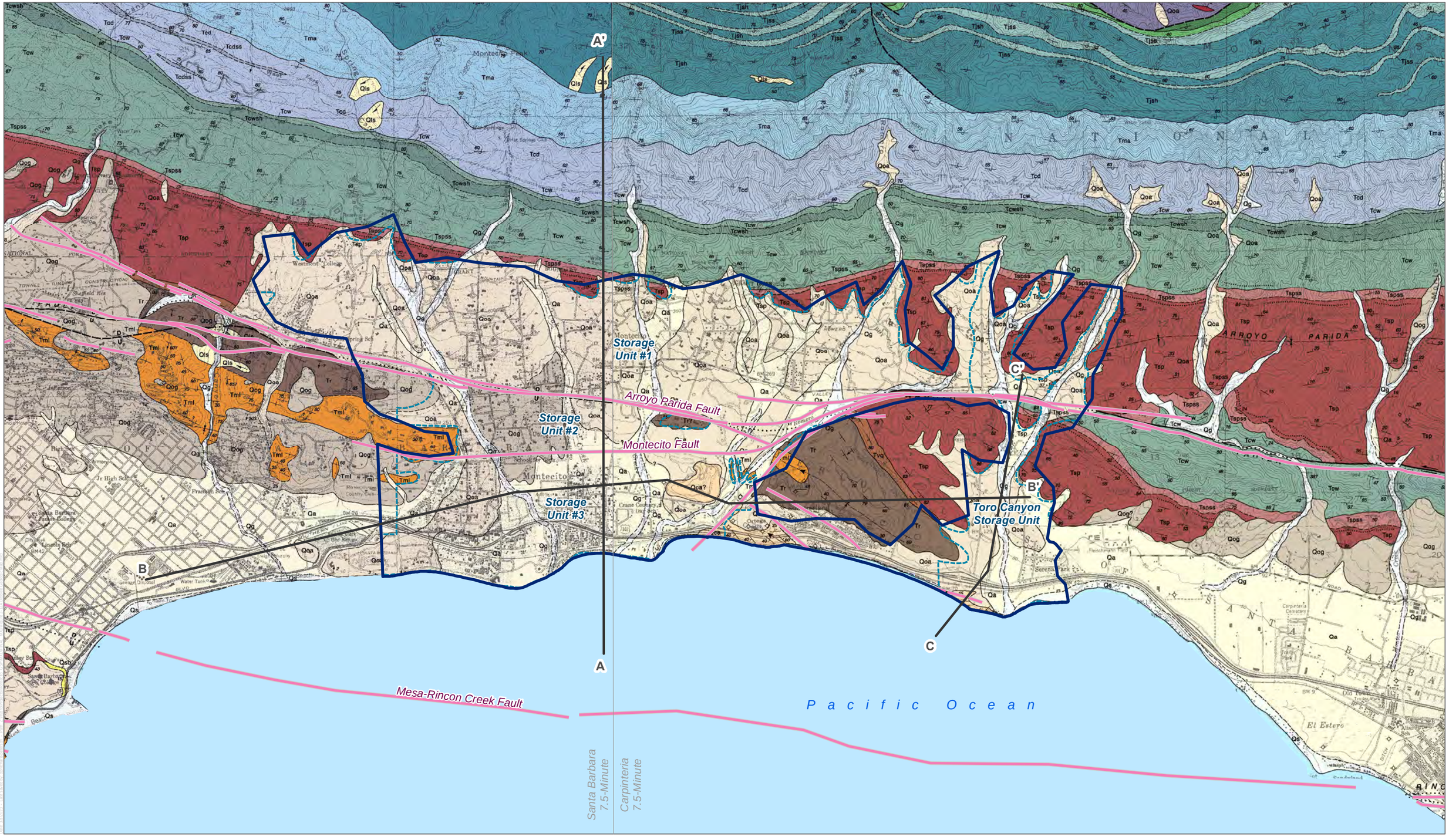
FIGURE 2-11

Hydrogeologic Conceptual Model

Montecito Groundwater Basin Groundwater Sustainability Plan

DUDEK

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DATUM: NAD 1983 DATA SOURCE: ESRI; DWR; USGS; Dibblee

DUDEK

0 0.5 1 Miles

FIGURE 2-12A

Dibblee Geologic Map

Montecito Groundwater Basin Groundwater Sustainability Plan

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Montecito Groundwater Basin (3-049, Plan Area)

Cross Section Location

Quaternary Faults

Montecito Basin Storage Units

Qs / Qg / Qa

SURFICIAL SEDIMENTS

Qs *Beach sand deposits*
Qg *Stream channel deposits, mostly gravel and sand*
Qa *Alluvium: unconsolidated floodplain deposits of silt, sand and gravel*

Qls

LANDSLIDE DEBRIS

Qog / Qoa

OLDER DISSECTED SURFICIAL SEDIMENTS

Qoa *Former alluvial deposits of silt, sand and gravel, in places weakly consolidated; local unconformities at base*
Qog *Cobble-boulder fan gravel and conglomerate deposits composed largely of sandstone detritus*

UNCONFORMITY

Qca

CASITAS FORMATION
Nonmarine; early to middle (?) Pleistocene age
Qca *Weakly consolidated alluvial deposits: gray to tan cobble-boulder gravel and gray to reddish sand and clay*

UNCONFORMITY

Tm / Tml

MONTEREY SHALE
Marine; early to late Miocene age
Tm *Upper shale unit: white-weathering, thin bedded, hard, platy to brittle siliceous shale; Mohnian Stage*
Tml *Lower shale unit: white weathering, soft, fissile to punky clay shale with interbeds of hard siliceous shale and thin limestone strata; lower Mohnian to uppermost Saucesian Stages*

Tmss

UNAMED SANDSTONE
(TEMBLOR SANDSTONE OF DIBBLEE, 1966)
Shallow marine; early Miocene age
Tmss *Light gray to tan fossiliferous arkosic sandstone and pebble conglomerate; local unconformity (?) at base; exposed north of Santa Ynez fault*



Tr

RINCON SHALE
marine; early Miocene age
Tr *Poorly bedded gray clay shale and siltstone, locally concretionary; Saucesian and upper Zemorrian Stages*

Tvq

VAQUEROS SANDSTONE
Shallow marine; early Miocene age
Tvq *Massive to thick bedded, light greenish-gray to tan, fine grained sandstone, locally calcareous; Zemorrian Stage*

Tsp / Tspss

SESPE FORMATION
Nonmarine; predominantly Oligocene age
Tsp *Maroon, red and green silty shale or claystone with interbedded red tan and gray sandstone; red arkosic sandstone and conglomerate at base*
Tspss *Red to pink sandstone and red claystone*

Tcw / Tcwsh

COLDWATER SANDSTONE
Marine; late Eocene age
Tcw *Hard, tan, bedded arkosic sandstone with minor interbeds of greenish-gray siltstone and shale; local oyster shell beds common in upper part; Narizian Stage*
Tcwsh *Greenish-gray siltstone and shale with occasional interbeds of tan sandstone*

Tcd / Tcdss

COZY DELL SHALE
Marine; late Eocene age
Tcd *Dark gray, argillaceous to silty micaceous shale with minor light gray to tan arkosic sandstone; Narizian Stage*
Tcdss *Light gray to tan arkosic sandstone with minor interbeds of gray micaceous shale*

Tma / Tmash

MATILIJA SANDSTONE
Marine; middle to late Eocene age
Tma *Hard, thick bedded, tan to mottled light greenish-gray arkosic sandstone with thin partings to thick interbeds of gray micaceous shale; lower Narizian and upper Ulatisian Stages*
Tmash *Gray micaceous shale with minor tan sandstone interbeds; exposed north of Santa Ynez fault*

Tjsh / Tjss

JUNCAL FORMATION
Marine; early(?) to middle Eocene age
Tjsh *Dark gray micaceous shale with minor thin interbeds of hard, gray-white to tan arkosic sandstone; lower Ulatisian(?) to upper Penutian(?) Stages*
Tjss *Hard, gray-white to tan arkosic sandstone with minor interbeds of dark gray micaceous shale*

Tsb / Tsbs

SIERRA BLANCA LIMESTONE
Shallow marine; early Eocene age
(exposed north of Santa Ynez fault)
Tsb *Hard, massive, white-weathering, sandy algal limestone*
Tsbs *Hard, light gray calcareous sandstone, locally fossiliferous*

UNCONFORMITY

Ksh / Kush / Kuss / Kucg

UNAMED MARINE STRATA
(Kush, Kuss, Kucg – Jalama ? Formation)
Late Cretaceous age
Ksh *Gray micaceous clay shale with minor interbeds of hard, gray-white to tan arkosic sandstone; exposed north of Santa Ynez fault*
Kush *Dark gray to black micaceous clay shale with minor interbeds of hard tan arkosic sandstone*
Kucg *Gray to brown cobble conglomerate of granitic, porphyritic-andesitic, and quartzitic detritus in arkosic sandstone matrix*
Kuss *Hard, light gray to tan arkosic sandstone with minor interbeds of micaceous shale*

DATUM: NAD 1983 DATA SOURCE: ESRI; DWR; USGS; Dibblee

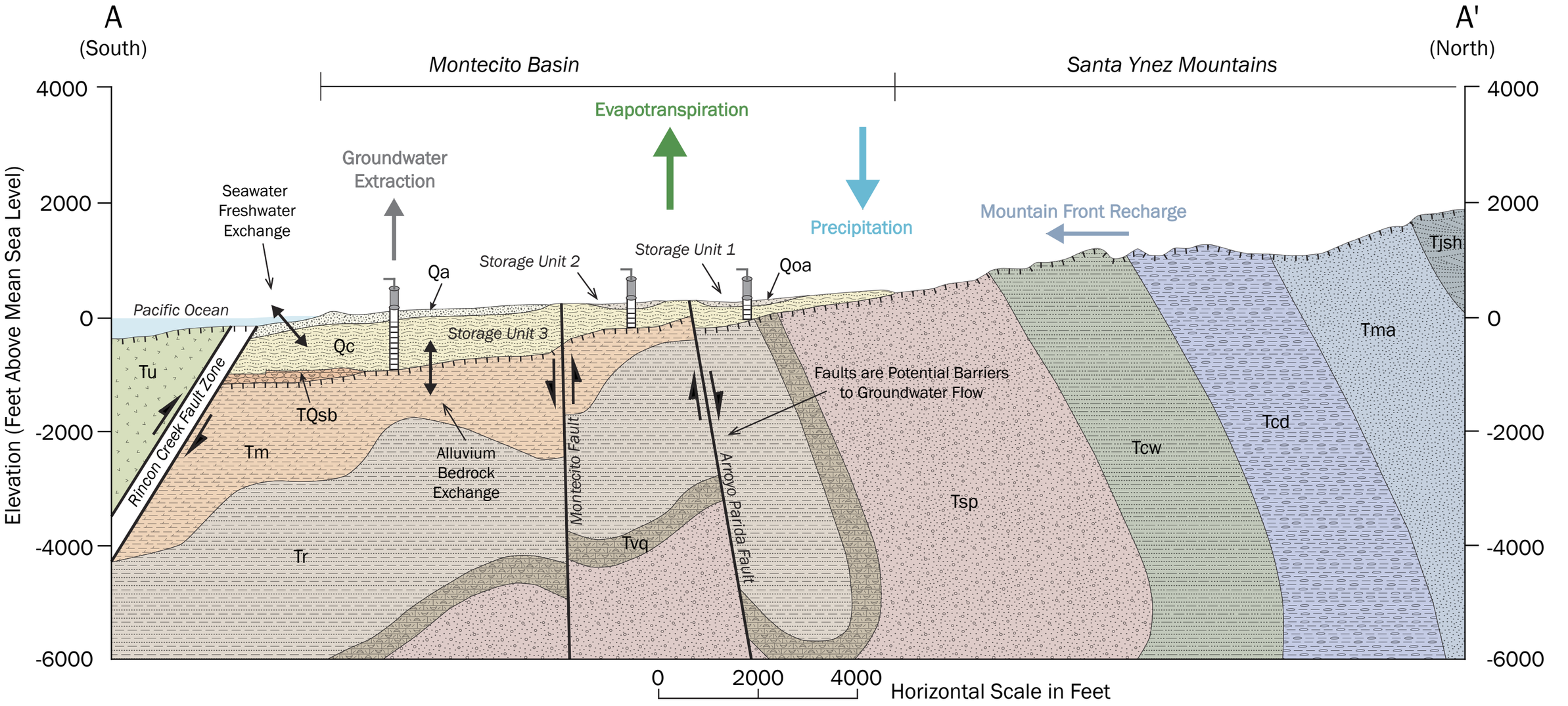
DUDEK

0 5 10 Miles

FIGURE 2-12B

Dibblee Geologic Map Legend

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SOURCE: Adopted from GTC 1974

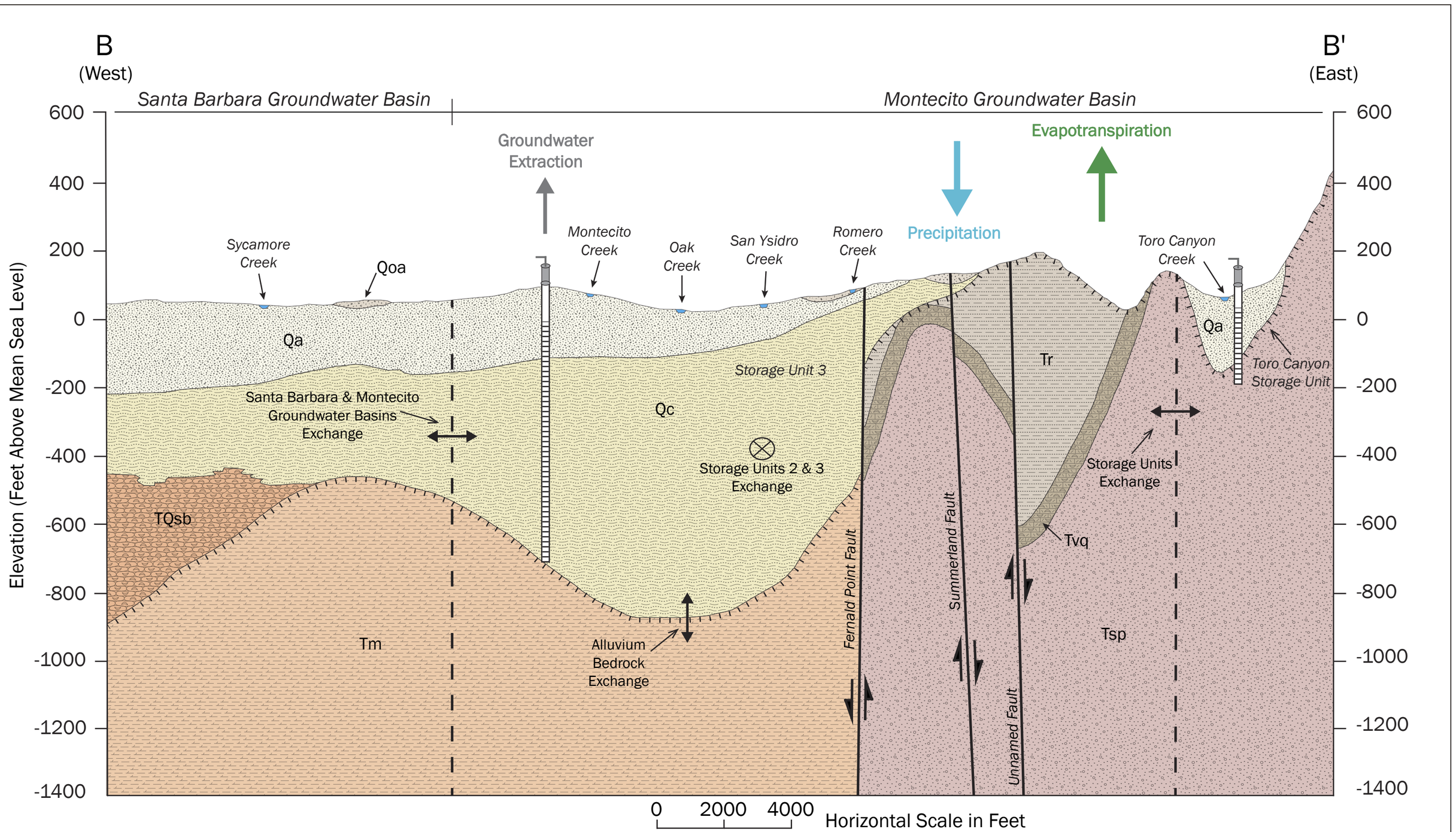
DUDEK

FIGURE 2-13

A-A' Geologic Cross Section

Montecito Groundwater Basin Groundwater Sustainability Plan

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SOURCE: Adopted from GTC 1974

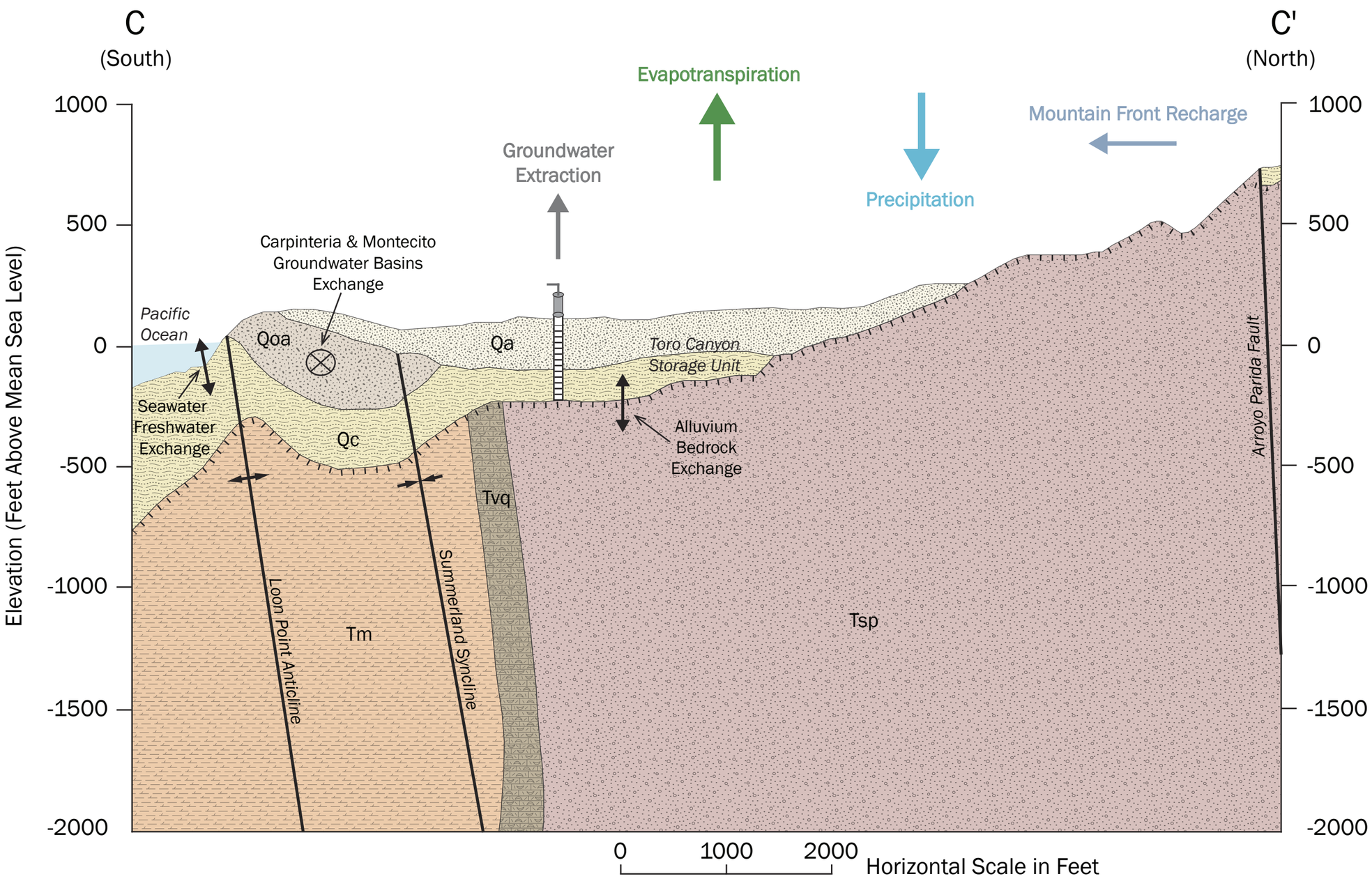
DUDEK

FIGURE 2-14

B-B' Geologic Cross Section

Montecito Groundwater Basin Groundwater Sustainability Plan

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SOURCE: Adopted from GTC 1974

DUDEK

FIGURE 2-15

C-C' Geologic Cross Section

Montecito Groundwater Basin Groundwater Sustainability Plan

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Alluvium: lenticular clay, silt, sand and gravel



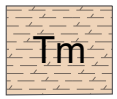
Older alluvium and riviera fanglomerate: boulder, cobble, and sand deposits



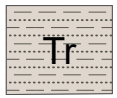
Casitas formation: lenticular sand, clay, and gravel (non-marine)



Santa Barbara formation: fossiliferous sandstone (marine)



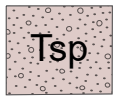
Undifferentiated Monterey formation: hard siliceous shale and soft organic shale (marine)



Undifferentiated Rincon formation: claystone and siltstone (marine)



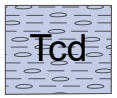
Vaqueros formation: fossiliferous sandstone (marine)



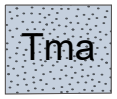
Undifferentiated Sespe formation: conglomerate, sandstone, siltstone (marine)



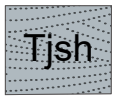
Coldwater formation: sandstone and siltstone (marine)



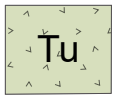
Cozy Dell formation: shale, minor sandstone (marine)



Matilija formation: sandstone (marine)



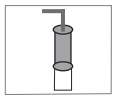
Juncal formation: shale and sandstone (marine)



Undifferentiated Tertiary rocks



Bottom of water-bearing units



Groundwater well



Groundwater exchange flow between storage units or basins



Groundwater basin boundary



Fault

SOURCE: Adopted from GTC 1974

DUDEK

FIGURE 2-16

Geologic Cross Sections Legend

Montecito Groundwater Basin Groundwater Sustainability Plan

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Legend

- Montecito Groundwater Basin (3-049, Plan Area)

Montecito Basin Storage Units

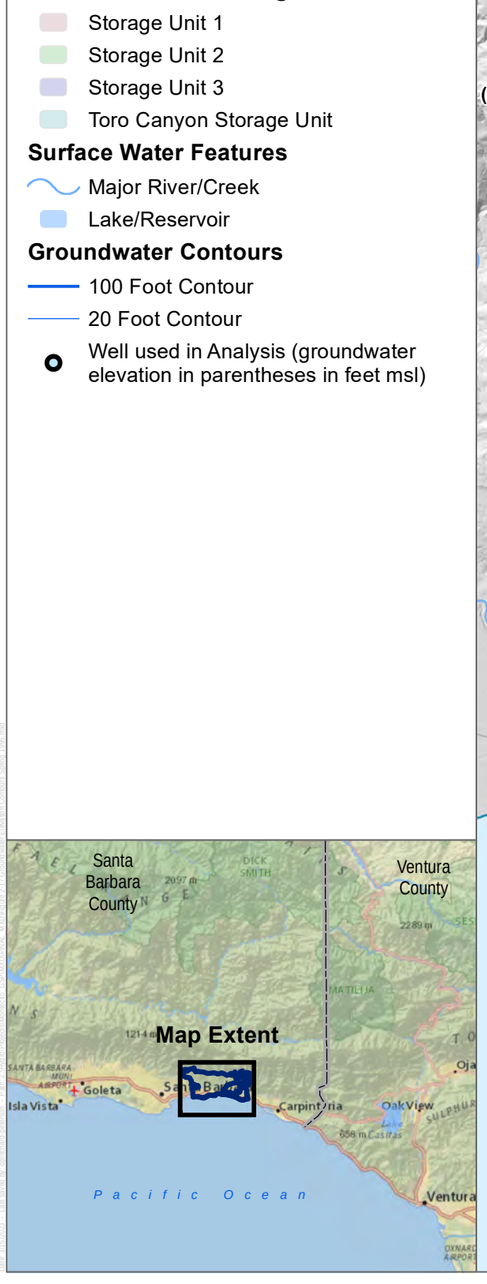
- Storage Unit 1
- Storage Unit 2
- Storage Unit 3
- Toro Canyon Storage Unit

Surface Water Features

- Major River/Creek
- Lake/Reservoir

Groundwater Contours

- 100 Foot Contour
- 20 Foot Contour
- Well used in Analysis (groundwater elevation in parentheses in feet msl)



DATUM: NAD 1983 DATA SOURCE: ESRI; DWR; County of Santa Barbara; Montecito Water District

DUDEK

0 0.5 1 Miles

FIGURE 2-17

Groundwater Elevation Contours Spring 1995

Montecito Groundwater Basin Groundwater Sustainability Plan

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Legend

- Montecito Groundwater Basin (3-049, Plan Area)

Montecito Basin Storage Units

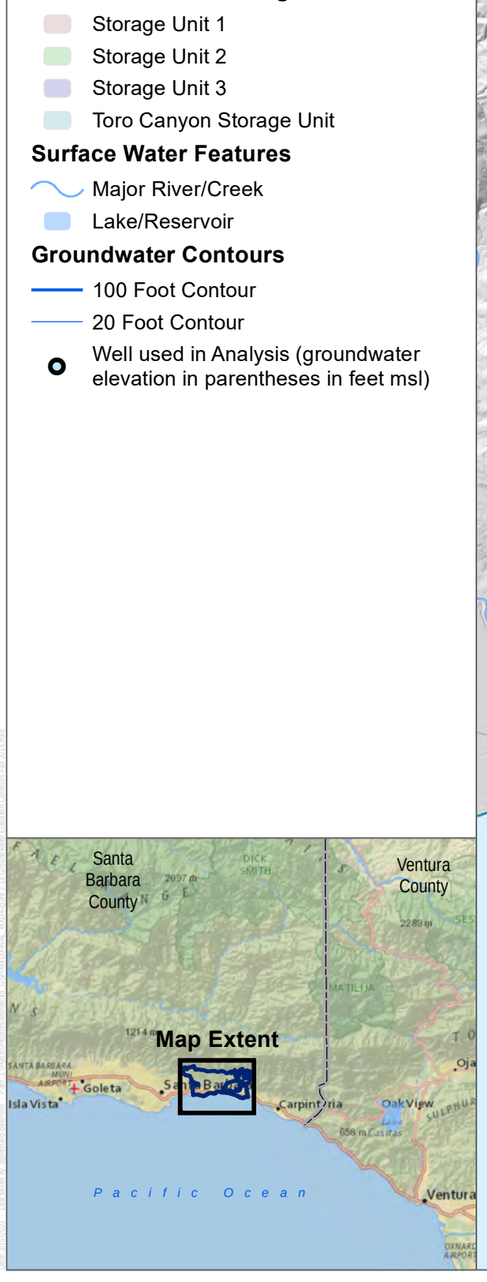
- Storage Unit 1
- Storage Unit 2
- Storage Unit 3
- Toro Canyon Storage Unit

Surface Water Features

- Major River/Creek
- Lake/Reservoir

Groundwater Contours

- 100 Foot Contour
- 20 Foot Contour
- Well used in Analysis (groundwater elevation in parentheses in feet msl)



DATUM: NAD 1983 DATA SOURCE: ESRI; DWR; County of Santa Barbara; Montecito Water District

DUDEK

0 0.5 1 Miles

FIGURE 2-18

Groundwater Elevation Contours Fall 2015

Montecito Groundwater Basin Groundwater Sustainability Plan

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Legend

- Montecito Groundwater Basin (3-049, Plan Area)

Montecito Basin Storage Units

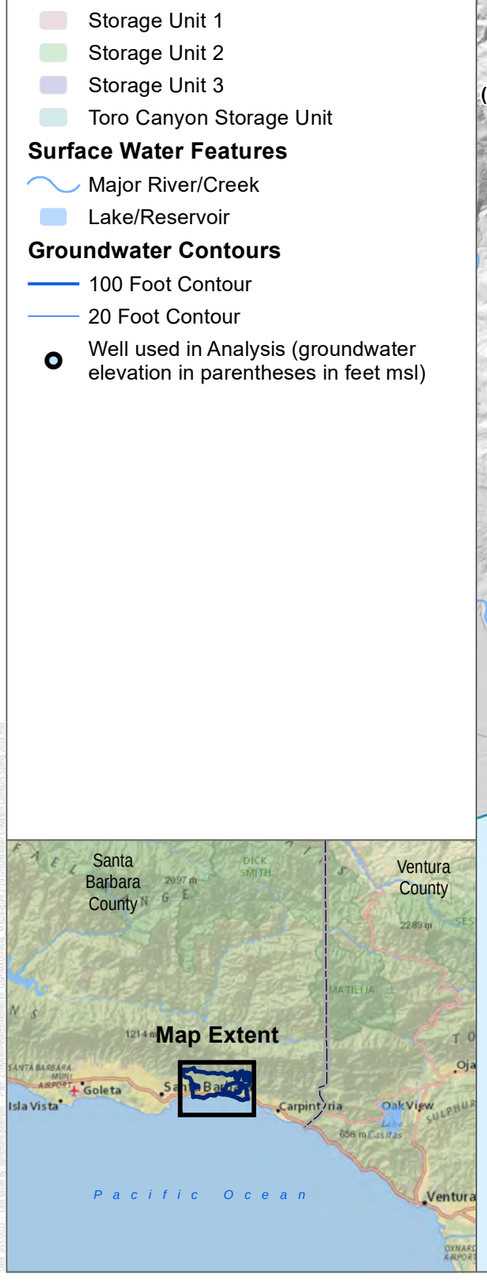
- Storage Unit 1
- Storage Unit 2
- Storage Unit 3
- Toro Canyon Storage Unit

Surface Water Features

- Major River/Creek
- Lake/Reservoir

Groundwater Contours

- 100 Foot Contour
- 20 Foot Contour
- Well used in Analysis (groundwater elevation in parentheses in feet msl)



DATUM: NAD 1983 DATA SOURCE: ESRI; DWR; County of Santa Barbara; Montecito Water District

DUDEK

0 0.5 1 Miles

FIGURE 2-19

Groundwater Elevation Contours Spring 2019

Montecito Groundwater Basin Groundwater Sustainability Plan

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Legend

- Montecito Groundwater Basin (3-049, Plan Area)

Montecito Basin Storage Units

- Storage Unit 1
- Storage Unit 2
- Storage Unit 3
- Toro Canyon Storage Unit

Surface Water Features

- Major River/Creek
- Lake/Reservoir

Groundwater Contours

- 100 Foot Contour
- 20 Foot Contour
- Well used in Analysis (groundwater elevation in parentheses in feet msl)

1-32 (416.17)
1-38 (509.33)
1-47 (615.5)
1-29 (388.34)
1-5 (465)
1-4 (402.86)
1-35 (433.04)
1-36 (369.5)
1-48 (452)
1-30 (378.34)
1-40 (280.5)
1-33 (301.67)
1-45 (174.17)
1-28 (418.58)
1-43 (726)
1-18 (235)
1-21 (263.17)
1-42 (238)
1-6 (97.2)
1-8 (129.67)
1-19 (92.5)
1-7 (110.09)
1-17 (121.5)
1-51 (131)
1-15 (128)
1-13 (179)
1-11 (222.83)
1-10 (194.33)
1-1 (154.94)
1-53 (200.5)
1-3 (198.08)
2-3 (282)
2-2 (280)
4-4 (296)
1-49 (171.25)
1-54 (172.15)
1-50 (170.08)
3-9 (0.61)
3-22 (-4.79)
3-17 (189.7)
3-8 (-5.5)
3-12a (-12.29)
3-25 (-4.72)
3-23 (41.91)
3-15 (-9.7)
3-24 (3.33)
3-2 (41.67)
3-28 (4)
3-5 (4)
3-27 (1)
3-7 (-0.2)
3-19 (2.33)
3-20 (7.5)
4-6 (4)

500
400
300
200
100
0
600

Montecito Creek
San Ysidro Creek
Oak Creek
Romero Creek
Picay Creek
Toro Canyon Creek
Garrapata Creek
Buell Reservoir
Ortega Reservoir
Andree Clark Bird Refuge
Sycamore Creek

P a c i f i c O c e a n



DATUM: NAD 1983 DATA SOURCE: ESRI; DWR; County of Santa Barbara; Montecito Water District

DUDEK

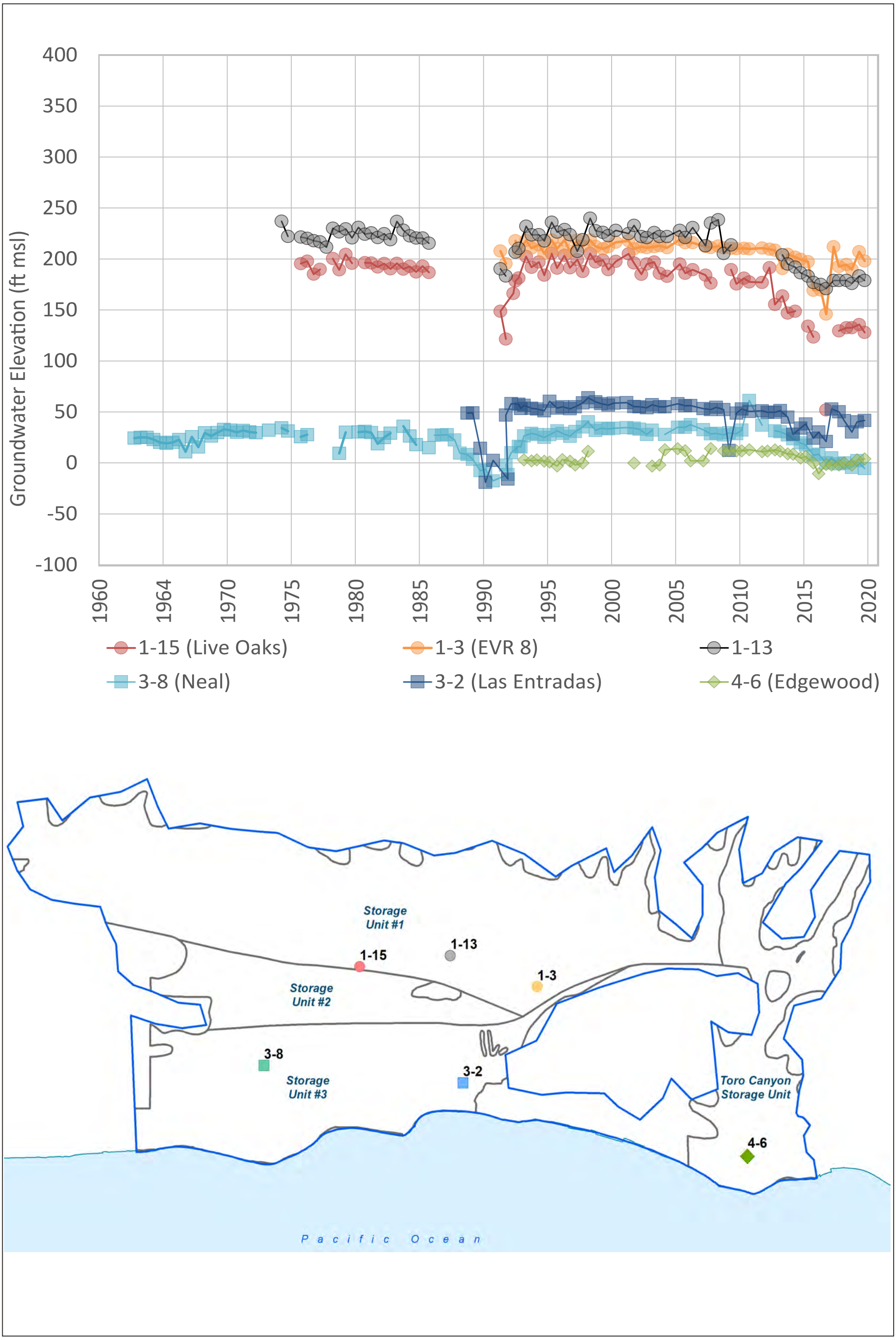
0 0.5 1 Miles

FIGURE 2-20

Groundwater Elevation Contours Fall 2019

Montecito Groundwater Basin Groundwater Sustainability Plan

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SOURCE: Montecito Water District

FIGURE 2-21

Groundwater Levels in Key Indicator Wells

Montecito Groundwater Basin Groundwater Sustainability Plan

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Legend

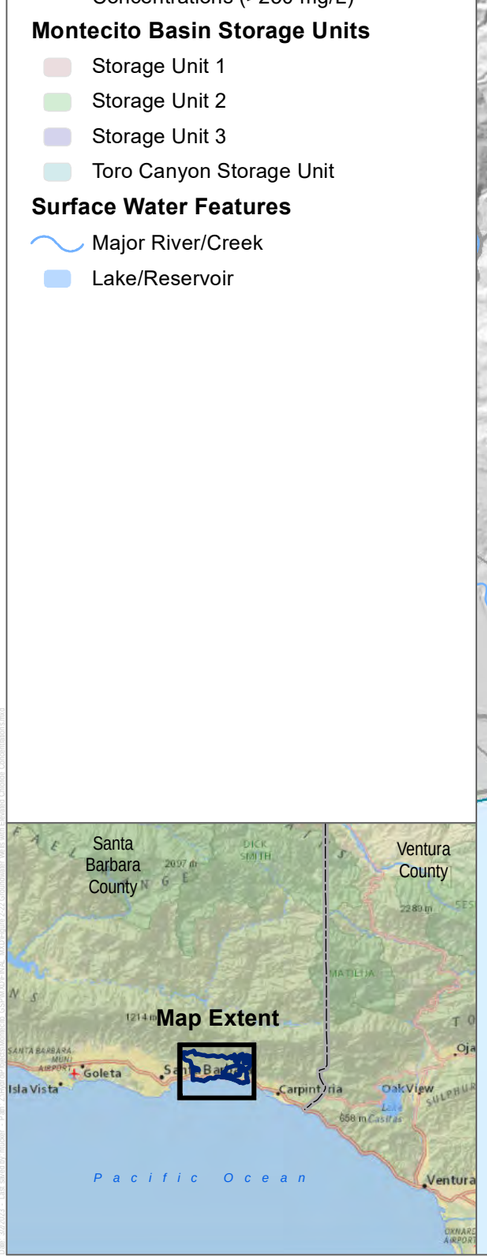
- Montecito Groundwater Basin (3-049, Plan Area)
- Wells with Elevated Chloride Concentrations (>250 mg/L)

Montecito Basin Storage Units

- Storage Unit 1
- Storage Unit 2
- Storage Unit 3
- Toro Canyon Storage Unit

Surface Water Features

- Major River/Creek
- Lake/Reservoir





DATUM: NAD 1983 DATA SOURCE: ESRI; DWR; USGS; County of Santa Barbara; Montecito Water District

DUDEK

0 0.5 1 Miles

FIGURE 2-22

Groundwater Wells with Elevated Chloride Concentrations

Montecito Groundwater Basin Groundwater Sustainability Plan

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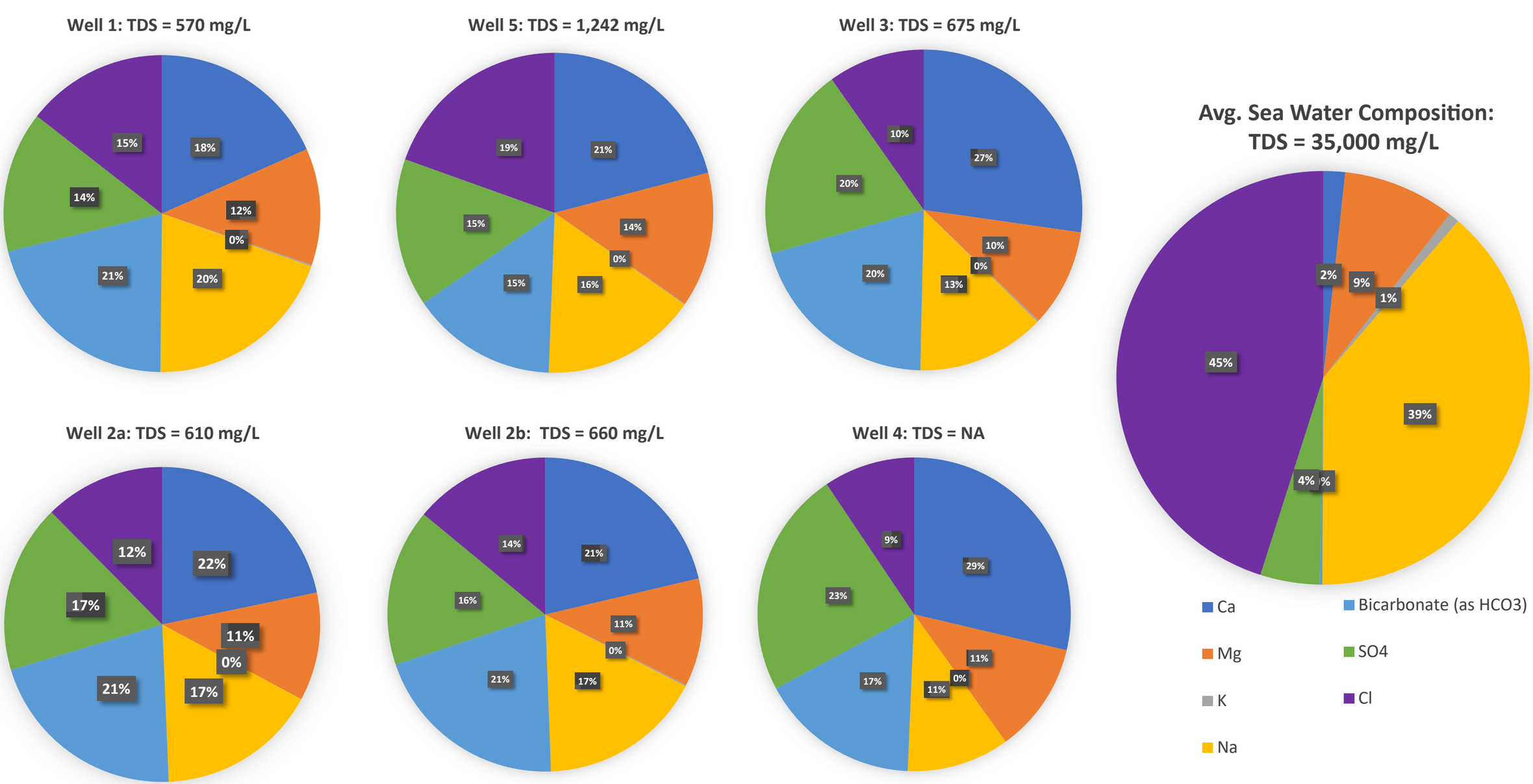
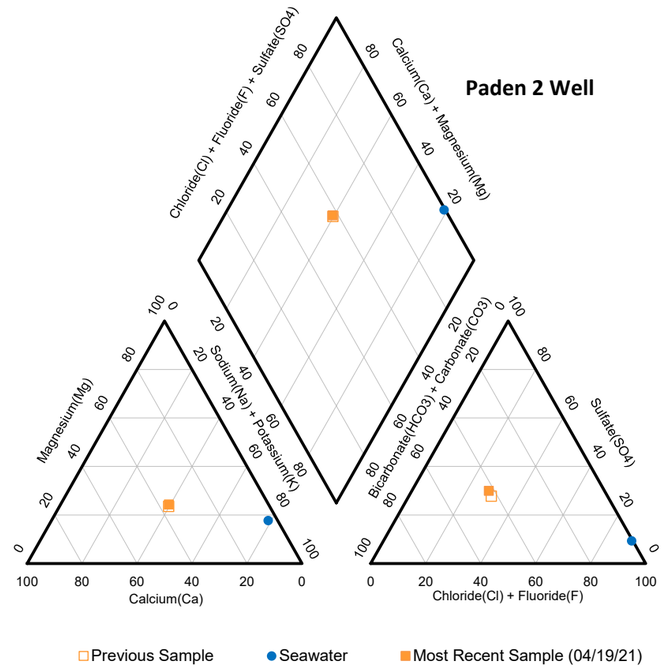


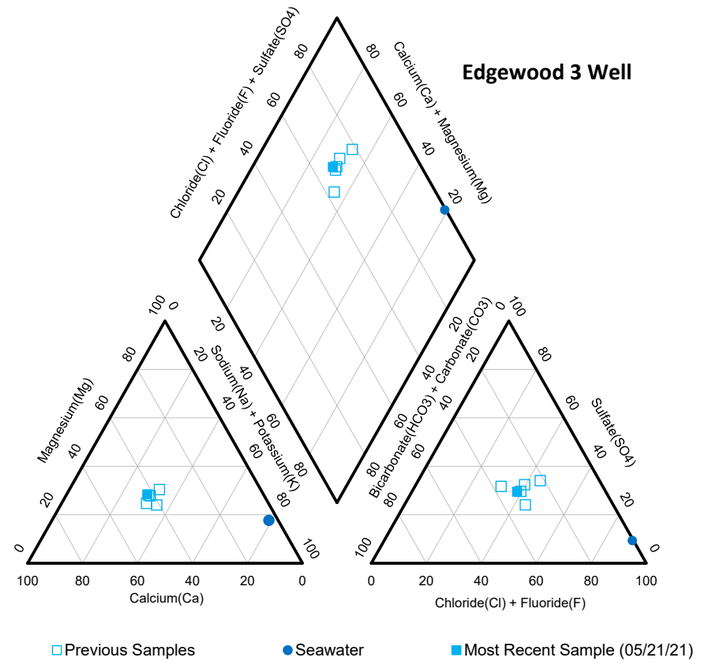
FIGURE 2-23

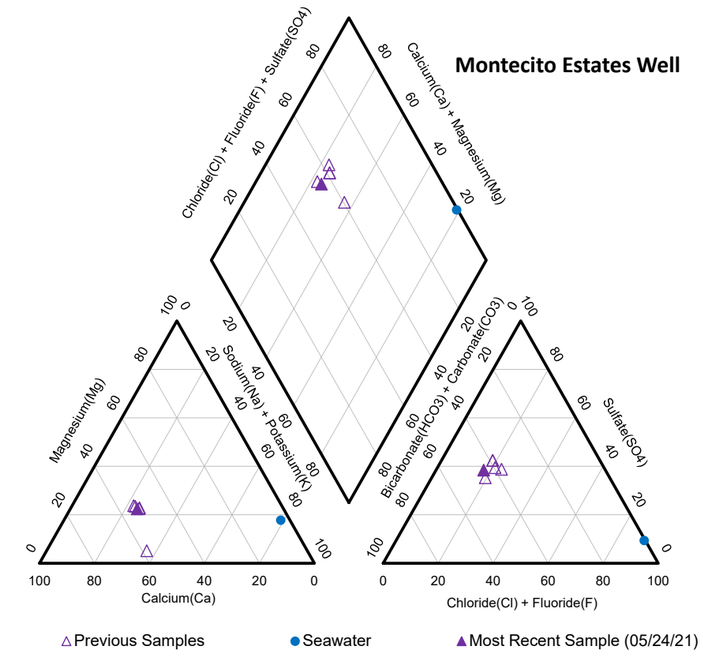
Seawater Intrusion Monitoring Wells Water Quality Composition Pie Charts

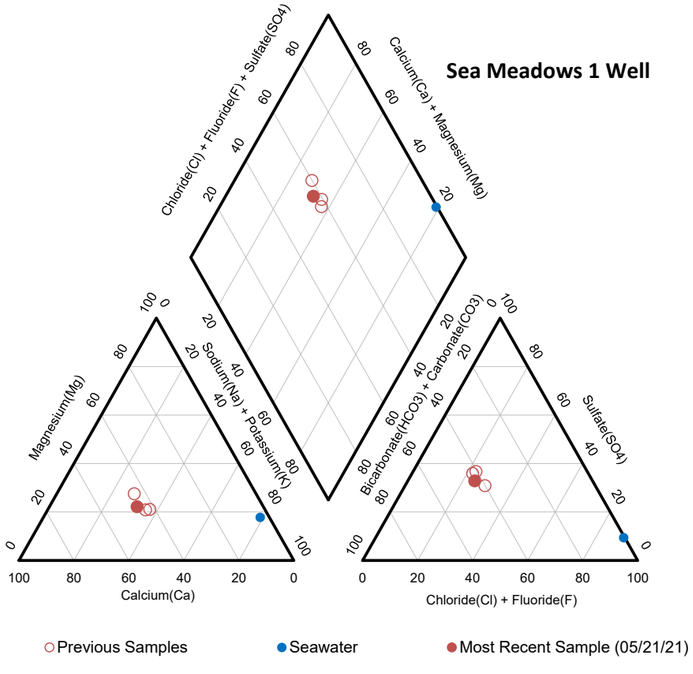
Montecito Groundwater Basin Groundwater Sustainability Plan

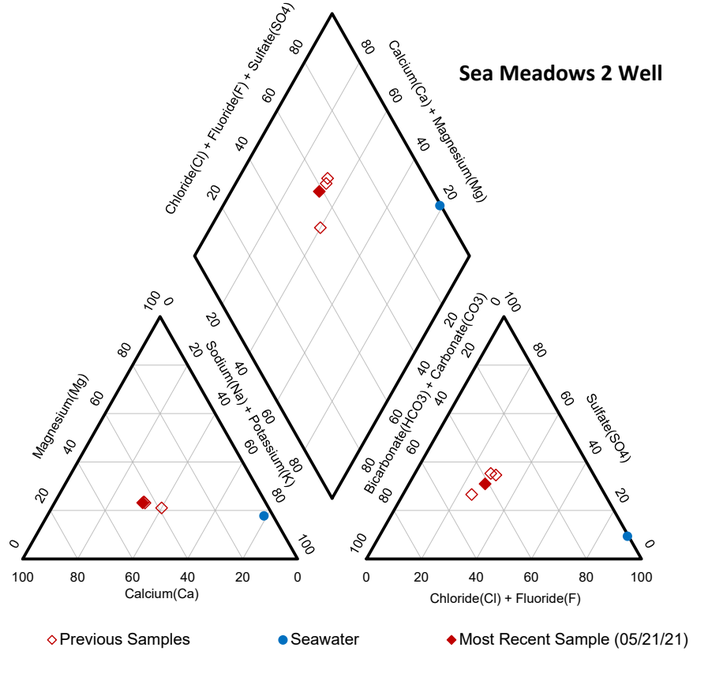
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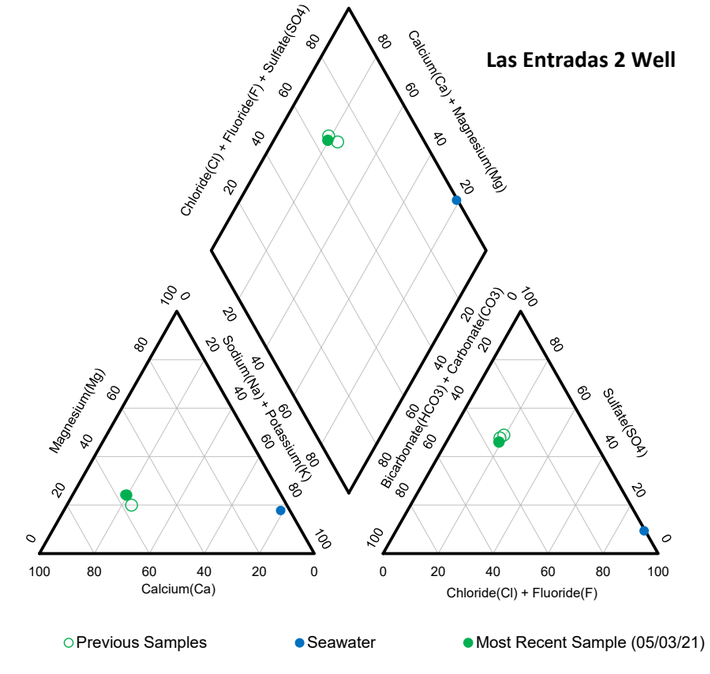


FIGURE 2-24

Seawater Intrusion Monitoring Wells Water Quality Piper Plots

Montecito Groundwater Basin Groundwater Sustainability Plan

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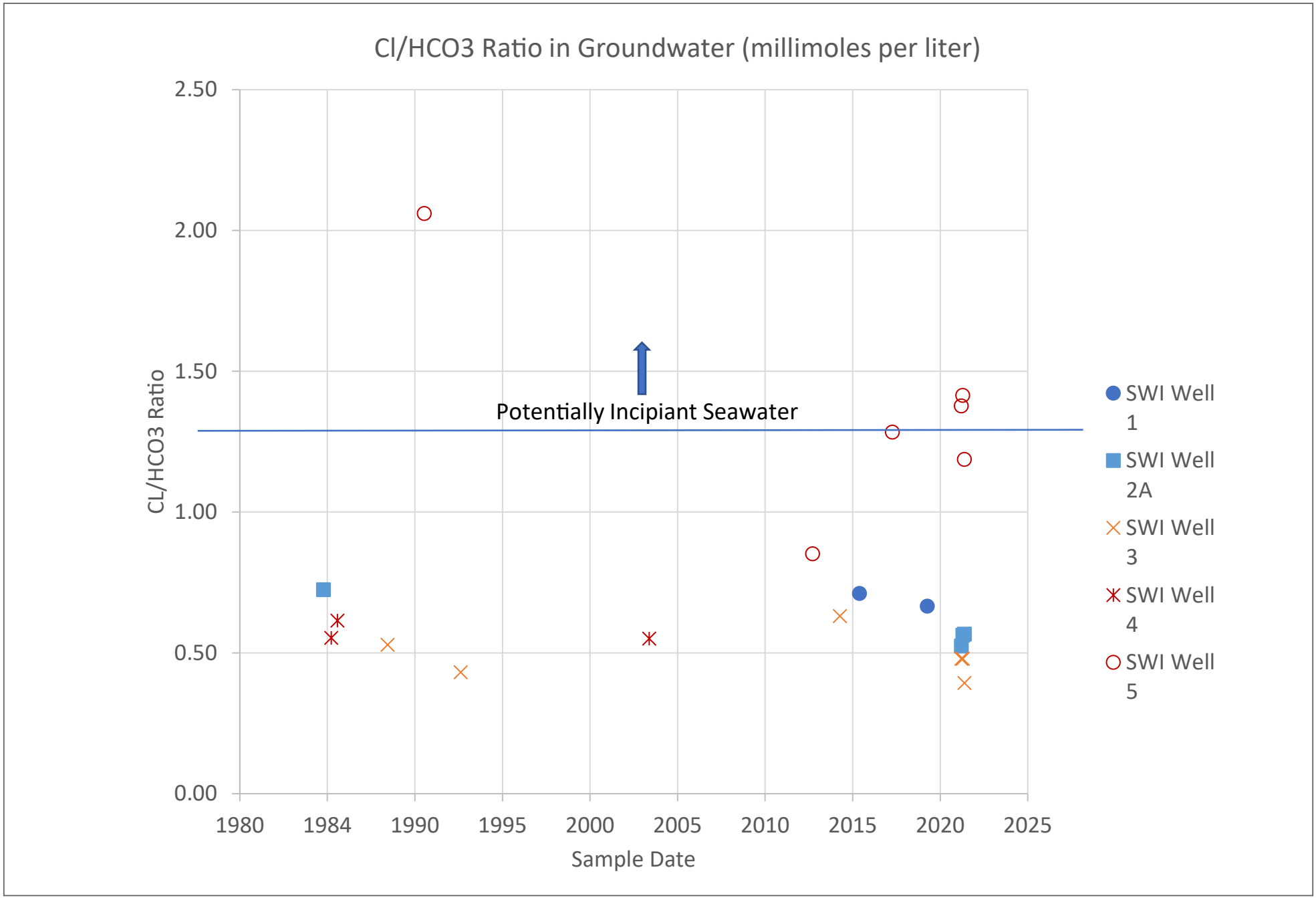


Figure 2-25

Seawater Intrusion Monitoring Wells: Ratio of Chloride (Cl^-) to Bicarbonate (HCO_3^-) Concentrations in Groundwater

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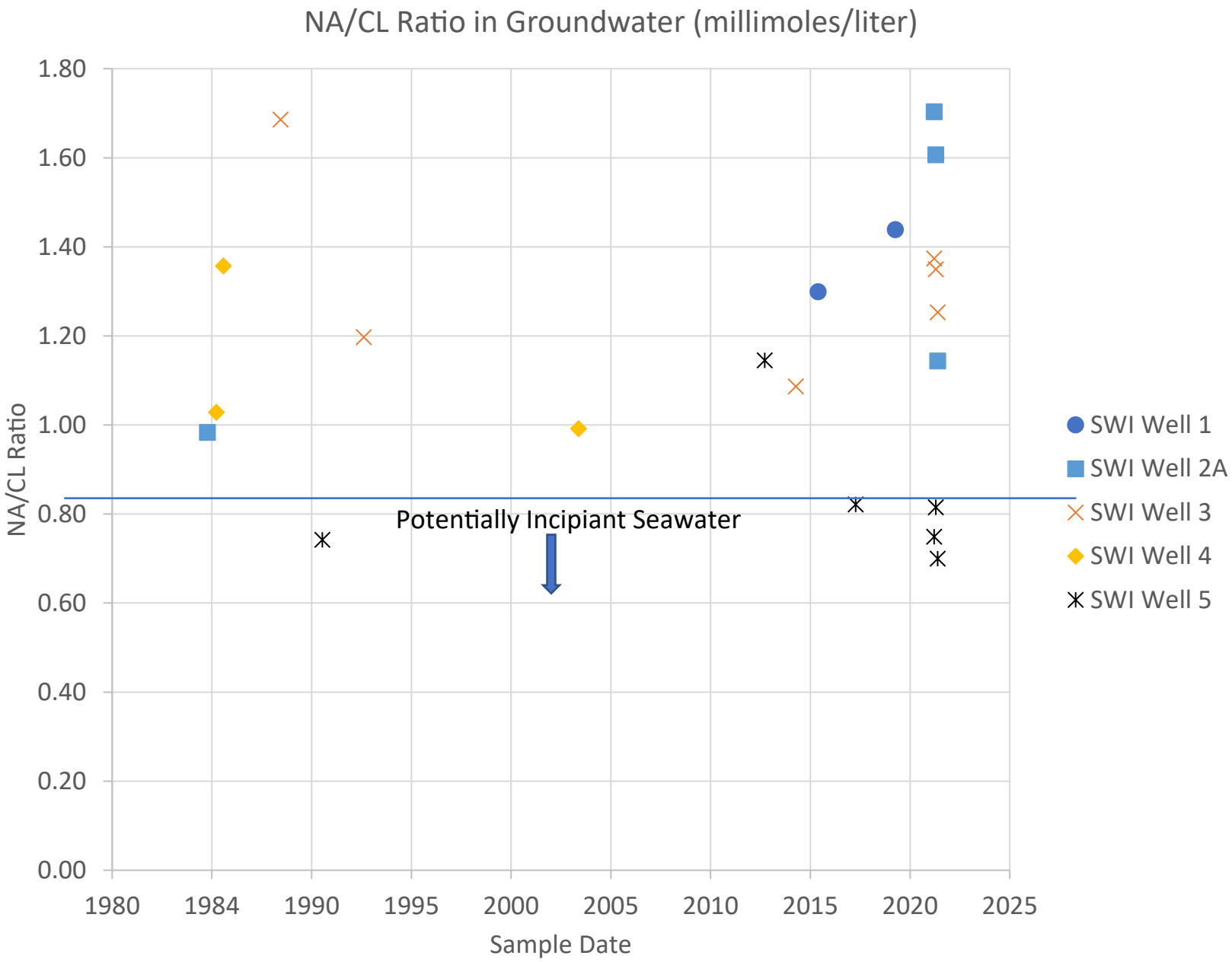


Figure 2-26

Seawater Intrusion Monitoring Wells: Ratio of Sodium (Na^+) to Chloride (Cl^-) Concentrations in Groundwater

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Legend

- Montecito Groundwater Basin (3-049, Plan Area)
- Storage Unit 1
- Storage Unit 2
- Storage Unit 3
- Toro Canyon Storage Unit
- Montecito Water District
- MWD Production Wells

Surface Water Features

- Major River/Creek
- Lake/Reservoir

Envirostor Sites and Facilities

- Inactive

GeoTracker Sites and Facilities

- Cleanup Program Sites
- LUST Cleanup Sites
- Other Sites; Non-Case Information, Pending Review
- Case Closed

Potential Media of Concern

- Undefined / Under Investigation
- Groundwater / Aquifer Concerns
- Soil

Department of Oil, Gas and Geothermal Resources

- Field Boundaries
- Inactive/Plugged/Abandoned Oil Well



Gibraltar Rd
W Mountain Dr
E Mountain Dr
Bella Vista Dr
Toro Creek Canyon Oil Seperator
Montecito Water District (shop and garage area)
Storage Unit #1
Fmr. Montecito Fire Stn. Chevron (#9-1789)
Park Ln
Ladera Ln
Buell Reservoir
Toro Canyon Creek
144
Baker Pass Rd
Hot Springs Rd
Montecito Creek
192
Picay Creek
Romero Creek
Garrapata Creek
Ortega Reservoir
Camino Viejo Rd
Alston Rd
Storage Unit #2
Oak Creek
San Ysidro Creek
San Ysidro Rd
Sheffield Dr
Equilon Enterprises LLC (Shell Station)
Hanna Property Chevron #9-1572
76 Station #0535
Storage Unit #3
Historic Oilwell Investigation
Summerland Texaco
Summerland Road yard
Toro Canyon Storage Unit
Ortega Hill Rd
101
S Salinas St
Sycamore Creek
Andree Clark Bird Refuge
Coast Village Rd
N Jameson Ln
225
Toro Canyon Rd
AGF & ASF Redistribution Station
Pacific Ocean

DATUM: NAD 1983 DATA SOURCE: ESRI; DWR; USGS; County of Santa Barbara; NWIS Mapper; SWRCB (Geotracker); DTSC (Envirostor)

DUDEK

0 0.5 1 Miles

FIGURE 2-27

Regulatory Cleanup Program Sites

Montecito Groundwater Basin Groundwater Sustainability Plan

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Legend

Montecito Groundwater Basin (3-049, Plan Area)

Surface Water Features

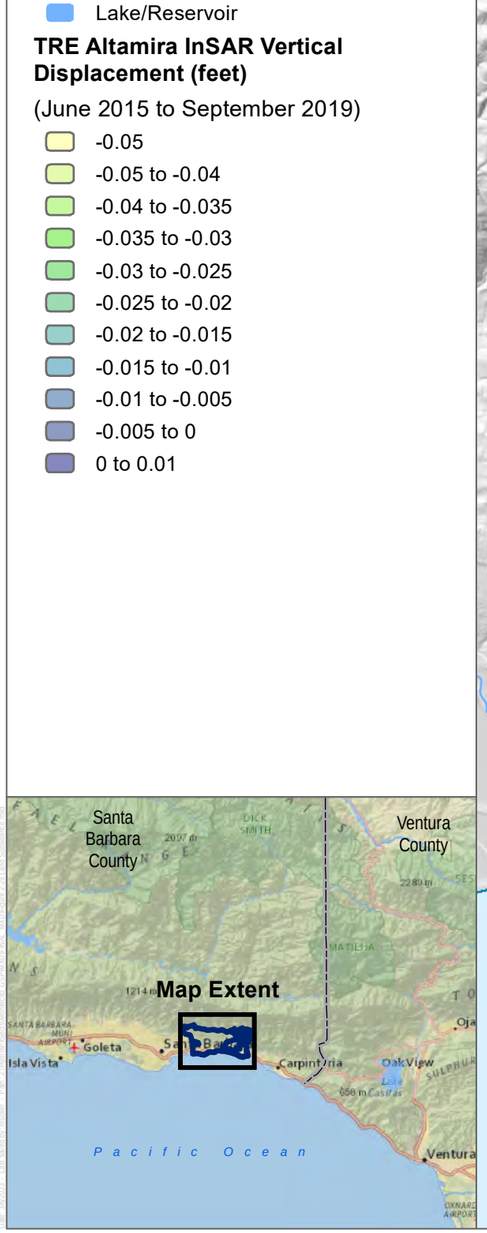
Major River/Creek

Lake/Reservoir

TRE Altamira InSAR Vertical Displacement (feet)

(June 2015 to September 2019)

- -0.05
- -0.05 to -0.04
- -0.04 to -0.035
- -0.035 to -0.03
- -0.03 to -0.025
- -0.025 to -0.02
- -0.02 to -0.015
- -0.015 to -0.01
- -0.01 to -0.005
- -0.005 to 0
- 0 to 0.01



DATUM: NAD 1983 DATA SOURCE: ESRI; DWR; USGS; County of Santa Barbara

DUDEK

0 0.5 1 Miles

FIGURE 2-28

Land Subsidence

Montecito Groundwater Basin Groundwater Sustainability Plan

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Legend

Montecito Groundwater Basin (3-049, Plan Area)

Priority Potential GDEs

Stream

Ephemeral

Intermittent

Perennial

Watershed

Sycamore Creek Watershed

Montecito Creek Watershed

Oak Creek Watershed

Romero Creek Watershed

San Ysidro Creek Watershed

Toro Canyon Creek Watershed

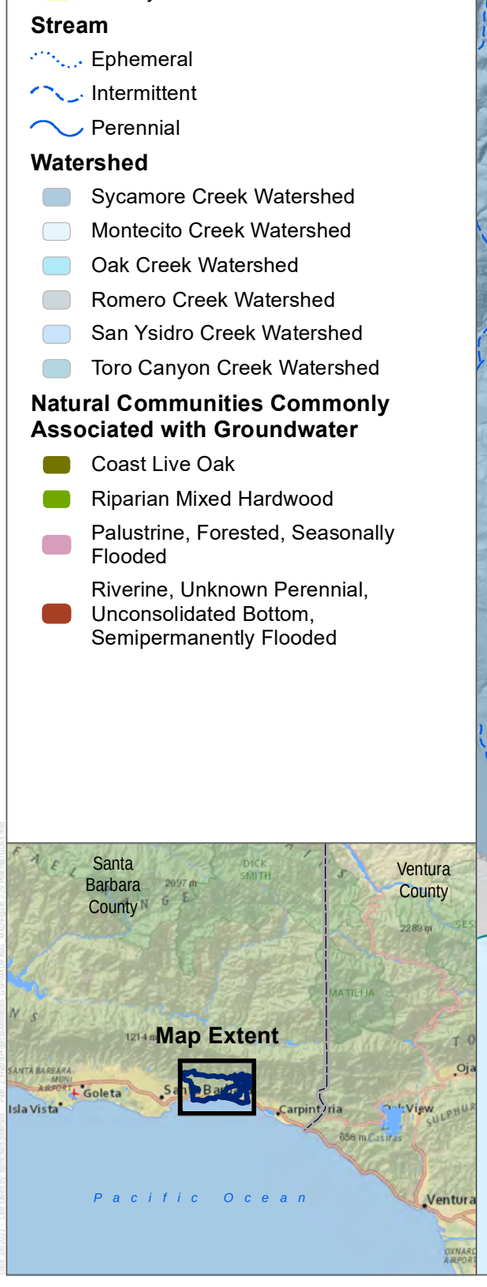
Natural Communities Commonly Associated with Groundwater

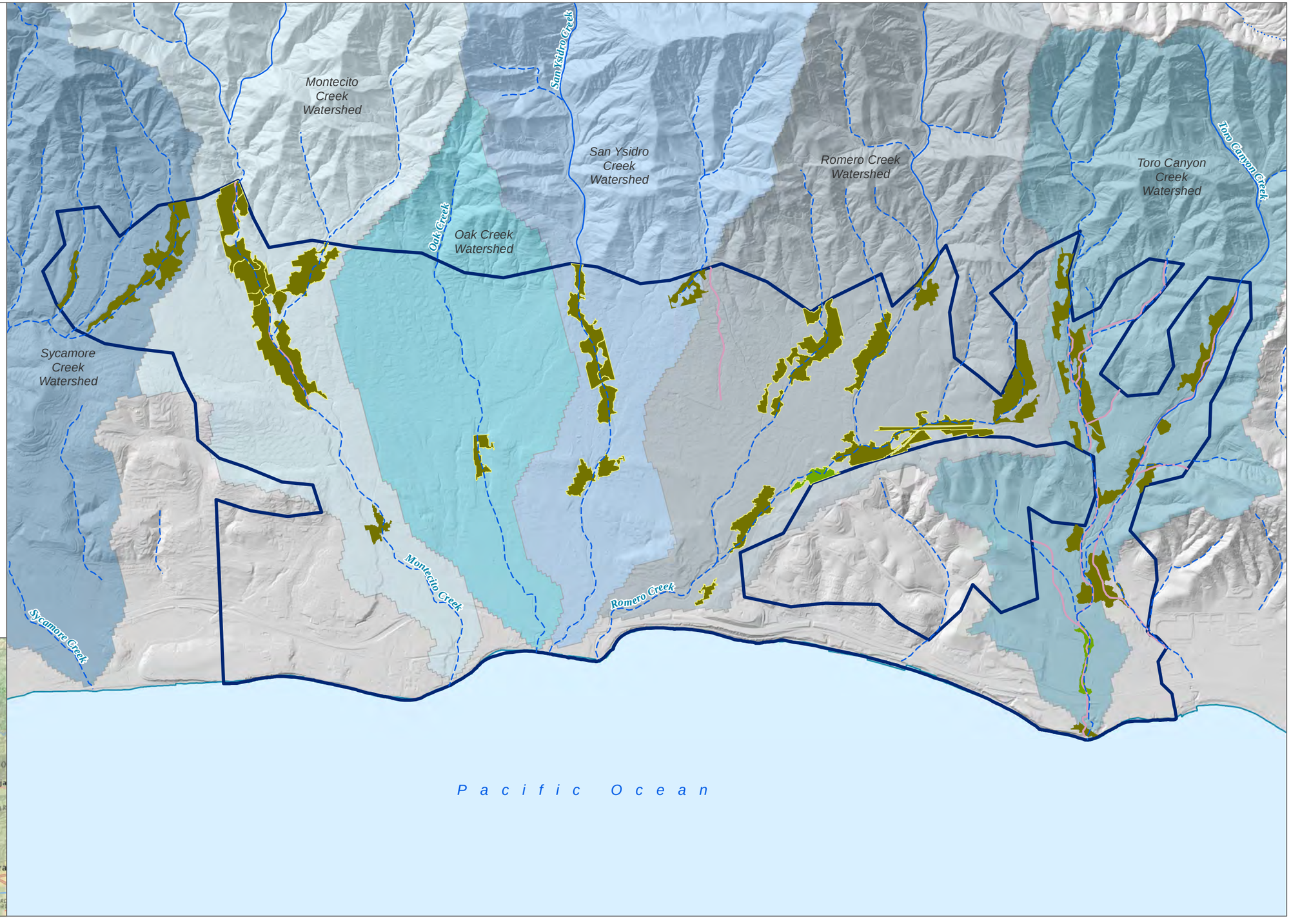
Coast Live Oak

Riparian Mixed Hardwood

Palustrine, Forested, Seasonally Flooded

Riverine, Unknown Perennial, Unconsolidated Bottom, Semipermanently Flooded





DATUM: NAD 1983 DATA SOURCE: ESRI; DWR NCCAG Dataset; USGS

DUDEK

0 0.5 1 Miles

FIGURE 2-29

Potential Groundwater-Dependent Ecosystems

Montecito Groundwater Basin Groundwater Sustainability Plan

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Legend

- Active Model Domain
- Montecito Groundwater Basin (3-049, Plan Area)
- Montecito Basin Storage Units

Interpolated Depth to Bedrock

- <15
- 16 - 60
- 61 - 95
- 96 - 162
- 163 - 234
- 235 - 290
- 291 - 350
- 351 - 460
- 461 - 700
- 701 - 1,000

Measured Depth to Bedrock

- 0 - 15
- 16 - 50
- 51 - 95
- 96 - 162
- 163 - 234
- 235 - 290
- 291 - 350
- 351 - 460
- 461 - 700
- 701 - 1000

Data Source

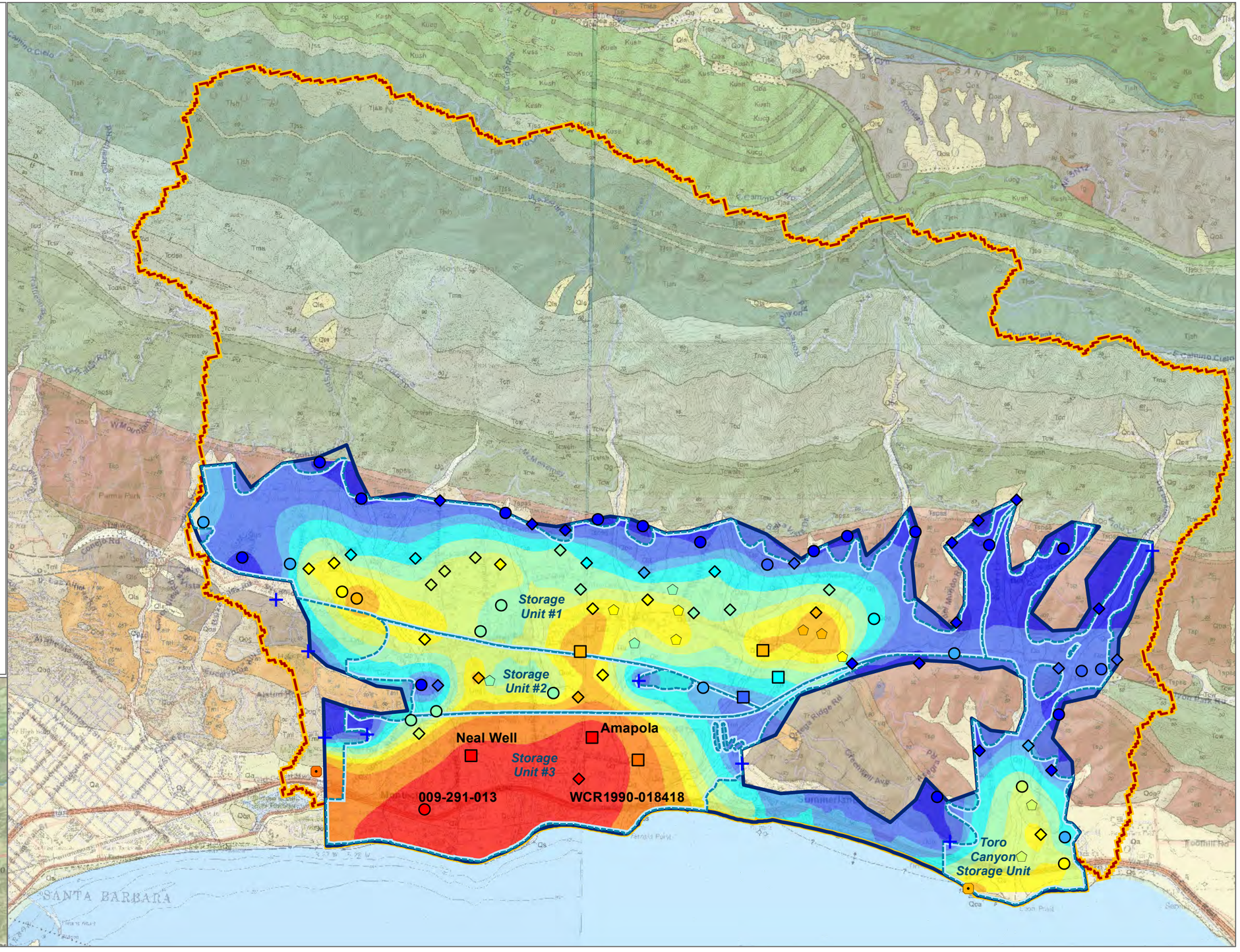
- DWR
- Diblee Map
- GTC 1974 Report
- Geosyntec
- MWD
- SB County

Notes:
MWD Logs at Amapola Well and Neal Well do not contact bedrock
Depth to bedrock at these wells estimated using cross sections in GTC (1974)

Depth to bedrock at 009-291-013 and WCR1990-018418 estimated at 1,000 ft. bgs based on Amapola and Neal Well

Measured and Interpolated Values represented Depth to Bedrock in units of feet [ft.]





SOURCE: DWR; Diblee; MWD; County of Santa Barbara; Geosyntec; GTC 1974

DUDEK

0 0.5 1 Miles

FIGURE 2-30

Measured and Estimated Depth to Bedrock in the Montecito Groundwater Basin

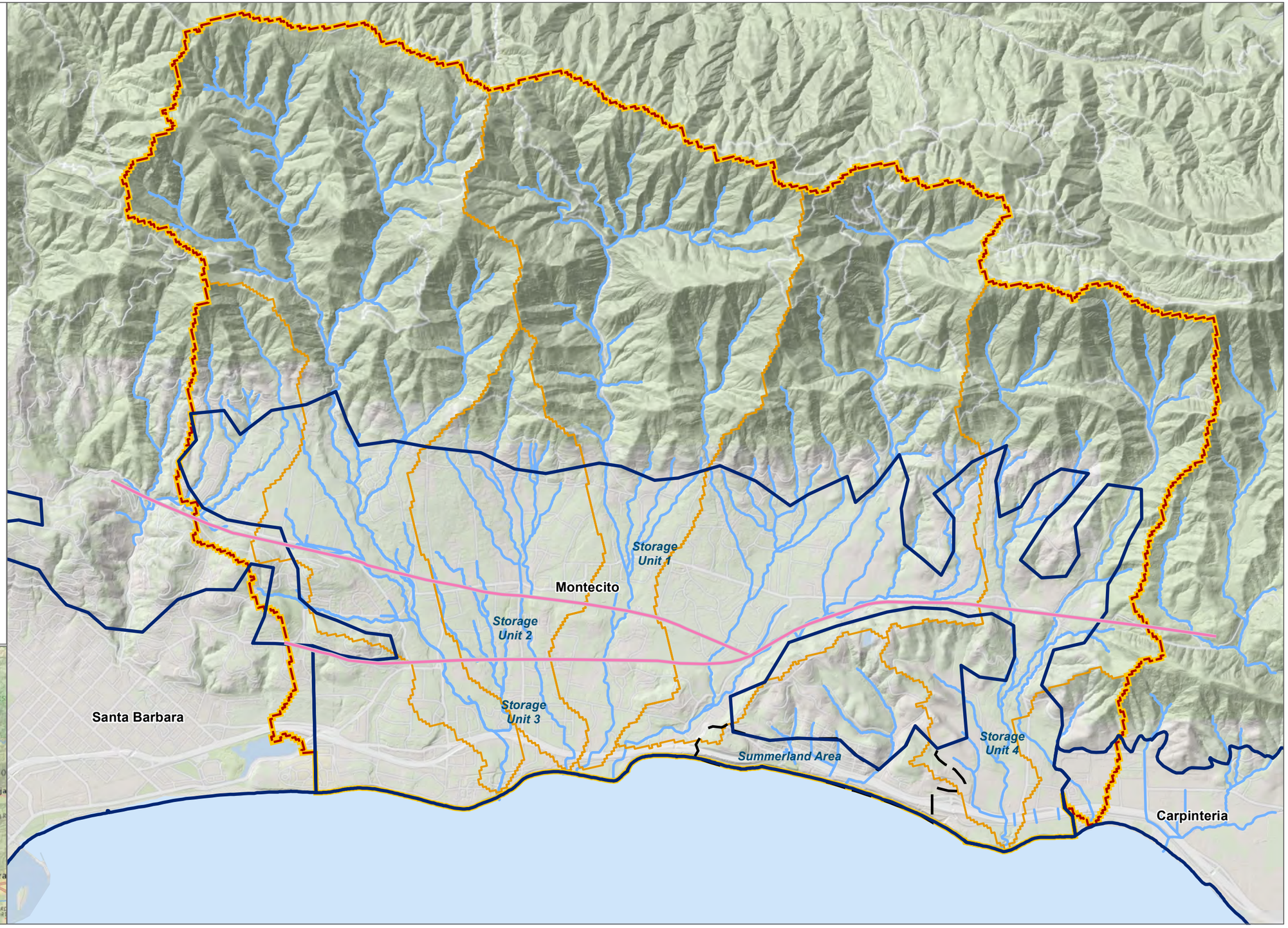
Montecito Groundwater Basin Groundwater Sustainability Plan

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Legend

- BNM Active Model Domain Extent
- Subwatershed within the MBNM
- Mapped Streams and Creeks across the Contributing Watershed
- Fault Lines
- DWR B118 Basin Boundaries
- Boundary of Summerland Area





SOURCE: MWD, DWR, USGS

DUDEK

0 0.5 1 Miles

FIGURE 2-31

BNM Active Model Domain and Primary Watershed Features

Montecito Groundwater Basin Groundwater Sustainability Plan

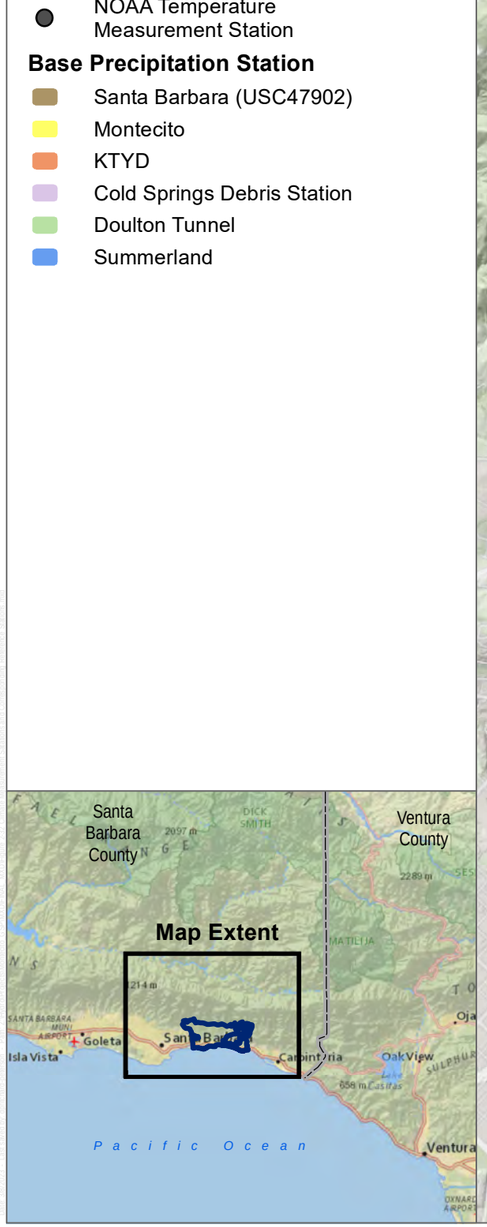
INTENTIONALLY LEFT BLANK

Legend

- Montecito Groundwater Basin (3-049, Plan Area)
- BNM Active Model Domain Extent
- Santa Barbara County Rain Gauges
- NOAA Temperature Measurement Station

Base Precipitation Station

- Santa Barbara (USC47902)
- Montecito
- KTYD
- Cold Springs Debris Station
- Doulton Tunnel
- Summerland



KTYD (#227)

Doulton Tunnel (#231)

Cold Springs Debris Basin (#210)

Montecito (#325)

Santa Barbara (USC47902)

Summerland (#328)

144 192 225 101

SOURCE: MWD, County of Santa Barbara, NOAA

DUDEK

0 0.5 1 Miles

FIGURE 2-32

Climate Measurement Stations and Corresponding Reference Stations Used in the BNM

Montecito Groundwater Basin Groundwater Sustainability Plan

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Legend

- Montecito Groundwater Basin (3-049, Plan Area)
- Montecito Basin Storage Units
- Lake/Reservoir

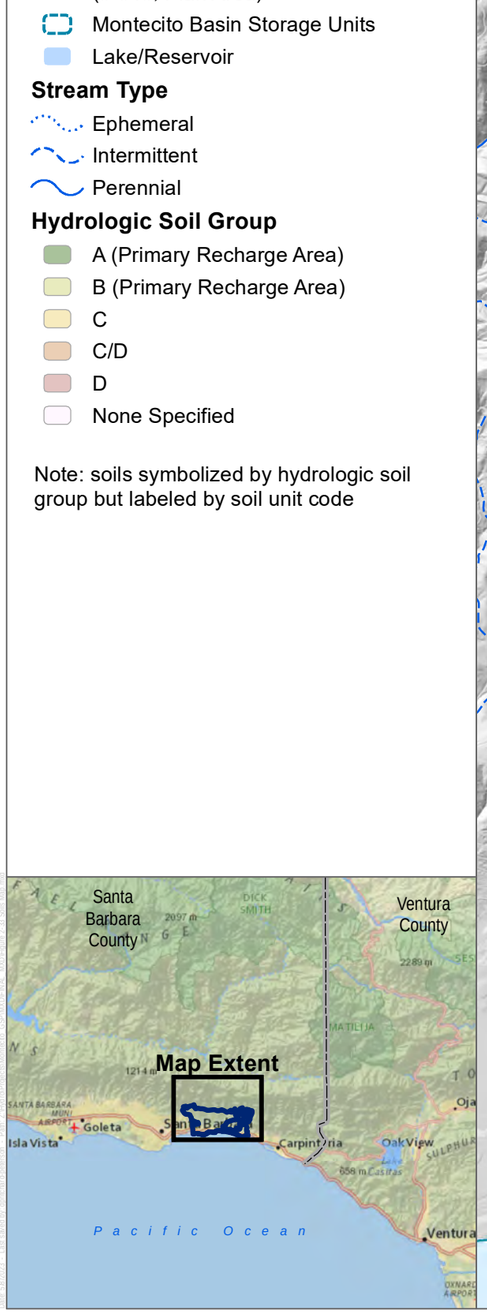
Stream Type

- Ephemeral
- Intermittent
- Perennial

Hydrologic Soil Group

- A (Primary Recharge Area)
- B (Primary Recharge Area)
- C
- C/D
- D
- None Specified

Note: soils symbolized by hydrologic soil group but labeled by soil unit code



DATUM: NAD 1983 DATA SOURCE: ESRI; DWR; USGS; County of Santa Barbara; USDA NRCS

DUDEK

0 0.5 1 Miles

FIGURE 2-33

Soils and Recharge Areas Map

Montecito Groundwater Basin Groundwater Sustainability Plan

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Legend

- Montecito Groundwater Basin (3-049, Plan Area)
- Montecito Basin Storage Units
- Parcel with Septic System

Surface Water Features

- Major River/Creek
- Lake/Reservoir



DATUM: NAD 1983 DATA SOURCE: ESRI; DWR; USGS; County of Santa Barbara

DUDEK

0 0.5 1 Miles

FIGURE 2-34

Parcels with Septic System

Montecito Groundwater Basin Groundwater Sustainability Plan

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Legend

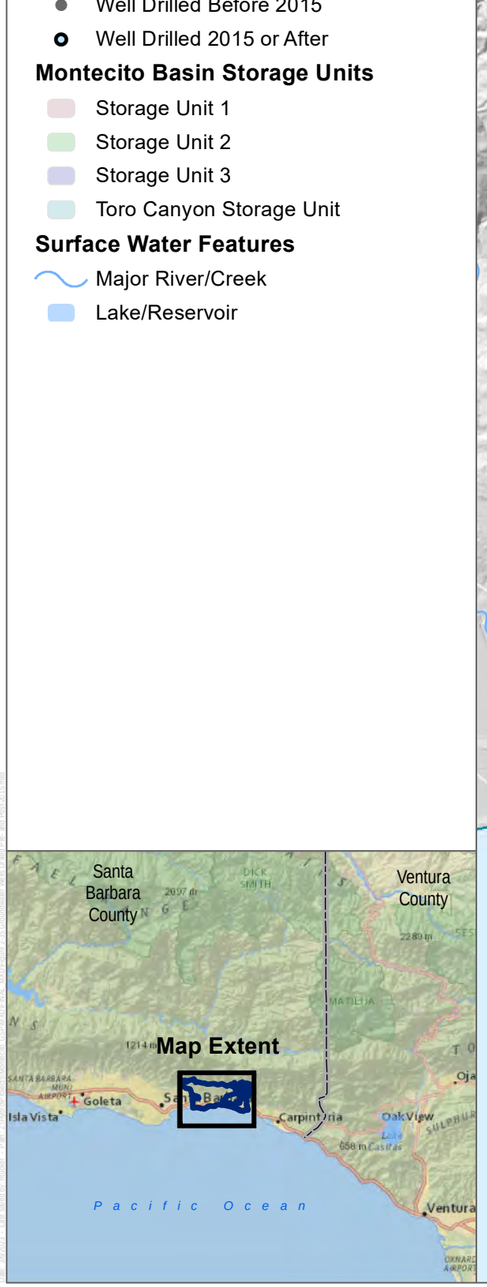
- Montecito Groundwater Basin (3-049, Plan Area)
- Well Drilled Before 2015
- Well Drilled 2015 or After

Montecito Basin Storage Units

- Storage Unit 1
- Storage Unit 2
- Storage Unit 3
- Toro Canyon Storage Unit

Surface Water Features

- Major River/Creek
- Lake/Reservoir



DATUM: NAD 1983 DATA SOURCE: ESRI; DWR; USGS; County of Santa Barbara; NWIS Mapper; Montecito Water District

DUDEK

0 0.5 1 Miles

FIGURE 2-35

Groundwater Wells Drilled Pre- vs. Post-2015

Montecito Groundwater Basin Groundwater Sustainability Plan

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Legend

- Montecito Groundwater Basin (3-049, Plan Area)
- Montecito Basin Storage Units

Groundwater Wells - Presumed Use

- Irrigation
- Domestic
- Water Supply
- Monitoring
- Cathodic Protection/Heat Exchange
- Test Well
- Industrial
- Other/Unknown

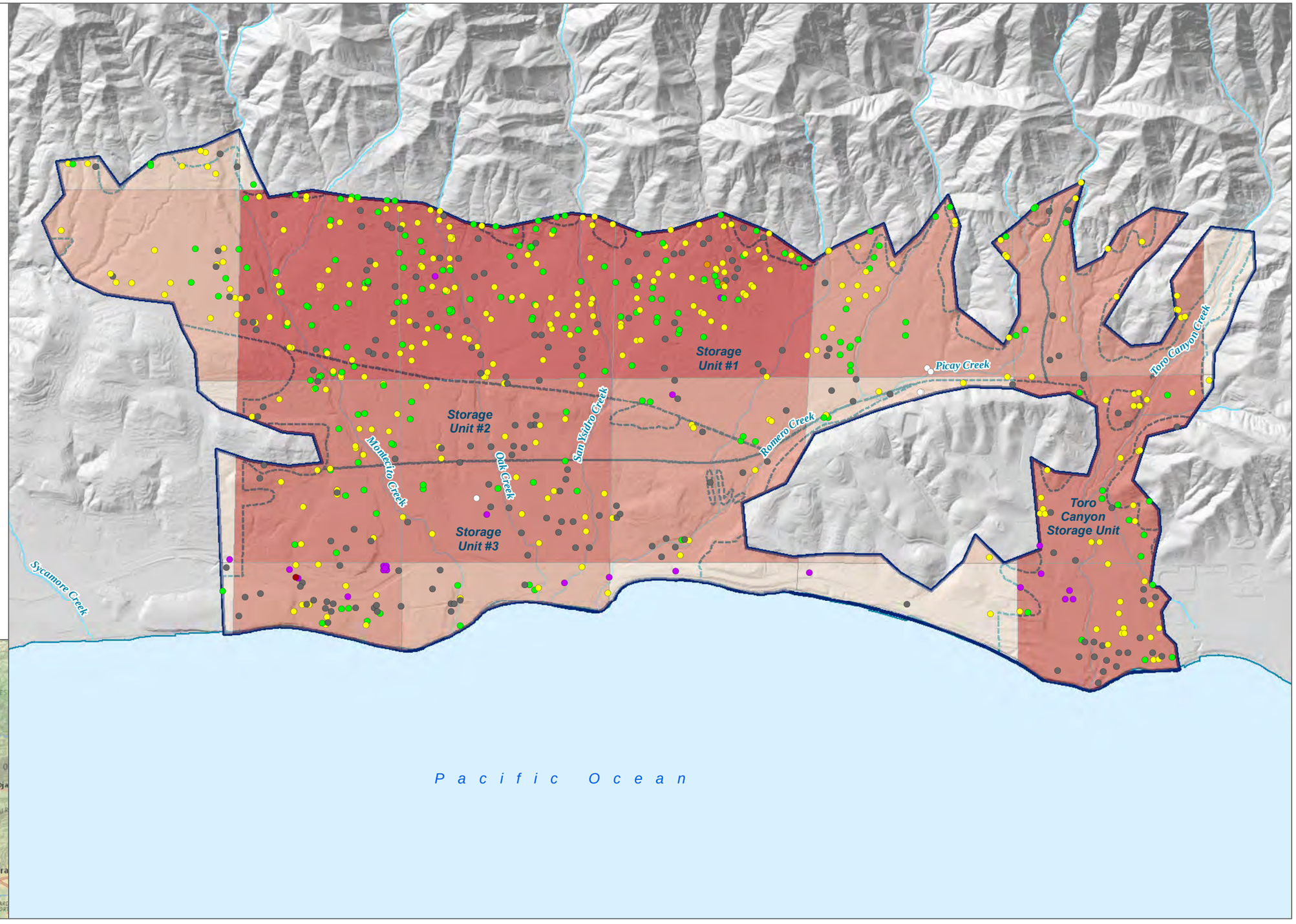
Well Density per Square Mile

- 0 - 5
- 6 - 15
- 16 - 25
- 26 - 40
- 41 - 60
- 61 - 136

Surface Water Features

- Major River/Creek





DATUM: NAD 1983 DATA SOURCE: ESRI; DWR; USGS; County of Santa Barbara; NWIS Mapper; Montecito Water District

DUDEK

0 0.5 1 Miles

FIGURE 2-36

Groundwater Well Locations and Well Density per Square Mile

Montecito Groundwater Basin Groundwater Sustainability Plan

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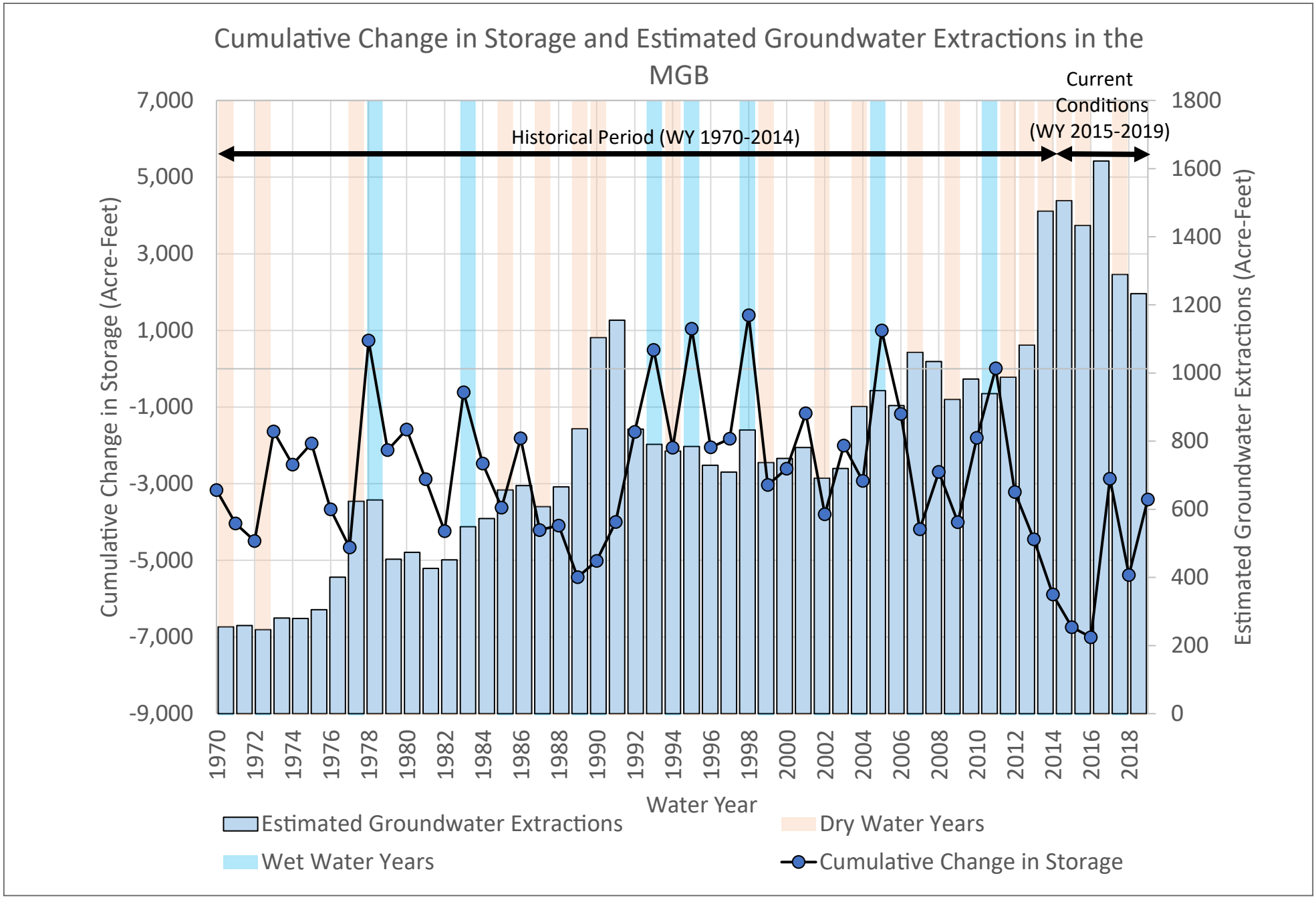


Figure 2-37

Change in Groundwater in Storage and Annual Groundwater Extractions (WY 1970-2019) in the MGB

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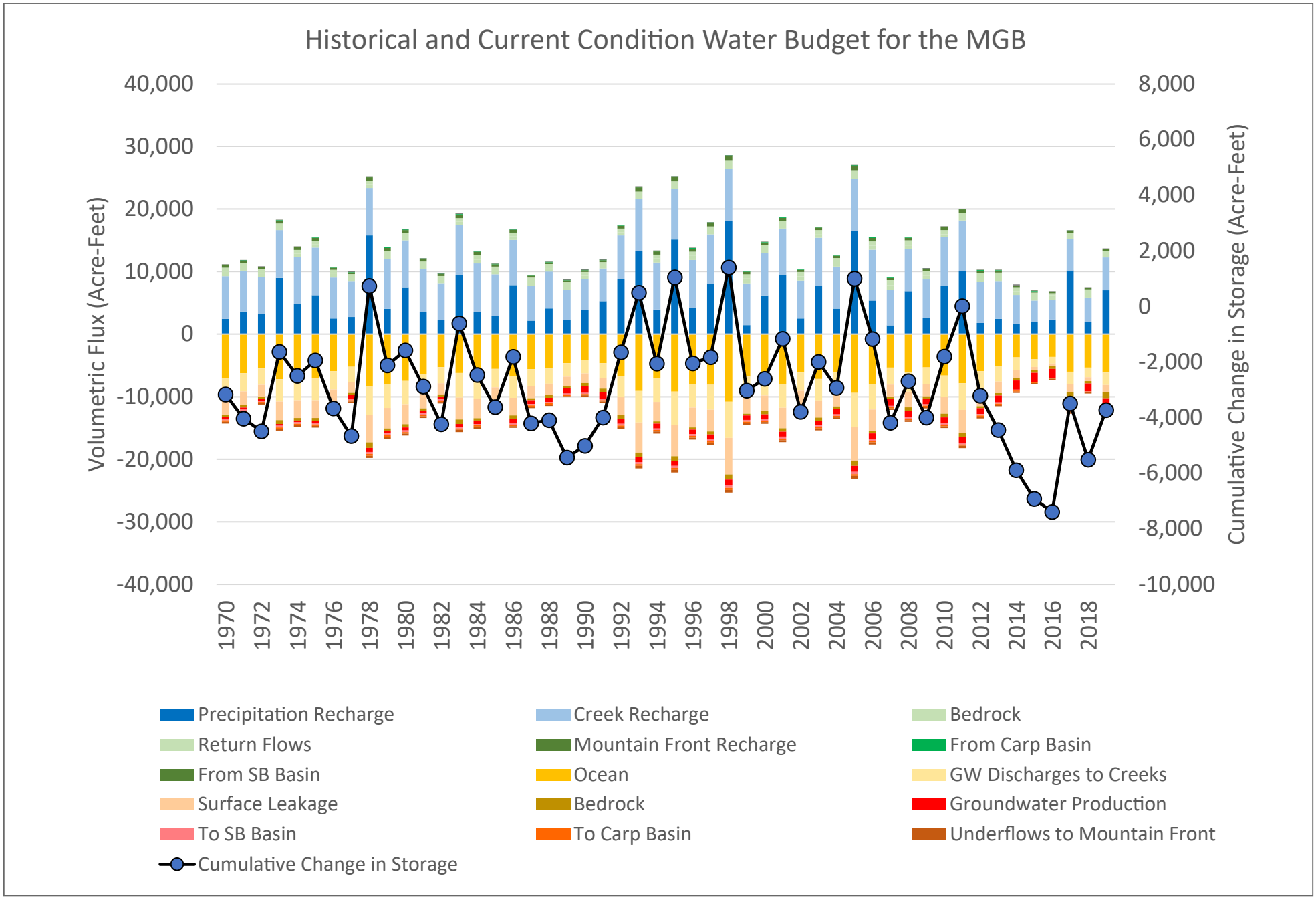


Figure 2-38

Groundwater Budget (WY 1970-2019) for the MGB

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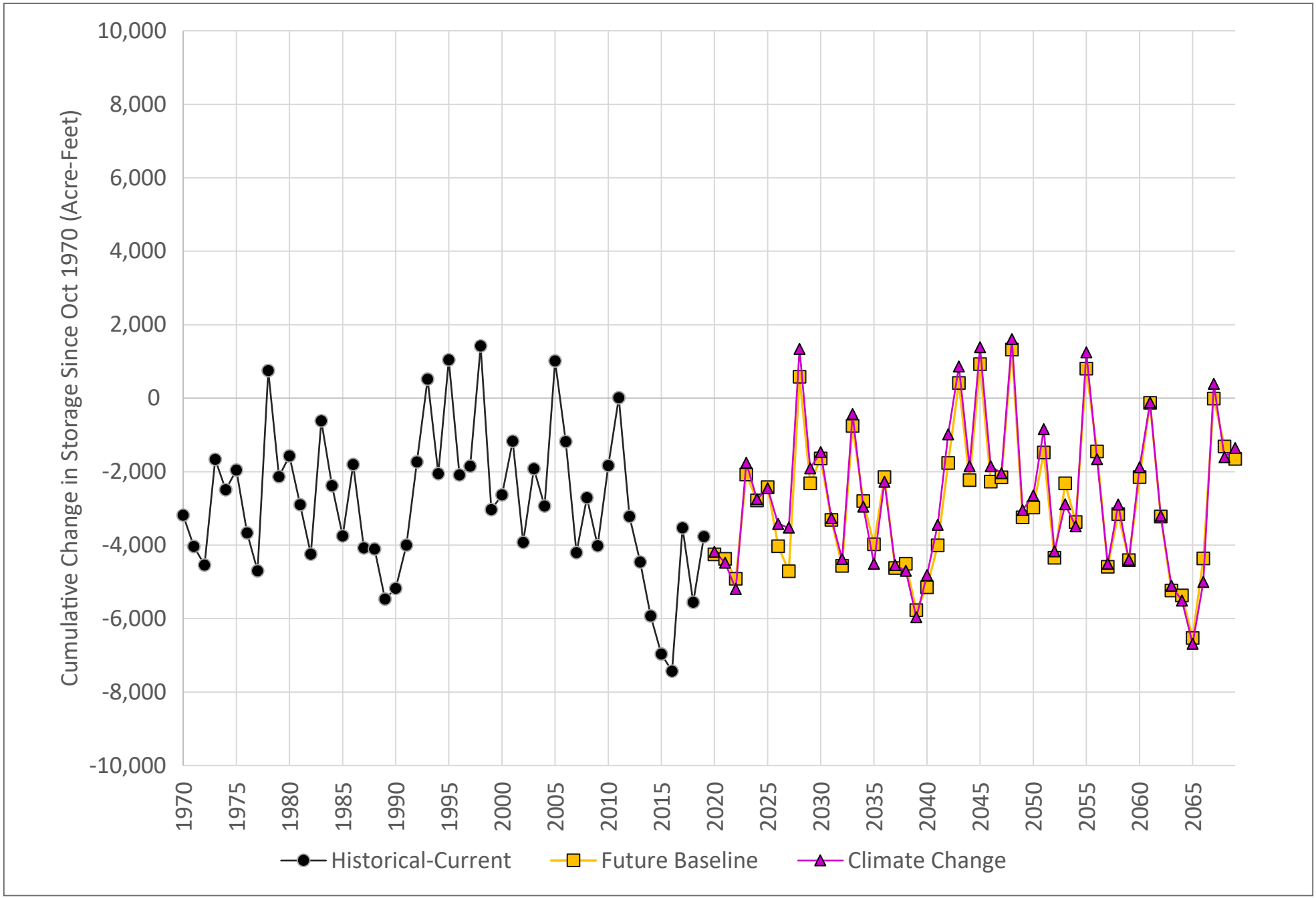


Figure 2-39

Historical, Current, and Projected Change in Groundwater in Storage (WY 1970-2069) in the MGB

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CHAPTER 3
SUSTAINABLE MANAGEMENT CRITERIA

The Montecito Groundwater Basin Groundwater Sustainability Agency (Montecito GSA) has defined the sustainability goal with consideration of the beneficial uses and users of the Montecito Groundwater Basin (MGB). This chapter of the Groundwater Sustainability Plan (GSP) presents the sustainability goal, including how it was determined and how sustainability will be achieved and maintained through the 50-year planning and implementation horizon. Each component of the sustainable management criteria is presented in a subsection of this chapter as it applies to the specific conditions of the MGB, beginning with the sustainability goal (Section 3.1), followed by the undesirable results pertaining to the sustainability indicators (Section 3.2), minimum thresholds used as indicators of potentially unsustainable conditions (Section 3.3), and measurable objectives marking the specific benchmarks on the way to achieving sustainability (Section 3.4).[1] The monitoring network provides the quantifiable metrics on which the sustainable management criteria are based (Section 3.5). The monitoring network has been configured to assess developing conditions within the MGB and fill the data gaps needed to further evaluate the sustainability indicators. The sustainable management criteria defined in this GSP will be periodically re-evaluated through the annual reports and GSP evaluations required by the Sustainable Groundwater Management Act (SGMA) and adjusted as needed to ensure MGB sustainability. Available data and current analyses indicate that no undesirable results are present or predicted in the MGB based on the definition of undesirable results (Section 3.2), basin settings and water budget (Sections 2.2 and 2.3), and sustainable management criteria (Sections 3.2, 3.3, and 3.4).

3.1 SUSTAINABILITY GOAL

The SGMA requires each Groundwater Sustainability Agency (GSA) to establish a sustainability goal for the basin that, "culminates in the absence of undesirable results within 20 years" of GSP adoption (23 CCR 354.24). Within the SGMA framework, undesirable results occur in the basin if groundwater conditions cause significant and unreasonable impacts to any combination of the following six indicators (23 CCR 354.28):

- Chronic lowering of groundwater levels
- Reduction of groundwater in storage
- Seawater intrusion
- Degraded water quality
- Land subsidence
- Depletions of interconnected surface water

The sustainability goal for the MGB will avoid undesirable results for all six sustainability indicators (Sections 3.1 through 3.6) and protect long-term groundwater availability, usability, and reliability for all beneficial uses and users in the MGB. Known beneficial uses and users in the MGB include the following:

- Municipal groundwater extractors that provide a source of potable and non-potable water supply to the communities that overlie the MGB

[1]
- "'Sustainability indicator' refers to any of the effects caused by groundwater conditions occurring throughout the basin that, when significant and unreasonable, cause undesirable results" (23 CCR 351[ah]).
- "Minimum threshold" means "a numeric value for each sustainability indicator used to define undesirable results" (23 CCR 351[t]).
- "Measurable objectives" means "specific, quantifiable goals for the maintenance or improvement of specified groundwater conditions that have been included in an adopted Plan to achieve the sustainability goal for the basin" (23 CCR 351[s]).

- Small water companies and private well owners that use groundwater as a source of domestic water supply
- Private well extractors that utilize groundwater for a source of landscape irrigation supplemental to water served by the Montecito Water District (MWD)
- Private well extractors that utilize groundwater to support local agriculture and small farming operations

Additionally, riparian and aquatic habitat that are mapped in parts of the MGB may be groundwater dependent, but the degree to which these habitats rely on groundwater is a data gap (Section 2.2.4.6, Groundwater–Surface Water Connections, and 2.2.4.7, Groundwater-Dependent Ecosystems). This is a data gap that will be further evaluated with GSP implementation.

Based on the current understanding of historical groundwater conditions, projected groundwater conditions, and the beneficial uses and users in the MGB, the Montecito GSA has defined the following sustainability goal for the MGB (Montecito GSA 2023):

> The Montecito GSA's sustainability goal is to prevent undesirable results and optimize long-term use of the groundwater basin for the benefit of all stakeholders. This will be achieved through a collaborative, knowledge-based process informed by locally-defined quantitative criteria, ongoing monitoring and modeling, and incremental, data-supported management actions as needed to prevent seawater intrusion and ensure sustainable groundwater levels, storage, and quality.

Under this definition, sustainable groundwater management includes the following:

- Protecting the long-term function of groundwater extraction wells that provide a source of municipal, domestic, landscape irrigation, and agricultural water supplies
- Ensuring groundwater elevations remain sufficiently high to protect the MGB from seawater intrusion
- Ensuring groundwater availability and quality remains suitable for all beneficial uses and users (human and ecosystem)

This sustainability goal is based on the data presented in Chapter 2, Plan Area and Basin Setting, of the GSP (e.g., Sections 2.2.4.1, Groundwater Elevation Data, 2.2.4.4, Groundwater Quality, and 2.3.2, Inflow to Groundwater System) and supports local efforts to preserve the unique, semi-rural characteristics of Montecito outlined in the Montecito Community Plan (Santa Barbara County 1995) by providing long-term availability of local water supplies during all climate conditions, including the worsening drought conditions now experienced across the state.

3.1.1 Achieving and Maintaining Sustainability

MWD, as designated by Assembly Bill 3030, oversaw groundwater management in the MGB since the establishment of the Groundwater Basin Management Plan for the Montecito Water District in 1998 (MWD 1998). In 2019, the Montecito GSA was formed to develop a new management plan for the MGB that ensures long-term sustainability.

Groundwater usage in the MGB has steadily increased from the 1970s through 2019 (Sections 2.3.5.1, Quantification of Historical Water Budget, and 2.3.5.2, Quantification of Current Water Budget) due to community buildout, increased construction of privately owned wells, climatic conditions, and environmental stresses that limit the availability of imported and local surface water supplies. While groundwater usage has increased, groundwater elevations in the MGB have not exhibited continuous long-term declines indicative of overdraft. Rather, groundwater elevations across the MGB decline during periods of drought and recover during above normal and wet water years

(for example, see hydrographs for Well 1-19, Well 1-1, Well 3-12a, and Well 3-22, in Appendix B, Montecito GSA Governance Documents).

In addition, time series of chloride concentrations measured in the Toro Canyon Storage Unit and the eastern part of Storage Unit 3 indicate that historical groundwater usage in the MGB has not led to seawater intrusion. This conclusion is based on recent groundwater quality measurements collected at wells 4-6, 3-2, 3-28, and 3-32 (Appendix E), which indicate that chloride concentrations along the coastline of the MGB are similar to, or less than, the chloride concentrations measured in the late 1980s. Additional analyses also support the absence of seawater intrusion including groundwater chemistry and cation/anion ratios using calcium, magnesium, potassium, sodium, and other constituents. However, it should be noted that the relationship between short-term groundwater level changes, seawater intrusion, and the source of elevated chloride concentrations in the southwestern part of Storage Unit 3 is a data gap (Section 2.2.4.3, Seawater Intrusion) and will be addressed through GSP implementation.

While the historical data indicate that groundwater management and usage has not resulted in overdraft or seawater intrusion to the MGB, management under the SGMA requires a more detailed characterization of the impacts of groundwater production on sustainability indicators that were previously not addressed under the 1998 groundwater management plan. These indicators include:

- Seawater intrusion: While historical data and stakeholder reports indicate seawater intrusion has not occurred in the MGB, data gaps exist regarding the spatial and temporal coverage of groundwater quality measurements in the MGB. These data gaps limit quantitative characterization of the impacts that pumping may have on localized seawater intrusion and associated degradation of groundwater quality.
- Degraded water quality: Existing groundwater quality data collected from the MGB indicate a lack of extensive or significant water quality degradation that would impact groundwater use and supply in the MGB. However, groundwater quality samples in the MGB are limited in spatial and temporal extent, and a data gap exists in regard to the relationship between groundwater usage and groundwater quality.
- Depletions of interconnected surface water: There are extremely limited data that characterize historical creek flows and no data characterizing current creek flows throughout the MGB. As a result, there is a significant data gap in regard to the degree to which the groundwater and surface water are connected in parts of the MGB, and the degree to which groundwater production influences creek flows, ecosystem uses, and users of groundwater.
- Land subsidence: While there is limited data characterizing land subsidence in the MGB, the geologic materials that compose the principal aquifer are not expected to be susceptible to land subsidence that would interfere with surface infrastructure. Therefore, while data gaps associated with this sustainability indicator exist, it is not anticipated that future undesirable results associated with this indicator will occur.

The Montecito GSA recognizes that early implementation of the GSP and associated groundwater management will occur under some degree of uncertainty as additional data is needed to fully characterize these conditions in the MGB. The Montecito GSA has adopted a management strategy that aims to provide operational flexibility for local groundwater users while avoiding conditions that might detrimentally impact MGB replenishment, groundwater accessibility, groundwater quality, and the health of ecosystems that may rely on groundwater as a source of water supply.

3.1.1.1 Management by Storage Unit

Groundwater conditions across the MGB are influenced by land use (Section 2.1.5, Land Use Elements of Topic Categories of Applicable General Plans), faulting (Section 2.2.2, Hydrogeologic Conceptual Model), and proximity to

the coastline (Sections 2.2.4.3). To provide operational flexibility to all users in the MGB, while remaining protective against local conditions that may promote the occurrence of undesirable results (Section 3.2), the Montecito GSA anticipates managing the MGB on an individual storage unit basis. Although the Montecito GSA anticipates managing the storage units individually, these storage units have not been defined as separate management areas in the MGB because there are no significant differences in groundwater usage sectors between Storage Units, they operate under the same sustainability goal (Section 3.1), and undesirable results were defined using uniform metrics across the entirety of the MGB (Sections 3.2, 3.3, and 3.4).

Because the MGB is not currently experiencing undesirable results that limit groundwater accessibility and usability, the initial management actions will mainly focus on data collection and analysis projects that reduce data gaps within the MGB (Section 2.1.2, Existing Monitoring Programs; Chapter 4, Projects and Management Actions).

3.1.2 Monitoring and Evaluating Sustainability in the Montecito Groundwater Basin

Groundwater sustainability in the MGB will be monitored and evaluated using a network of 19 groundwater monitoring wells that will be regularly sampled to characterize the spatial and temporal distribution of groundwater levels and quality throughout the MGB (Section 3.5). This network of 19 wells will be used to characterize groundwater conditions associated with four of the six sustainability indicators during early implementation of the MGB GSP (Section 3.2.7, Identifying the Occurrence of Undesirable Results in the Montecito Groundwater Basin). These four indicators are chronic lowering of groundwater levels, reduction of groundwater in storage, seawater intrusion, and degradation of groundwater quality. As described in Sections 3.3 and 3.4, the Montecito GSA has not established sustainable management criteria for interconnected surface water and land subsidence at this time; sustainability criteria for these two indicators will be developed, as appropriate, as additional data is collected during GSP implementation (Sections 3.2.5, Land Subsidence – Undesirable Results, and 3.2.6, Depletions of Interconnected Surface and Groundwater – Undesirable Results). An overview of applicable undesirable results, sustainability criteria, and associated metrics are presented in the Table 3-1 below. The background data, justification, and monitoring frequency that support the establishment of the sustainability criteria are described in Sections 3.2, 3.3, 3.4, and 3.5 of this chapter of the GSP.

Table 3-1. Defining Long-Term Sustainability

Sustainability Indicator	Storage Unit	Undesirable Result	Monitoring Metric	Minimum Threshold	Measurable Objective	Monitoring Points
Chronic Lowering of Groundwater Levels	1	Long-term loss of well function due to well screen aeration	Groundwater elevations	Elevations 10 feet below historical low	Historical average groundwater elevations	6
	2			Elevations 20 feet below historical low		2*
	3	Groundwater levels that promote seawater intrusion		Historical low inland from coastline; mean sea level along coastline		8
	Toro Canyon			Historical low		1*
Reduction of Groundwater in Storage	1	Same as chronic lowering of groundwater levels	Groundwater elevations	Same as chronic lowering of groundwater levels		
	2					
	3					
	Toro Canyon					
Seawater Intrusion	3	Degradation of water quality	Chloride concentration	Chloride = 200 mg/L	Chloride = 100 mg/L	5
	Toro Canyon					1*
Degraded Water Quality	1	Water quality concentrations that exceed state and regional regulatory levels and objectives	Concentrations of TDS, nitrate, iron, manganese, chloride	California Sate Drinking Water Standards/State Central Coast Basin Plan Objectives	California Sate Drinking Water Standards/State Central Coast Basin Plan Objectives	2
	2					2
	3					8
	Toro Canyon					1*
Land Subsidence	All	Determined not needed at this time due to MGB geology	Determined not needed at this time due to MGB geology			
Depletion of Interconnected Surface Water	All	Not defined at this time due to limited data	Not defined at this time due to limited data			

Notes: TDS = total dissolved solids; mg/L = milligrams per liter; MGB = Montecito Groundwater Basin.

* Limited data exists, more representative monitoring points to be added to storage unit during first 5 years of Groundwater Sustainability Plan implementation.

3.2 UNDESIRABLE RESULTS

To support sustainable management of the MGB, the Montecito GSA has performed a comprehensive assessment of conditions that may be associated with undesirable results. Under SGMA, undesirable results occur when groundwater conditions throughout the MGB cause significant and unreasonable impacts to any of six sustainability indicators:

- Chronic lowering of groundwater levels
- Reduction of groundwater in storage
- Seawater intrusion
- Degradation of water quality
- Land subsidence
- Interconnected surface water

The Montecito GSA has defined significant and unreasonable results for each sustainability indicator using the data and processes compiled for this GSP, with consideration of the beneficial uses and users within the MGB. The Montecito GSA is required to assess undesirable results for each indicator unless "undesirable results to one or more sustainability indicators are not present and are not likely to occur in the basin" (23 CCR 354.26 [d]). Each of the six sustainability indicators is applicable to the MGB and has been evaluated in relation to undesirable results. Sustainability indicators for which there are data gaps or too little data to fully evaluate the related undesirable results will be further defined by the development and implementation of additional monitoring capabilities during GSP implementation.

A description of the undesirable results applicable to each of the sustainability indicators is provided in Sections 3.2.1 through 3.2.6. Each section describes the cause of groundwater conditions throughout the MGB that would lead to undesirable results and the potential effects of undesirable results on the beneficial uses and users of groundwater in the MGB. The criteria used to define groundwater conditions at which undesirable results occur are described in Section 3.2.7. These criteria are based on a quantitative combination of minimum threshold exceedances for each sustainability indicator.

3.2.1 Chronic Lowering of Groundwater Levels – Undesirable Results

Chronic lowering of groundwater levels is an undesirable result applicable to, but not currently occurring in, the MGB. Undesirable results associated with chronic lowering of groundwater levels may occur in the form of a depletion of groundwater supply, depletion of interconnected surface waters that may support riparian and aquatic ecosystem, and/or the occurrence of groundwater conditions that are conducive to seawater intrusion. The primary cause of undesirable results associated with chronic lowering of groundwater levels is groundwater production in excess of the sustainable yield.

Significant and unreasonable chronic lowering of groundwater levels would impact beneficial uses and users of groundwater in the MGB by limiting the volume of accessible groundwater in the MGB, causing a long-term decline in well function due to progressive screen aeration and associated mechanical failure, limiting the ability for groundwater elevations to recover to historical average levels in response to normal and above normal water years, and/or causing

long-term loss of fresh groundwater in storage near the coast due to seawater intrusion. Groundwater levels indicative of these conditions are described in detail below.

3.2.1.1 Definition of Undesirable Results

3.2.1.1.1 Storage Unit 1

Undesirable results associated with chronic lowering of groundwater levels in Storage Unit 1 were defined with consideration of the beneficial uses and users of groundwater in the MGB (Section 3.1). Groundwater usage by these different sectors has increased from an estimated total production rate of approximately 150 acre-feet per year (AFY) in 1970 to an estimated total production rate of approximately 450 AFY in 2019 (Sections 2.3.5.1 and 2.3.5.2). Throughout this historical period, groundwater elevations have experienced declines that locally exceed 50 to 75 feet and recoveries that restore this inland storage unit back to historical high groundwater levels (e.g., Wells 1-13, 1-15, 1-19; Figure 3-1, Historical and Current Groundwater Elevations in Storage Unit 1 of the MGB). Groundwater elevation recoveries following periods of increased groundwater usage and drought indicate that historical production rates have not led to a significant and unreasonable lowering of groundwater levels in Storage Unit 1.

3.2.1.1.1.1 Significant and Unreasonable Chronic Lowering of Groundwater Levels

Long-term loss of groundwater accessibility and degradation of well function for private and municipal groundwater users is considered an undesirable result associated with chronic lowering of groundwater levels in the MGB. Because pump depths are generally not known, significant and unreasonable loss of groundwater accessibility and well function was assessed by quantifying the fraction of well screen interval that becomes entrained with air (e.g., well screen aeration) at specific groundwater elevations. Well screen aeration was used as a proxy for loss of groundwater accessibility and decline in well function because increasing levels of entrained air is expected to lead to (i) pump failure due to cavitation and insufficient net positive head suction, and (ii) increased biological activity that promotes well screen fouling and a corresponding reduction of well efficiency (Driscoll 1986; Roscoe Moss Company 1990; Schnieders 2003). Because of these potential impacts, the Montecito GSA determined that well screen aeration exceeding 50% of the total well screen length is likely indicative of impacts to long-term groundwater accessibility and well function.

Under historical average conditions, less than 10% of the wells constructed in Storage Unit 1 operated with more than 50% of the well screen aerated (Figure 3-2, Historical Estimated Groundwater in Storage and Well Aeration in Storage Unit 1 of the MGB). The relatively small fraction of wells operating under these conditions indicates that groundwater wells in the MGB are generally designed to avoid aeration. During the most recent drought, groundwater elevations in Storage Unit 1 reached historical low levels, and the storage unit experienced a 3-year period from water year 2014 through 2016 where more than 20% of the wells completed in the principal aquifer operated with at least 50% of the well screen aerated. As previously discussed, these historical low groundwater elevations and well screen aeration levels did not correspond to a significant and unreasonable loss of groundwater accessibility or degradation of well function.

To provide sufficient operational flexibility to the various water use sectors in Storage Unit 1, the Montecito GSA has defined significant and unreasonable results associated with chronic lowering of groundwater levels as groundwater elevations that occur below historical low levels. To quantify the magnitude of groundwater elevation declines associated with these significant and unreasonable impacts, the Montecito GSA assessed the potential impact to well screen aeration under a synthetic drought scenario. This drought scenario was generated by appending the model-estimated reduction of groundwater storage during the 2011–2016 drought to the fall 2019

groundwater conditions (Figure 3-2). The 2011–2016 period was selected because it is representative of recent and significant drought conditions that incorporate current groundwater extraction trends.

During the 2011–2016 drought period, groundwater in storage in Storage Unit 1 declined by approximately 3,200 acre-feet (AF) (Section 2.3.5.1). Based on the simulated storage change, average model-estimated aquifer properties, and areal extent of Storage Unit 1, the synthetic drought scenario corresponds to a 10-foot decline below historical low groundwater levels. At these groundwater levels, more than 40% of the wells in Storage Unit 1 are expected to operate with at least 50% of the well screen aerated.

Current groundwater elevations[2] in Storage Unit 1 range from approximately 20 to 100 feet above historical low groundwater elevations. Because of this, the 10-foot decline below historical low is expected to provide sufficient operational flexibility to meet current municipal and private well demands, while ensuring that groundwater elevations do not drop to levels that may impact long-term groundwater accessibility and well function or inhibit basin recovery. Based on this analysis, the Montecito GSA has defined undesirable results associated with chronic lowering of groundwater levels in Storage Unit 1 as groundwater elevation declines that remain 10 feet below historical low groundwater levels for a period of more than 3 consecutive water years.

The 3-year time frame was selected based on historical groundwater elevation declines and recoveries. In Storage Unit 1, groundwater elevations exhibit seasonal variations that on average range from approximately 10 to 20 feet between spring high and fall low conditions (Appendix E, Groundwater Elevation Hydrographs). Groundwater elevation declines that persist for up to 3 years have historically recovered in response to a single normal or above normal water year. Conversely, consecutive seasonal declines that have exceeded a 3-year timeframe have been followed by recovery, but these recoveries are generally not associated with restoration to pre-dry-period conditions. Based on this, the 3-year time frame is anticipated to provide operational flexibility during short periods of below normal water years, while mitigating against long-term declines that limit the MGB's recovery during normal and above normal water years.

In addition to providing operational flexibility to private and municipal groundwater users, the 10-foot decline below historical low is not expected to draw groundwater elevations down to significantly low levels that would impede recovery and long-term access of groundwater for beneficial users in the MGB. The definition of an undesirable result associated with chronic lowering of groundwater levels in Storage Unit 1 will be re-evaluated as additional data is collected and as part of the 5-year GSP evaluation.

3.2.1.1.2 Storage Unit 2

Undesirable results associated with chronic lowering of groundwater levels in Storage Unit 2 were defined with consideration of all beneficial uses and users. Groundwater usage in Storage Unit 2 is estimated to have increased from approximately 10 AFY in water year 1970 to approximately 175 AFY in water year 2019. Unlike Storage Unit 1, there is insufficient groundwater elevation data for Storage Unit 2 to characterize historical groundwater elevations and trends in this part of the MGB. However, because, the geologic and geographic setting of Storage Unit 2 is similar to that of Storage Unit 1, undesirable results associated with chronic lowering of groundwater levels were defined using the same well screen aeration criteria as those established for Storage Unit 1.

[2] Current conditions are defined using data collected in the 2019 water year. Groundwater quality data from the 2021 water year were integrated into the GSP as part of MWD's implementation of the Round 1 Sustainable Groundwater Management Grant Program Award.

During the 2011–2016 drought period, the Basin Numerical Model (BNM) estimates that groundwater in storage in Storage Unit 2 declined by approximately 1,300 AF (Section 2.3.5.1). Based on the simulated storage change, average model-estimated aquifer properties, and areal extent of each storage unit, the synthetic drought scenario corresponds to a 20-foot decline in groundwater elevations below historical low groundwater levels. At these groundwater levels, approximately 20% of the wells in Storage Unit 2 are expected to operate with at least 50% of the well screen aerated[3] (Figure 3-3, Historical Estimated Groundwater in Storage and Well Aeration in Storage Unit 2 of the MGB).

Based on this analysis, the Montecito GSA has defined undesirable results associated with chronic lowering of groundwater levels in Storage Unit 2 as groundwater elevation declines that remain 20 feet below historical low groundwater levels for a period of more than 3 consecutive water years.

As previously noted, there is insufficient data to define historical groundwater elevations in Storage Unit 2. Accordingly, the modeled-estimate change in storage and corresponding estimate of groundwater elevations in the storage unit are subject to a significant degree of uncertainty.

To address this data gap, the Montecito GSA has constructed a dedicated monitoring well in Storage Unit 2 and is now monitoring privately owned wells in the storage unit. The definition of an undesirable result associated with chronic lowering of groundwater levels in Storage Unit 2 will be re-evaluated as additional data is collected from these wells and as part of the 5-year GSP evaluation.

3.2.1.1.3 Storage Unit 3 and the Toro Canyon Storage Unit

Undesirable results associated with chronic lowering of groundwater levels in Storage Unit 3 and the Toro Canyon Storage Unit were defined with consideration to the beneficial uses and users of groundwater in the coastal storage units of the MGB (Section 3.1). Groundwater usage by these different sectors has increased throughout the historical period in Storage Unit 3 and the Toro Canyon Storage Unit. In water year 1970, total estimated production from these storage units was approximately 100 AFY, and in water year 2019, total production was estimated to be approximately 600 AFY (Sections 2.3.5.1 and 2.3.5.2). Similar to Storage Unit 1, groundwater elevations throughout the historical record demonstrate a strong response to climatic variability, exhibiting declines during drought and recovery during above normal and wet water years (for example, see hydrographs for Wells 3-2, 3-22, and 3-12a; Figure 3-4, Historical and Current Groundwater Elevations in Storage Unit 3 of the MGB).

More than 75% of the wells constructed in Storage Unit 3 and the Toro Canyon Storage Unit are screened entirely below sea level. Because of this, beneficial uses and users of groundwater in the coastal storage units of the MGB would likely be impacted by seawater intrusion prior to experiencing levels of well screen aeration that impact long-term well function. Therefore, undesirable results associated with chronic lowering of groundwater levels in Storage Unit 3 and the Toro Canyon Storage Unit were defined with consideration of seawater intrusion.

Groundwater elevations vary spatially across Storage Unit 3 and have historically been lowest in the northern part of the storage unit, adjacent to the Montecito Fault, which is located approximately 1 mile inland from the coast. Along the trace of the Montecito Fault, land surface elevations range from approximately 100 to 200 feet mean sea level (MSL). In this inland part of the storage unit, groundwater elevations reached historical low levels in water years 2016 and 2017, where they were encountered approximately −10 to −100 feet MSL. During this same period,

[3] Groundwater elevations in the principal aquifer in Storage Unit 2 have not historically been monitored due to the relatively low yield and productivity of the storage unit. Because of this, historical well screen aeration levels are not well constrained. The GSA is currently using state grant funds to construct a multi-completion monitoring well in Storage Unit 2 to address this data gap.

groundwater elevations measured along the coast ranged from −10 feet MSL to 50 feet MSL. While groundwater levels were encountered significantly below sea level in the inland parts of Storage Unit 3, groundwater quality measurements collected along the coastline indicate that these groundwater elevations did not induce seawater intrusion (Section 3.1). These data indicate that undesirable results associated with chronic lowering of groundwater levels in Storage Unit 3 and the Toro Canyon Storage Unit are not currently occurring.

3.2.1.1.3.1 Significant and Unreasonable Chronic Lowering of Groundwater Levels

Because the Montecito GSA aims to preserve the volume of fresh groundwater along the coast, the undesirable result associated with chronic lowering of groundwater levels would be groundwater elevations that promote seawater intrusion to the MGB. To ensure that groundwater levels do not promote seawater intrusion to the MGB, the Montecito GSA has defined undesirable results associated with chronic lowering of groundwater levels in Storage Unit 3 and the Toro Canyon Storage Unit as groundwater elevations that (i) drop below historical low levels near the Montecito Fault for a period of more than 3 consecutive water years, or (ii) drop below the density-adjusted MSL along the coast for a period of more than 3 consecutive water years.

This definition of an undesirable result provides a balanced management framework that aims to maintain a seaward gradient along the coast while providing operational flexibility inland of the coast, where water levels have historically dropped below sea level without a corresponding occurrence of seawater intrusion. The definition of an undesirable result associated with chronic lowering of groundwater levels in Storage Unit 3 will be re-evaluated as additional data is collected and as part of the 5-year GSP evaluation.

3.2.2 Reduction of Groundwater in Storage – Undesirable Results

Significant and unreasonable reduction of groundwater in storage is an undesirable result applicable to the MGB. The primary cause of significant and unreasonable reduction of groundwater in storage is groundwater production in excess of the sustainable yield. Significant and unreasonable reduction of groundwater in storage may occur in the form of the following:

- Reduction of groundwater supply in the inland storage units that limits the volume of groundwater accessible to local users and limits aquifer recovery during normal and above normal water years
- Replacement of fresh groundwater supplies with seawater in the coastal parts of the MGB abutting the Pacific Ocean

Significant and unreasonable reduction of groundwater in storage is also associated with chronic lowering of groundwater levels and may be associated with seawater intrusion. Similar to chronic lowering of groundwater levels, undesirable results associated with reduction of groundwater storage are not currently occurring (Section 3.2.1, Chronic Lowering of Groundwater Levels – Undesirable Results).

Groundwater elevations in the MGB will be used to determine whether significant or unreasonable reduction of groundwater storage occurs. Based on well construction information, historical groundwater usage, and historical water levels, significant and unreasonable reduction of groundwater storage is defined as the following for each storage unit:

Storage Unit 1

Groundwater elevation declines that remain 10 feet below historical low groundwater levels for a period of more than 3 consecutive water years.

Storage Unit 2

Groundwater elevation declines that remain 20 feet below historical low groundwater levels for a period of more than 3 consecutive water years.

Storage Unit 3 and the Toro Canyon Storage Unit

Groundwater elevations that (i) drop below historical low levels near the Montecito Fault for a period of more than 3 consecutive water years, or (ii) drop below the density-adjusted MSL along the coast for a period of more than 3 consecutive water years.

These criteria are the same as those established for chronic lowering of groundwater levels (Section 3.2.1) and are expected to maintain the volume of groundwater in storage equal to 55% of the total usable storage in Storage Unit 1,[4] maintain the volume of groundwater in storage equal to 75% of the total usable storage in Storage Unit 2,[5] and preserve the volume of fresh groundwater in storage in Storage Unit 3 and the Toro Canyon Storage Unit.

3.2.3 Seawater Intrusion – Undesirable Results

Significant and unreasonable seawater intrusion is an undesirable result applicable to the MGB. The primary cause of an undesirable result associated with seawater intrusion would be groundwater production in excess of the sustainable yield. Groundwater production in excess of the sustainable yield may lead to seawater intrusion by causing groundwater elevations along the coast to drop below sea level, inducing landward migration of saline water into the freshwater aquifers of the MGB. Significant and unreasonable seawater intrusion would impact beneficial uses and users of groundwater in the MGB by reducing the volume of fresh groundwater available for domestic, municipal, and irrigation supplies.

Chloride concentrations measured at wells constructed near the coast indicate that chloride in groundwater has not increased since the 1980s, when testing began (Section 3.1; Figure 3-5, Historical and Current Chloride Concentrations Measured along the Coastline of the MGB). Inland of the coast, chloride concentrations in groundwater measured near the Montecito Fault have ranged from approximately 198 milligrams per liter (mg/L) (measured on June 14, 2021, at the Ennisbrook 2 well) to approximately 470 mg/L (measured on June 25, 2018, at the Ennisbrook 5 well; Figure 3-6, Wells with Chloride Concentration Measurements Used to Evaluate Sustainable Management Criteria for the MGB, and Figure 3-7, Historical and Current Chloride Concentrations Measured in the Inland Portions of Storage Unit 3 in the MGB). These chloride concentrations are approximately 100–400 mg/L

[4] Usable storage in Storage Unit 1 was estimated by calculating the volume of groundwater in storage between historical high groundwater levels and the base of the alluvium that composes the principal aquifer. Using model-estimated specific yield, historical high potentiometric surface, and alluvium thickness, it was estimated that the total usable storage in Storage Unit 1 is approximately 14,000 AF. This estimate is uncertain and will be refined as additional data is collected through GSP implementation.

[5] Usable storage in Storage Unit 2 was estimated by calculating the volume of groundwater in storage between historical high groundwater levels and the base of the alluvium that composes the principal aquifer. Using model-estimated specific yield, historical high potentiometric surface, and alluvium thickness, it was estimated that the total usable storage in Storage Unit 2 is approximately 8,200 AF. This estimate is uncertain due to the lack of historical groundwater level data in the storage unit. Additionally, this estimate will be refined as additional data is collected through GSP implementation.

higher than those measured along the coast. While the source of these chlorides is not well characterized, the fact that the chloride concentration trends in this part of the MGB differ from those measured along the coastline suggests that chloride in the inland portions of Storage Unit 3 is not associated with seawater intrusion. These data indicate that undesirable results associated with seawater intrusion are not currently occurring in the MGB.

3.2.3.1 Seawater Intrusion Monitoring Projects and Programs

As discussed in Sections 2.1.2 and 2.2.4.3, data gaps exist associated with the spatial and temporal distribution of chloride concentration measurements in the MGB. These data gaps impact the ability to assess the degree to which short-term groundwater level declines below sea level promote temporary seawater intrusion, the concentration of chloride in groundwater adjacent to the coastline in the Toro Canyon Storage Unit, and the degree to which seawater intrusion has or has not impacted water quality in the southwestern part of Storage Unit 3. In 2021, the Montecito GSA expanded their seawater intrusion monitoring network and is currently constructing a new dedicated monitoring well in the southwestern part of the MGB to address the spatial and temporal data gaps in Storage Unit 3. Additionally, the Montecito GSA has identified projects to expand seawater intrusion monitoring in the Toro Canyon Storage Unit during GSP implementation (Chapter 4).

3.2.3.2 Definition of Undesirable Results

Based on historical groundwater usage, groundwater elevations, and groundwater quality, the undesirable results associated with seawater intrusion is the occurrence of chloride concentrations that exceed 200 mg/L along the coastline. The 200 mg/L chloride concentration level is approximately equal to the lowest chloride concentration currently measured in the inland portion of Storage Unit 3, near the Montecito Fault.

The 200 mg/L chloride concentration was selected because the change from current chloride concentrations to the 200 mg/L concentration is indicative of a positively increasing trend along the coastline but is not expected to cause groundwater quality degradation to the extent that beneficial uses and users are impacted. Because groundwater elevations directly impact seawater intrusion in the MGB, the groundwater elevation minimum thresholds and measurable objective are established to prevent seawater intrusion (Sections 3.3.1, Chronic Lowering of Groundwater Levels, and 3.4.1, Chronic Lowering of Groundwater Levels). Additionally, while chloride concentrations will be used to evaluate undesirable results associated with seawater intrusion, the Montecito GSA plans to monitor concentrations of iodide, bromide, and silica along the coastline to better characterize the source(s) of chloride measured in Storage Unit 3.

3.2.4 Degradation of Water Quality – Undesirable Results

Degradation of water quality is an undesirable result that is applicable to the MGB. Groundwater quality has been monitored since the 1980s and has remained suitable for current and planned beneficial uses (Section 2.2.4.4). Constituents of potential concern (COPC) within the MGB include total dissolved solids (TDS), nitrate, chloride, manganese, and iron (Table 2-16). Deeper resident connate fluids native to the MGB may be a source of salts, inorganic constituents, and trace metals in the MGB (USGS 2016). The Montecito GSA is currently assessing opportunities to enhance water quality monitoring to identify regions in the MGB where these resident connate fluids are contributing to constituent concentrations in the principal aquifer.

TDS, nitrate, chloride, manganese, and iron concentrations in groundwater have temporarily exceeded maximum contaminant level (MCL) and secondary MCL (SMCL) concentrations in localized regions of the MGB (Figure 3-8, Current Groundwater Quality Monitoring Wells in the MGB, through Figure 3-12, Historical and Current Iron

Concentrations Measured in Groundwater in the MGB). These MCL and SMCL exceedances have not historically occurred over geographically extensive regions of the MGB or for extended periods of time that would impact groundwater usage (Figures 3-8 through 3-12). The groundwater quality data collected in the MGB indicate that undesirable results associated with degradation of water quality are not currently occurring in the MGB.

The MWD complies with all applicable testing and treatment requirements for production wells, and the Montecito GSA intends to increase monitoring of groundwater quality where data gaps exist (see Section 3.5.7.2, Identification of Data Gaps, and Chapter 4, Projects and Management Actions). The Montecito GSA has constructed new dedicated groundwater monitoring wells in Storage Unit 2 and the southwestern part of Storage Unit 3 as part of these efforts. The Montecito GSA plans to construct additional dedicated groundwater monitoring wells in the southwest part of Storage Unit 3 and in the Toro Canyon Storage Unit, south of Freeway 101 (Section 2.1.2.5, Monitoring Network Grant Programs).

3.2.4.1 Definition of Undesirable Result

The undesirable result for each COPC in the MGB is a concentration in groundwater that exceeds state regulatory standards or objectives established in the Regional Water Quality Control Board (RWQCB) Water Quality Control Plan for the Central Coast Basin (Central Coast Basin Plan) (Table 3-2; Central Coast RWQCB 2019). The undesirable result concentration was established by comparing the state regulatory standards and RWQCB Central Coast Basin Plan objectives and selecting the higher of the two values (Table 3-2). The lower of the two values was selected for establishment of the measurable objective concentrations (Section 3.4.4, Degraded Water Quality – Measurable Objectives).

This definition of an undesirable result ensures that groundwater usability is preserved while water quality data gaps are addressed. As noted in Chapter 2 of this GSP, these water quality data gaps contribute to uncertainty in the relationship between groundwater pumping, groundwater levels, and CPOC concentrations in groundwater. The Montecito GSA is currently assessing opportunities to reduce these data gaps and plans to re-evaluate this undesirable result definition and corresponding sustainable management criteria as part of the 5-year update to the GSP.

Table 3-2. Undesirable Results Associated with the Degradation of Water Quality

Contaminant of Potential Concern	State Regulatory Standards SMCLs (mg/L)		U.S. Environmental Protection Agency SMCLs (mg/L)	RWQCB Central Coast Basin Plan Objectives	
	SMCL (mg/L)	*Upper SMCL (mg/L)*		*Concentration (mg/L)*	*Notes*
TDS	N/A	**1,000**	500	700	SB and Carp mean values
Manganese	0.05	N/A	0.05	**0.2**	For Ag use
Iron	0.3	N/A	0.3	**5**	For Ag use
Chloride*	N/A	**500**	250	75	SB and Carp mean values
Nitrate**	**10**		10	7	SB and Carp mean values Nitrate values are maximum contaminant levels (MCL)

Notes: SMCL = secondary maximum contaminant level; mg/L = milligrams per liter; RWQCB = Regional Water Quality Control Board; TDS = total dissolved solids; N/A = not available/not applicable.
SB and Carp mean values = the values determined for the Montecito Groundwater Basin are an average of those for the Santa Barbara and Carpinteria Groundwater Basins.
Undesirable result concentrations highlighted in **bold**.
* Undesirable results for chloride along the coast are established separately for seawater intrusion.
** Nitrate as nitrogen.

3.2.5 Land Subsidence – Undesirable Results

Groundwater production from the MGB may result in significant and unreasonable land subsidence if the subsidence "substantially interferes with surface land uses" (CWC Section 10721[x][5]). Interferometric synthetic aperture radar (InSAR) land surface elevation data has documented vertical displacement of about 0.10 inches of land surface rise to about a 0.5 inches of land surface subsidence between June 2015 and September 2019 within separate parts of the MGB (Figure 2-28, Land Subsidence), and there is no evidence of historical infrastructure failure attributable to inelastic land subsidence (Section 2.2.4.5, Land Subsidence). Based on these data, inelastic land subsidence is an undesirable result not currently occurring or likely to occur in the future within the MGB.

Because significant and unreasonable land subsidence due to groundwater production is not known to have occurred in the past nor expected to occur in the future, the Montecito GSA has not established undesirable results for land subsidence. The Montecito GSA will continue to monitor land subsidence in the MGB using publicly available InSAR data and will periodically re-evaluate the need for establishing sustainable management criteria related to this indicator.

3.2.6 Depletions of Interconnected Surface and Groundwater – Undesirable Results

Undesirable results associated with depletion of interconnected surface and groundwater are confined to habitat and groundwater-dependent ecosystems (GDEs) within creek corridors. These ecosystems may include riparian habitat, such as coast live oak and mixed hardwood (Section 2.2.4.7), and spawning habitat for sensitive species such as the Southern California steelhead trout (*Oncorhynchus mykiss irideus*) (CBI 2017).

There is a substantial data gap related to this sustainability indicator due to the limited data characterizing historical creek flow and the specific types, water requirements, and locations of GDEs and habitat within and adjacent to the MGB's creeks (Section 2.2.4.6 and 2.2.4.7). While results from the BNM indicate that groundwater and surface water may be connected in parts of the MGB, these model results are uncertain due to the lack of stream flow measurements collected throughout the historical period (Section 2.3.2.3, Creek Recharge).

The Montecito GSA has installed a series of new surface water monitoring stations to better characterize surface water flows across the MGB (Figure 2-7, Existing Grant Funded Monitoring Programs). These data, coupled with the Montecito GSA's intention to install shallow piezometers along creek corridors during GSP implementation, will greatly improve understanding of groundwater–surface water connectivity in the MGB. These measurements will be incorporated into future updates of the BNM to refine model estimates of stream flows and groundwater–surface water connectivity in the MGB.

Due to the very limited data available to characterize surface water flows, GDEs, and interconnected groundwater–surface water, the Montecito GSA has not established undesirable results for depletions of interconnected surface water as part of this GSP. Rather, the Montecito GSA will re-evaluate this sustainability indicator and, if appropriate, establish sustainable management criteria as part of the 5-year update after reviewing and assessing data collected through implementation of the Montecito GSA's new stream flow monitoring program, planned shallow piezometer wells, and updated model results during the first 5-years of GSP implementation.

3.2.7 Identifying the Occurrence of Undesirable Results in the Montecito Groundwater Basin

Groundwater conditions in the MGB are currently monitored using a network of about 60 wells (Section 2.1.2.1, Groundwater Level Monitoring). Of these wells, 19 were selected as representative monitoring points (RMPs) for the MGB (Table 3-3; Figure 3-13, Representative Monitoring Points). Of these 19 wells, 17 wells will be used as RMPs for chronic lowering of groundwater levels and reduction of groundwater in storage (Figure 3-13), 13 wells will be used as RMPs for degradation of water quality (Figure 3-13), and 6 will be used as RMPs for seawater intrusion (Figure 3-13). Undesirable results for each of these indicators will be determined by comparing groundwater elevations, chloride concentrations, and COPC concentrations to the appropriate minimum threshold groundwater elevations and concentrations presented in Section 3.3. A detailed discussion of the criteria used to determine the occurrence of an undesirable result is described below.

Table 3-3. Representative Monitoring Points in the MGB

Well ID	Well Name	Well Ownership	Well Use	Well Depth (ft)	Groundwater Level Record	Monitoring Parameters
Storage Unit 1						
1-13	N/A	MWD	Monitoring	N/A	1974 to present	GWL, GS
1-15	Live Oaks 1	MWD	Monitoring	590	1975 to present	GWL, GS
1-19	T Mosby	MWD	Production	400	1962 to present	GWL, GS, GWQ
1-3	EVR 8	MWD	Monitoring	165	1988 to present	GWL, GS
1-37	N/A	Private	Monitoring	190	1991 to present	GWL, GS
1-1	Valley Club #2	MWD	Production	230	1988 to present	GWL, GS, GWQ
Storage Unit 2						
TBD	GSA Monitoring Well #2	MWD	Monitoring	N/A	N/A	GWL, GS, GWQ
2-4	N/A	Private	Production	420	2020 to present	GWL, GS, GWQ
Storage Unit 3						
TBD	GSA Monitoring Well #1	MWD	Monitoring	N/A	N/A	GWL, GS, SWI, GWQ
3-2	Las Entradas 2	MWD	Monitoring	450	1988 to present	GWL, GS, SWI, GWQ
3-22	Amapola	MWD	Production	618	1990 to present	GWL, GS, GWQ
3-28	SWI Monitoring Well #3	Private	Production	165	2018 to present	GWL, GS, SWI, GWQ
3-7	N/A	Private	Monitoring	150	1981 to present	GWL, GS
3-8	Neal Well	MWD	Monitoring	685	1962 to present	GWL, GS
3-12	Paden 2	MWD	Production	565	2012 to present	GWL, GS, SWI, GWQ
3-32	SWI Monitoring Well #2a	Private	Production	200	2021 to present	GWL, GS, SWI, GWQ
3-25	Ennisbrook 2	MWD	Production	510	1990 to present	GWQ
3-26	Ennisbrook 5	MWD	Production	460	1990 to present	GWQ
Toro Canyon Storage Unit						
4-6	Edgewood 3	MWD	Production	320	1993 to present	GWL, GS, SWI, GWQ

Notes: MGB = Montecito Groundwater Basin; ft = feet; N/A = not available/not applicable; MWD = Montecito Water District; GWL = groundwater level; GS = groundwater storage; GWQ = groundwater quality; TBD = to be determined; GSA = Groundwater Sustainability Agency; SWI = seawater intrusion.

3.2.7.1 Groundwater Elevation – Undesirable Results

Groundwater elevations will be measured at six RMPs in Storage Unit 1, two RMPs in Storage Unit 2, eight RMPs in Storage Unit 3, and one RMP in the Toro Canyon Storage Unit to assess whether an undesirable result associated with chronic lowering of groundwater levels and reduction of groundwater in storage is occurring (Figure 3-13). Additionally, the groundwater elevations measured at the eight RMPs in Storage Unit 3 provide an indication of whether groundwater conditions may lead to an undesirable result associated with seawater intrusion. These 17 wells were selected based on their location, well construction, and historical record of measurement. Because groundwater conditions in each storage unit are influenced by local faulting, the Montecito GSA plans to define the occurrence of undesirable results on an individual storage unit basis (Section 3.1).

Groundwater levels measured at these 17 wells will be compared to their corresponding minimum threshold groundwater elevations (Section 3.3) to assess whether undesirable results are occurring within a storage unit. Because groundwater levels are locally impacted by private and municipal extractions, a single minimum threshold exceedance is not considered an undesirable result for the storage unit. Similarly, because groundwater elevations are also climatically driven in the MGB and readily recover during normal and wet water years, minimum threshold exceedances during a single monitoring event would not be indicative of an undesirable result.

3.2.7.1.1 Quantitative Combination of Exceedances

An individual storage unit is expected to experience an undesirable result associated with chronic lowering of groundwater levels, reduction of groundwater storage, and/or seawater intrusion if the groundwater elevations exceed the minimum threshold elevations at more than 50%, and at least two, RMPs in a given storage unit for three consecutive spring monitoring events.

3.2.7.1.1.1 Notes on Storage Unit 2

The approach to define undesirable results in Storage Unit 2 is the same as Storage Unit 1 and is designed to provide groundwater users sufficient operational flexibility to meet current and projected demands, while protecting the MGB's ability to recover from drought during above normal and wet water years.

However, groundwater elevations in the principal aquifer have not historically been monitored in Storage Unit 2, and therefore, there is a lack of measured data to support specific implementation and threshold development. The Montecito GSA has constructed a dedicated monitoring well in Storage Unit 2 and is now monitoring privately owned wells to characterize groundwater conditions in the storage unit.

The data from these new wells will be incorporated into the GSP as it is acquired. Accordingly, the thresholds indicative of an undesirable result in Storage Unit 2 have not been set in this Plan but will be established as part of the 5-year GSP update.

3.2.7.1.1.2 Notes on the Toro Canyon Storage Unit

Groundwater elevations have historically been measured at one RMP in the Toro Canyon Storage Unit (Figure 3-13). This is the only well completed in the principal aquifer within the Toro Canyon Storage Unit that the Montecito GSA has access to monitor. To better evaluate groundwater conditions, the Montecito GSA is currently assessing opportunities to monitor or construct additional groundwater wells in the Toro Canyon Storage Unit (Chapter 4). Sustainable management criteria for this storage unit will be implemented upon acquisition of additional data.

3.2.7.2 Seawater Intrusion – Undesirable Results

Undesirable results associated with seawater intrusion will be assessed using chloride concentrations measured in groundwater at six RMPs: five located in Storage Unit 3 and one located in the Toro Canyon Storage Unit (Figure 3-13). Four of the five RMPs in Storage Unit 3 are all located adjacent to the coastline, and groundwater conditions are reflective of the boundary between the MGB and the Pacific Ocean. Well 3-12, which is located inland of the coastline, is included as a seawater intrusion RMP to provide comparison of chloride concentration trends measured along the coast with chloride concentrations measured closer to the Montecito Fault. The single RMP selected for the Toro Canyon Storage Unit is approximately 0.5 miles inland from the coastline, and the MGB is currently assessing opportunities to construct an additional monitoring well adjacent to the coastline to provide data more representative of the onset of seawater intrusion.

3.2.7.2.1 Quantitative Combination of Exceedances

Chloride concentrations in groundwater measured at these six wells will be compared to the 200 mg/L minimum threshold chloride concentration (Section 3.3.4, Seawater Intrusion – Minimum Thresholds) to assess whether undesirable results associated with seawater intrusion are occurring within Storage Unit 3 or the Toro Canyon Storage Unit. Undesirable results are anticipated to occur within each storage unit if chloride concentrations exceed 200 mg/L in more than 50%, and at least two, of the RMPs in each storage unit for three consecutive spring monitoring events.

3.2.7.2.1.1 Notes on the Toro Canyon Storage Unit

Current chloride concentrations in groundwater measured at the RMP for the Toro Canyon Storage Unit (Well 4-6) exceed 200 mg/L (Figure 3-5). The source of this chloride is not well defined, but trilinear diagrams of water type suggest that local groundwater quality is not consistent with what would be expected if seawater intrusion was occurring in the storage unit (Section 2.2.4.3). However, this is the only well that the Montecito GSA currently has access to monitor within the storage unit, and thus, provides the best available data to characterize groundwater conditions.

As noted above, the Montecito GSA is currently assessing opportunities to monitor and/or construct additional monitoring wells in the Toro Canyon Storage Unit to better characterize groundwater conditions. This additional data will provide the Montecito GSA with the ability to identify the occurrence of seawater intrusion in the Toro Canyon Storage Unit.

3.2.7.3 Groundwater Quality – Undesirable Results

Undesirable results associated with degradation of water quality will be assessed by comparing COPC concentrations in groundwater measured at 13 RMPs in the MGB: 2 in Storage Unit 1, 2 in Storage Unit 2, 8 in Storage Unit 3, and 1 in the Toro Canyon Storage Unit (Figure 3-13).

3.2.7.3.1 Quantitative Combination of Exceedances

TDS, nitrate as nitrogen, manganese, chloride, and iron concentrations measured at the 13 water quality RMPs in the MGB will be compared to their respective state or regional objective concentrations (Table 3-3) to assess whether undesirable results are occurring within each storage unit. Undesirable results are anticipated to occur within each storage unit when the state regulatory or regional objective concentrations are exceeded for one or

more constituents in more than 50%, and at least two, of the RMPs in each storage unit for a period of three consecutive spring monitoring events.

3.3 MINIMUM THRESHOLDS

This section describes the minimum thresholds established for chronic lowering of groundwater levels, reduction of groundwater in storage, seawater intrusion, and degradation of water quality. As noted in Section 3.2, undesirable results and minimum thresholds are not established for land subsidence and interconnected surface water as part of this GSP. Minimum thresholds for land subsidence are not established because significant and unreasonable land subsidence that interferes with infrastructure is not anticipated to occur in the MGB.

Minimum thresholds for interconnected surface water are not established due to the substantial data gaps that exist in the MGB associated with this sustainability indicator (Section 2.2.4.7). The Montecito GSA is implementing a project to better characterize creek flows. Additionally, as previously noted, the Montecito GSA plans to construct shallow piezometers along creek corridors in conjunction with the expanded stream flow monitoring to better characterize interconnected surface waters in the MGB (Section 4.1.3, Evaluate Groundwater–Surface Water Interactions). These data will be incorporated into the 5-year GSP update, during which the Montecito GSA will re-evaluate minimum thresholds and measurable objectives for this indicator (Section 2.1.2.5).

3.3.1 Chronic Lowering of Groundwater Levels – Minimum Thresholds

3.3.1.1 Minimum Thresholds and Current Groundwater Levels

Minimum threshold groundwater elevations in Storage Unit 1 are established 10 feet below historical low groundwater elevations (Table 3-4). Spring 2019 groundwater elevations ranged from approximately 20 to 80 feet higher than the minimum threshold groundwater elevations (Figure 3-13; Table 3-4).

3.3.1.1.1 Storage Unit 1

At the minimum threshold groundwater elevations in Storage Unit 1, it is anticipated that approximately 47% of groundwater production wells may operate with at least 50% of their well screen aerated. This level of screen aeration in Storage Unit 1 is similar to the operational conditions experienced in the storage unit at historical low groundwater levels. The minimum threshold groundwater elevations in Storage Unit 1 were selected with the goal of preventing chronic lowering of groundwater levels by providing a lower limit on the acceptable groundwater elevation declines. This lower limit preserves well function by curtailing the long-term exposure of private and municipal wells to well screen aeration, ensures that the MGB recovers to average conditions in response to normal and wet water years, and provides sufficient operational flexibility to local groundwater users during periods of drought where surface water supplies to the MGB may become limited.

3.3.1.1.2 Storage Unit 2

Minimum threshold groundwater elevations are not established in Storage Unit 2 because groundwater elevations have not historically been measured within the alluvium (Table 3-4). The two wells containing groundwater level data are screened primarily within the bedrock that underlies the MGB and therefore are not reflective of groundwater conditions within the MGB as defined in B118. To address this data gap, the Montecito GSA is constructing a new multi-completion monitoring well and currently executing an access agreement to begin

monitoring a second well in Storage Unit 2 (Table 3-4). The Montecito GSA will evaluate this data as it is collected and will re-evaluate minimum threshold groundwater elevations as part of the 5-year update to the GSP.

3.3.1.1.3 Storage Unit 3

Minimum threshold groundwater elevations in Storage Unit 3 are equal to the historical low groundwater levels at RMPs located near the Montecito Fault and the density-adjusted MSL at RMPs located along the coastline (Table 3-4). Spring 2019 groundwater elevations ranged from approximately 1 to 85 feet higher than the minimum threshold groundwater elevation in five out of the six RMPs (Figure 3-14, Storage Unit 1 Representative Monitoring Points: Historical and Projected Water Levels, Minimum Thresholds, Measurable Objectives; Table 3-4). The spring 2019 groundwater elevation measured at Well 3-7 was 0 feet MSL, which is 2 feet lower than the established minimum threshold groundwater elevation (Figure 3-15, Storage Unit 3 Representative Monitoring Points: Historical and Projected Water Levels, Minimum Thresholds, Measurable Objectives; Table 3-4).

The minimum threshold groundwater elevations in Storage Unit 3 are established to prevent seawater intrusion, preserve fresh groundwater supplies in the MGB, and provide sufficient operational flexibility to users inland of the coast during periods of drought where surface water supplies to the MGB may become limited. As noted in Section 3.2, groundwater production wells are not expected to become entrained with air at the minimum threshold groundwater elevations in Storage Unit 3.

3.3.1.1.4 Toro Canyon Storage Unit

The minimum threshold groundwater elevation established in the Toro Canyon Storage Unit is equal to the density-adjusted MSL measured at Well 4-6 (Edgewood 3) (Table 3-4). While this well is located more than 0.5 miles inland from the coast, this approach for establishing a minimum threshold provides a conservative approach towards preserving fresh groundwater supplies in the MGB.

Groundwater elevations measured at Well 4-6 (Edgewood 3) have been below the established minimum threshold groundwater elevation since fall 2015 (Figure 3-15). In spring 2016, the historical low at this well, groundwater was measured at an elevation of −11 feet MSL, which is approximately 16 feet below the minimum threshold groundwater elevation. Since spring 2016, groundwater elevations at Well 4-6 (Edgewood 3) have increased (Figure 3-15). The spring 2019 groundwater elevation was 3 feet MSL, which is approximately 2 feet below the minimum threshold groundwater elevation. As noted in section 3.2, the Montecito GSA is currently assessing opportunities to monitor or construct additional monitoring wells in the Toro Canyon Storage Unit to better constrain the appropriateness of the minimum threshold.

3.3.1.2 Projected Future Groundwater Conditions

To assess the impact of future basin operations on groundwater conditions in the MGB, the Montecito GSA developed two future model scenarios, a Future Baseline scenario and a Climate Change scenario, using the BNM that incorporated the best available data on future water demands, surface water availability, and climatological conditions (Section 2.3.5.3, Quantification of Future Water Budget). The Future Baseline scenario was developed assuming that the 50-year GSP projection horizon (e.g., water year 2020 through 2069) would experience the same climate conditions as those measured during the period from water year 1970 through 2019. To incorporate the recent trends in groundwater usage in the MGB, the Future Baseline scenario simulated pumping in the MGB using the average 2015–2019 groundwater production rate and incorporated a 0.5% annual increase in municipal extractions to reflect the anticipated increase in water demand associated with planned community buildout (MWD

2021). The Climate Change scenario simulated conditions in the MGB over the same 50-year projection horizon but incorporated DWR's 2070 central tendency climate change factors to represent the anticipated change in temperature, precipitation, and corresponding groundwater demands. Groundwater elevations from both of these scenarios were extracted at each of the groundwater level RMPs to quantify whether undesirable results are likely to occur within the 50-year GSP planning and implementation horizon (Figure 3-14, Storage Unit 1 Representative Monitoring Points: Historical and Projected Water Levels, Minimum Thresholds, Measurable Objectives, through Figure 3-16, Toro Canyon Representative Monitoring Points: Historical and Projected Water Levels, Minimum Thresholds, Measurable Objectives).

Groundwater elevations are projected to remain above the minimum threshold groundwater elevations at all 13[6] groundwater level RMPs, regardless of the impact of climate change on future hydrologic conditions. In Storage Unit 1, the BNM estimates that, similar to historical conditions, groundwater levels will decline during periods of drought (e.g., 2036 to 2040 and 2061 to 2066) and recover during periods of average and above normal water years (Figure 3-14). The BNM predicts that future groundwater elevations will reach their lowest levels in 2066; during this period, the BNM estimates that groundwater elevations in Storage Unit 1 will be 10 to 80 feet higher than the minimum threshold groundwater elevations (Figure 3-14).

In Storage Unit 3 and the Toro Canyon Storage Unit, the BNM estimates that groundwater elevations will decline by 25 to 30 feet during periods of future drought but will readily recover to historical average groundwater levels (Figure 3-15 and 3-16). Similar to Storage Unit 1, the BNM estimates that future groundwater elevations will be lowest during the simulated drought in 2066 but will remain approximately 5 to 50 feet higher than the minimum thresholds during this period.

Based on these results, the model indicates the MGB is not expected to experience undesirable results associated with chronic lowering of groundwater levels throughout the 50-year GSP planning and implementation horizon. However, as previously noted (Section 2.3.6, Discussion of Model Calibration and Uncertainties), the BNM underestimates the degree to which groundwater elevations decline in the inland portions of Storage Unit 3, likely due to the limited data available to constrain estimates of precipitation recharge and creek flows in the MGB. The Montecito GSA is currently implementing grant-funded projects to address these data gaps and will incorporate these data into model revisions during the first 5-years of GSP implementation. As part of future updates, additional modeling will be performed to better characterize the degree to which projected groundwater usage, surface water supplies, and climate impact groundwater elevation declines in this part of the MGB.

3.3.1.3 Measurement and Reporting

In accordance with the Montecito GSA's current groundwater monitoring protocols, the Montecito GSA will collect fall and spring groundwater elevation measurements at each of the groundwater level RMPs in the MGB. Groundwater levels are currently measured manually to an accuracy of 0.1 feet. As part of GSP implementation, the Montecito GSA plans to install pressure transducers in all RMPs in the MGB to better characterize short-term groundwater elevation changes. As noted in Section 3.2, the occurrence of undesirable results will be assessed by comparing consecutive spring groundwater level measurements to the minimum thresholds established for each storage unit.

[6] Groundwater elevations were not projected at Wells 2-4, GSA Monitoring Well #1, and GSA Monitoring Well #2 because either well construction has not been completed or historical measurements were not available to support establishment of sustainable management criteria at this time.

Table 3-4. Water Level Minimum Thresholds and Measurable Objectives

Well ID	Well Name	Storage Unit	Historical Low Water Level (ft MSL)	Spring 2019 Water Level (ft MSL)	Minimum Threshold (ft MSL)	Measurable Objective (ft MSL)	Applicable Sustainability Indicators
1-13	N/A	1	171	171	161	211	GWL, GS
1-15	Live Oaks 1	1	122	136	112	175	GWL, GS
1-19	T Mosby	1	23	93	13	158	GWL, GS
1-3	EVR 8	1	146	207	136	206	GWL, GS
1-37	N/A	1	122	141	112	182	GWL, GS
1-1	Valley Club #2	1	65	65	135	190	GWL, GS
TBD	GSA Monitoring Well #2	2	N/A	N/A	N/A	N/A	GWL, GS
2-4	N/A	2	N/A	N/A	N/A	N/A	GWL, GS
TBD	GSA Monitoring Well #1	3	N/A	N/A	N/A	N/A	GWL, GS, SWI
3-2	Las Entradas 2	3	-20	40	5	46	GWL, GS, SWI
3-22	Amapola	3	-34	-5	-35	7	GWL, GS
3-28	SWI Monitoring Well #3	3	1	4	3	3	GWL, GS, SWI
3-7	N/A	3	-28	4	2	2	GWL, GS
3-8	Neal Well	3	-18	2	-18	22	GWL, GS
3-12	Paden 2	3	-96	-12	-96	-41	GWL, GS, SWI
3-32*	SWI Monitoring Well #2a	3	N/A	N/A	2.5	N/A	GWL, GS, SWI
4-6	Edgewood 3	Toro	-11	3	5	5	GWL, GS, SWI

Notes: ft = feet; MSL = mean sea level; N/A = not available/not applicable; GWL = groundwater level; GS = groundwater storage; TBD = to be determined; GSA = Groundwater Sustainability Agency; SWI = seawater intrusion.

* Groundwater levels have not historically been measured at this well. Groundwater elevations will be measured as part of GSP implementation. Accordingly, no measurable objective is established for this well. The minimum threshold is established to be protective against seawater intrusion.

3.3.2 Reduction of Groundwater in Storage – Minimum Thresholds

3.3.2.1 Minimum Thresholds and Current Groundwater Conditions

3.3.2.1.1 Storage Unit 1

The minimum thresholds for reduction of groundwater in storage are equal to the groundwater elevation minimum thresholds established for chronic lowering of groundwater levels (Section 3.3.1). In Storage Unit 1, the groundwater elevation minimum thresholds correspond to an estimated total volume in storage of approximately 7,800 AF. This is approximately 45% lower than the volume of groundwater in storage under historical high conditions in Storage Unit 1. Ensuring that groundwater in storage does not drop below 55% of the historical high volume provides 7.5 years of groundwater production at the safe yield from spring 2019 conditions, ensures that groundwater wells will not remain entrained with air for periods that exceed historical operating conditions, and preserves the MGB's ability to recover to average conditions during normal and wet water years.

3.3.2.1.2 Storage Unit 2

As discussed in Section 3.3.1.1.2, minimum threshold groundwater elevations are not established in Storage Unit 2 because groundwater elevations have not historically been measured within the alluvium (Table 3-4).

3.3.2.1.3 Storage Unit 3

The groundwater elevation minimum threshold in Storage Unit 3 declines from MSL at the coast to below MSL near the Montecito Fault (Section 3.3.1). The groundwater elevation minimum thresholds in Storage Unit 3 correspond to a 2,800 AF reduction in groundwater storage from historical high conditions. Because seawater intrusion may occur in the MGB if groundwater levels drop below the minimum threshold, the 2,800 AF reduction of groundwater in storage is equal to the total usable storage in Storage Unit 3.

3.3.2.1.4 Toro Canyon Storage Unit

As noted in Section 3.3.1, the minimum threshold groundwater elevation in the Toro Canyon Storage Unit is established using the density-adjusted MSL. This corresponds to a reduction of groundwater in storage of approximately 650 AF below historical high groundwater conditions. This estimate of the volume of usable groundwater in storage will be re-evaluated as part of the 5-year GSP update after additional data is acquired to understand groundwater conditions closer to the coastline (Section 3.3.1).

3.3.2.2 Projected Groundwater Conditions

As noted in Section 3.3.1, future model simulations performed using the BNM indicate that the MGB is not anticipated to experience undesirable results associated with chronic lowering of groundwater levels throughout the 50-year GSP planning and implementation horizon. Because groundwater levels are a proxy for groundwater in storage, this also indicates that the MGB is not anticipated to experience undesirable results associated with reduction of groundwater in storage throughout the 50-year GSP planning and implementation horizon. Throughout the 50-year period from water year 2020 through 2069, the BNM estimates that groundwater in storage is expected to increase at a rate of approximately 30 AFY, regardless of climate conditions. This change in storage is within the predictive uncertainty of the model, which indicates that the BNM predicts long-term stability in groundwater in storage in the MGB under the projected groundwater demands, surface water supplies, and climate. These

projected conditions will be re-evaluated in future modeling and GSP updates that incorporate new data collected as part of the Montecito GSA's expanded stream flow monitoring program, construction of dedicated monitoring wells in Storage Unit 2 and the southwestern part of Storage Unit 3, expanded monitoring in the Toro Canyon Storage Unit, and shallow piezometer installation along primary creek corridors during GSP implementation.

3.3.2.3 Measurement and Reporting

In accordance with the Montecito GSA's current groundwater monitoring protocols, the Montecito GSA will collect spring and fall groundwater elevation measurements at each of the groundwater level RMPs in the MGB. Groundwater levels will be measured manually to an accuracy of 0.1 feet. As part of GSP implementation, the Montecito GSA plans to install pressure transducers in all RMPs in the MGB to better characterize short-term groundwater elevation changes. As noted in Section 3.2, the occurrence of undesirable results will be assessed by comparing consecutive spring groundwater level measurements to the minimum thresholds established for each storage unit.

3.3.3 Degraded Water Quality – Minimum Thresholds

Water quality standards vary based on end use. For example, groundwater used for landscape and agricultural irrigation may not be suitable for potable water. Within the MGB, groundwater is used as a source of municipal supply, where is it blended with surface water delivered throughout the MGB, irrigation supply, domestic water supply, and to a lesser extent, agricultural water supply. Of these, the domestic water supply is the most sensitive use group, though domestic users relying only on groundwater are a relatively small component of MGB stakeholders. Based on well locations, MWD service connections, and land use, the Montecito GSA estimates that there are about 46 wells in this category supplying 100 parcels.

To preserve water quality for these beneficial uses, the Montecito GSA has established minimum threshold concentrations for five COPCs: TDS, nitrate, manganese, chloride, and iron (Table 3-5). The COPCs addressed were those encountered during historical water quality testing within the MGB and those common in regional coastal groundwater basins with consideration of RWQCB objectives (Section 2.2.4.4). The minimum threshold concentrations are equal to the maximum state regulatory or regional plan benchmark concentration for each respective COPC (Table 3-5). Compliance with these regulatory standards and benchmarks demonstrate the Montecito GSA's commitment to managing MGB groundwater quality in accordance with regional groundwater quality management throughout the Central Coast.

As discussed in Section 3.2, the relationship between groundwater quality and groundwater production is not well defined in the MGB and has been identified as a data gap. The Montecito GSA anticipates utilizing the groundwater quality data collected through GSP implementation to better understand this relationship and identify effective projects and management actions if undesirable results associated with groundwater quality occur in the MGB.

3.3.3.1 Minimum Thresholds and Current Groundwater Conditions

3.3.3.1.1 Total Dissolved Solids

3.3.3.1.1.1 Storage Unit 1

TDS concentrations in groundwater have been historically measured at two wells in Storage Unit 1: Well 1-19 and Well 1-1 (Figure 3-13). TDS has not been measured at Well 1-1 since April 2003; during this sampling event, TDS

was measured at a concentration of 660 mg/L (Figure 3-17, Total Dissolved Solids (TDS): Measured Concentrations, Minimum Thresholds, and Measurable Objectives). TDS concentrations in Well 1-19 have been monitored since January 2017. Since 2017, TDS concentrations in groundwater measured at this well have ranged from a low of 530 mg/L on September 10, 2018, to a high of 940 mg/L on May 1, 2017 (Figure 3-17). On June 21, 2021, TDS was measured at a concentration of 660 mg/L, which is approximately 340 mg/L lower than the minimum threshold.

3.3.3.1.1.2 Storage Unit 2

TDS has not historically been measured in Storage Unit 2.

3.3.3.1.1.3 Storage Unit 3

TDS concentrations in groundwater in the inland portions of Storage Unit 3 have generally increased since the early 1980s (Figure 3-17). Two of the five RMPs in this storage unit have TDS concentrations that currently exceed the TDS minimum threshold concentration. These wells are located on the eastern side of the storage unit, near the Montecito Fault (Figure 3-13). TDS concentrations in groundwater along the coastline have not been monitored for a sufficient period to characterize historical and current trends.

3.3.3.1.1.4 Toro Canyon Storage Unit

The TDS concentration in groundwater measured at Well 4-6 currently exceeds the minimum threshold concentration of 1,000 mg/L (Figure 3-17). TDS concentrations in groundwater have not historically been measured at this well. As noted in Section 3.2.4, Degradation of Water Quality – Undesirable Results, the Montecito GSA is currently assessing opportunities to construct and monitor additional groundwater wells to better characterize groundwater conditions in the Toro Canyon Storage Unit.

3.3.3.1.2 Nitrate

Nitrate concentrations in groundwater have historically remained below the minimum threshold concentration of 10 mg/L at all wells except Well 4-6 (Figure 3-18, Nitrate: Measured Concentrations, Minimum Thresholds, and Measurable Objectives). The potential sources of groundwater constituents at Well 4-6, which is located in the Toro Canyon Storage Unit, are not well constrained (Section 2.2.4.4), and the historical record of nitrate measurements collected at this well are limited. To address this data gap, the Montecito GSA plans to assess the source of nitrate at this well and the potential extent of elevated nitrate concentrations in the Toro Canyon Storage Unit.

3.3.3.1.3 Manganese and Iron

Iron and manganese are naturally occurring constituents in the MGB that likely result from the dissolution of metal oxides that coat the sedimentary rocks that underly the MGB (USGS 2016) and probably indicate the presence of original connate waters in deeper portions of the aquifer (GTC 1974). However, there is limited data characterizing the iron and manganese concentration variations with depth in the MGB. Historically, iron and manganese have not been detected at concentrations that exceed their respective minimum threshold concentrations (Figure 3-19, Manganese: Measured Concentrations, Minimum Thresholds, and Measurable Objectives, and Figure 3-20, Iron: Measured Concentrations, Minimum Thresholds, and Measurable Objectives).

3.3.3.2 Projected Water Quality Conditions

The relationship between groundwater production, groundwater levels, and groundwater quality is a data gap in the MGB. This data gap exists because groundwater quality has not been routinely monitored in the MGB. Despite the limited monitoring, MWD, which now acts as the exclusive Montecito GSA for the MGB, has not received any reports of groundwater quality impairment that would impact beneficial uses and users in the MGB. Because land uses in the MGB are not anticipated to change throughout the planning and implementation horizon (Santa Barbara County 1995), the Montecito GSA does not anticipate the occurrence of undesirable results associated with the degradation of water quality. While undesirable results are not anticipated, the Montecito GSA plans to implement a standardized monitoring protocol to enhance the spatial and temporal resolution of groundwater quality conditions throughout the MGB and to better define the relationship between groundwater use and groundwater quality.

3.3.3.3 Measurement and Reporting

As noted in Section 3.2.1, COPC concentrations will be monitored in 13 RMPs semi-annually. COPC concentrations in groundwater will be measured using the appropriate measurement standards (Section 3.5.4.3, Groundwater Quality Monitoring Schedule) and will be compared to the water quality thresholds presented in Table 3-5. These groundwater quality measurements will be reported to DWR annually as part of the GSP annual report preparation and submittal.

Table 3-5. Water Quality Minimum Thresholds and Measurable Objectives

Well ID	Well Name	Storage Unit	Nitrate (mg/L)			TDS (mg/L)			Iron (mg/L)			Manganese (mg/L)			Chloride (mg/L)			Applicable Sustainability Indicators
			Current	*MT*	*MO*	*Current*	*MT*	*MO*	*Current*	*MT*	*MO*	*Current*	*MT*	*MO*	*Current*	*MT*	*MO*	
1-19	T Mosby	1	1.9	10	7	670	1,000	700	<0.05	5	0.3	<0.01	0.2	0.05	157	500	75	GWQ
1-1	Valley Club #2	1	N/A	10	7	N/A	1,000	700	N/A	5	0.3	N/A	0.2	0.05	N/A	500	75	GWQ
TBD	GSA Monitoring Well #2	2	N/A	10	7	N/A	1,000	700	N/A	5	0.3	N/A	0.2	0.05	N/A	500	75	GWQ
2-4	N/A	2	N/A	10	7	N/A	1,000	700	N/A	5	0.3	N/A	0.2	0.05	N/A	500	75	GWQ
TBD	GSA Monitoring Well #1	3	N/A	10	7	N/A	1,000	700	N/A	5	0.3	N/A	0.2	0.05	N/A	200	100	SWI, GWQ
3-2	Las Entradas 2	3	8.7	10	7	**1,300**	1,000	700	N/A	5	0.3	N/A	0.2	0.05	143.9	200	100	SWI, GWQ
3-22	Amapola	3	4.7	10	7	970	1,000	700	<0.05	5	0.3	0.03	0.2	0.05	177	500	75	GWQ
3-28	SWI Monitoring Well #3	3	**10.1**	10	7	660	1,000	700	N/A	5	0.3	N/A	0.2	0.05	88	200	100	SWI, GWQ
3-12	Paden 2	3	2.5	10	7	670	1,000	700	<0.05	5	0.3	0.05	0.2	0.05	193	200	100	SWI, GWQ
3-32	SWI Monitoring Well #2a	3	2	10	7	550	1,000	700	N/A	5	0.3	N/A	0.2	0.05	96	200	100	SWI, GWQ
3-25	Ennisbrook 2	3	2.7	10	7	890	1,000	700	<0.05	5	0.3	<0.01	0.2	0.05	198	500	75	GWQ
3-26	Ennisbrook 5	3	5.8	10	7	**1,800**	1,000	700	<0.05	5	0.3	<0.01	0.2	0.05	472	500	75	GWQ
4-6	Edgewood 3	Toro	**67.8**	10	7	**1,320**	1,000	700	N/A	5	0.3	N/A	0.2	0.05	240	200	100	SWI, GWQ

Notes: mg/L = milligrams per liter; TDS = total dissolved solids; current = most recent measurement; MT = minimum threshold; MO = measurable objective; GWQ = groundwater quality; N/A = not available/not applicable; TBD = to be determined; GSA = Groundwater Sustainability Agency; SWI = seawater intrusion;
Water Quality data was collected from the State Water Resources Control Board Groundwater Ambient Monitoring and Assessment (GAMA) database. Per GAMA's database descriptions, "<" signifies that the sample concentration is less than the GAMA result.
Bolded where current concentration is greater than the minimum threshold.

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3.3.4 Seawater Intrusion – Minimum Thresholds

The minimum threshold for seawater intrusion is a chloride concentration in groundwater equal to 200 mg/L (Table 3-6). Chloride concentrations associated with seawater intrusion will be measured at six RMPs located adjacent to the coastline (Section 3.2.7.1, Groundwater Elevation – Undesirable Results). This seawater intrusion minimum threshold is anticipated to be assessed in conjunction with the groundwater level minimum thresholds to identify periods where increases in chloride correspond to groundwater levels that drop below MSL. As discussed previously, the minimum threshold chloride concentrations for seawater intrusion are anticipated to provide sufficient operational flexibility to local groundwater users while remaining protective of the fresh groundwater supplies in the MGB.

3.3.4.1 Minimum Thresholds and Current Groundwater Conditions

As previously discussed, available historical groundwater elevation and chloride concentration data indicate that seawater intrusion is not currently occurring in the MGB. The chloride concentrations measured along the coast in Storage Unit 3 are currently below 200 mg/L and are similar to those measured in the late 1980s and early 1990s (Figure 3-21, Chloride: Measured Concentrations, Minimum Thresholds, and Measurable Objectives).

In the Toro Canyon Storage Unit, chloride was most recently measured at a concentration of 240 mg/L on December 17, 2021. While this concentration is 40 mg/L higher than the minimum threshold, the December 17, 2021, measurement is approximately 75 mg/L lower than the concentration of chloride in groundwater measured at the same well on July 17, 1990. Groundwater elevations measured at this well have remained relatively stable during this period (Figure 3-16). As noted in Section 3.2.7.1, the source of this chloride is not well defined, and the Montecito GSA is currently assessing opportunities to construct and/or monitor additional wells closer to the coastline in this part of the MGB.

3.3.4.2 Projected Seawater Intrusion

Results from the two future scenarios assessed using the BNM indicate that seawater intrusion is not anticipated to occur in the MGB over the 50-year GSP planning and implementation horizon. Throughout the historical period (water year 1970–2014), the BNM estimated that an average of approximately 6,700 AFY of groundwater discharged to the Pacific Ocean. During this period, groundwater production for the entire MGB averaged approximately 700 AFY.

During the 50-year GSP implementation and planning horizon, it is anticipated that groundwater production for the entire MGB will average approximately 1,500–1,600 AFY, depending on the climatological conditions (Tables F-11 and F-12). As a result, the average annual rate of groundwater discharging to the Pacific Ocean is anticipated to decline from approximately 6,700 AFY to approximately 5,800–5,900 AFY, depending on climate (Tables 2A-11 and 2A-12). These results indicate that the MGB is not anticipated to experience undesirable results associated with seawater intrusion throughout the 50-year planning and implementation horizon.

3.3.4.3 Monitoring and Reporting

Chloride concentrations in groundwater at the six seawater intrusion RMPs will be measured at least semi-annually. Chloride concentrations at these six wells will be compared to the minimum threshold chloride concentrations to identify trends and the potential occurrence of undesirable results and will be reported to DWR in the GSP annual report. Additionally, the Montecito GSA intends to expand seawater intrusion monitoring to address existing spatial and temporal data gaps in Storage Unit 3 and the Toro Canyon Storage Unit during GSP implementation (Section 4.1.2, Expand Seawater Intrusion Monitoring Network).

Table 3-6. Seawater Intrusion Minimum Thresholds and Measurable Objectives

Well ID	Well Name	Storage Unit	Historical High		Current Conditions		Minimum Threshold (mg/L)	Measurable Objective (mg/L)	Applicable Sustainability Indicators
			Concentration (mg/L)	*Date*	*Concentration (mg/L)*	*Date*			
TBD	GSA Monitoring Well #1	3	N/A	N/A	N/A	N/A	200	100	SWI
3-2	Las Entradas 2	3	143.9	5/20/1991	119	12/17/2021	200	100	SWI
3-28	SWI Monitoring Well #3	3	88	4/11/2014	65	12/17/2021	200	100	SWI
3-7	Paden 2	3	193	12/30/2017	89	6/14/2021	200	100	SWI
3-32	SWI Monitoring Well #2a	3	96	7/19/2021	60	12/17/2021	200	100	SWI
4-6	Edgewood 3	Toro	316	7/17/1990	**240**	12/17/2021	200	100	SWI

Notes: mg/L = milligrams per liter; TBD = to be determined; GSA = Groundwater Sustainability Agency; N/A = not available/not applicable; SWI = seawater intrusion.
Bolded where current concentration is higher than the minimum threshold

3.3.5 Land Subsidence – Minimum Thresholds

Available data suggests that inelastic land subsidence is not presently occurring nor is it likely to become an undesirable result within the MGB over the 50-year GSP implementation and planning period (Section 3.2.5, Land Subsidence – Undesirable Results). Because groundwater elevations may drop below historical low groundwater elevations (Section 3.3.1), the Montecito GSA will continue to monitor land subsidence using publicly available InSAR data to identify the potential occurrence of land subsidence due to groundwater extractions and corresponding dewatering of the groundwater aquifers, if occurring. The Montecito GSA will prepare InSAR maps annually as part of the GSP annual reporting and, as necessary, re-evaluate the need to establish land subsidence minimum thresholds.

3.3.6 Depletions of Interconnected Surface and Groundwater – Minimum Thresholds

Minimum thresholds for interconnected surface water and GDEs were not established as part of this GSP due to the significant data gaps that exist in this MGB. To support development of specific minimum thresholds for this indicator in the future, the Montecito GSA is currently implementing a state grant-funded project that aims to better characterize creek flows in the MGB. The data collected as part of this project will be incorporated into the GSP and BNM updates.

3.4 MEASURABLE OBJECTIVES

This section describes the measurable objectives established for chronic lowering of groundwater levels, reduction of groundwater in storage, seawater intrusion, and degradation of water quality. Similar to the minimum thresholds, measurable objectives are not established for land subsidence and interconnected surface water. Measurable objectives for land subsidence are not established because significant and unreasonable land subsidence that interferes with infrastructure is not anticipated to occur in the MGB.

Measurable objectives for interconnected surface water are not established due to the substantial data gaps that exist in the MGB associated with this sustainability indicator. The Montecito GSA is implementing a state grant-funded project that aims to better characterize creek flows and interconnected surface waters in the MGB. These data will be incorporated into the 5-year GSP update, during which the Montecito GSA will establish minimum thresholds and measurable objectives for this indicator.

3.4.1 Chronic Lowering of Groundwater Levels – Measurable Objectives

The measurable objective groundwater elevations for the MGB are equal to the average groundwater elevation measured at each of the 17 groundwater level RMPs (Table 3-4). This criterion is the same for each storage unit in the MGB and is expected to provide operational flexibility for groundwater users during periods of drought, while providing the opportunity for precipitation and creek flows to recharge the MGB during above normal and wet water years. At historical average conditions, approximately 90% of the wells in Storage Unit 1 will operate with their screens fully saturated, and all well screens are expected to remain completely saturated in Storage Unit 2. Similarly, the historical average conditions in Storage Unit 3 and the Toro Canyon Storage Unit have remained protective against seawater intrusion; measurable objectives equal to these conditions are anticipated to remain protective against seawater intrusion in the future.

Groundwater elevations are projected to remain approximately equal to the measurable objective groundwater elevations across the MGB throughout the 50-year planning and implementation horizon (Figures 3-14 through 3-16). As such, the Montecito GSA does not anticipate the need to immediately implement a set of projects or management actions to avoid undesirable results associated with chronic lowering of groundwater levels. The Montecito GSA has identified a group of baseline projects to further characterize groundwater conditions (Chapter 4).

3.4.2 Reduction of Groundwater Storage – Measurable Objectives

The measurable objectives for reduction of groundwater in storage are the same as those established for chronic lowering of groundwater levels (Section 3.4.1). The measurable objective groundwater levels are expected to provide sufficient volume of groundwater in storage to meet the demands of all beneficial uses and users, while also providing opportunity for additional aquifer replenishment and recovery during normal, above normal, and wet water years.

3.4.3 Seawater Intrusion – Measurable Objectives

The measurable objective for seawater intrusion is a chloride concentration of 100 mg/L. The 100 mg/L measurable objective chloride concentration is equal to the Central Coast Basin Plan objective established for the Central Coastal Basin (Central Coast RWQCB 2019) for the adjacent Carpinteria Groundwater Basin (DWR Basin No. 3-018) and is 100 mg/L lower than the minimum threshold chloride concentration established for seawater intrusion (Section 3.3.4). The 100 mg/L difference between the minimum threshold and measurable objective chloride concentration is expected to provide local groundwater users with operational flexibility to meet the demands of all beneficial uses and users without promoting the onset of undesirable results.

Chloride concentrations in groundwater are lower than the measurable objective concentrations in four out of the six seawater intrusion RMPs. As described in Section 3.2.3, Seawater Intrusion – Undesirable Results, these concentrations are not likely indicative of seawater intrusion because chloride concentrations are currently lower than those measured in the late 1990s, despite the fact that groundwater levels have declined over the same period. Because these data do not indicate the historical or current occurrence of seawater intrusion in the MGB, the Montecito GSA does not anticipate the need to immediately implement a set of projects or management actions to avoid undesirable results in the MGB.

3.4.4 Degraded Water Quality – Measurable Objectives

The measurable objectives established for the four COPCs in the MGB are equal to the minimum of the state regulatory concentration and the average regional Central Coast Basin Plan objective established for the Carpinteria and Santa Barbara Groundwater Basins (Table 3-5). Using the minimum of the two concentration criteria ensures that the groundwater supplies for the most sensitive beneficial users in the MGB are protected as groundwater quality data gaps are addressed through GSP implementation. In addition, these measurable objective concentrations support ongoing regional groundwater quality preservation efforts undertaken by RWQCB (Central Coast RWQCB 2019).

While the relationship between groundwater production, groundwater levels, and COPC concentrations is a data gap in the MGB, it is expected that the difference between measurable objective and minimum threshold concentrations provide sufficient operational flexibility for ongoing groundwater use without causing undesirable results in the MGB. The Montecito GSA anticipates enhancing the groundwater quality monitoring in the MGB through GSP implementation and will incorporate these data into future updates to the GSP.

3.4.5 Land Subsidence – Measurable Objectives

Measurable Objectives were not set because inelastic land subsidence is not presently nor is it likely to become an undesirable result within the MGB (Section 2.2.4.5). The Montecito GSA proposes to monitor groundwater levels to ensure that inelastic land subsidence does not become an undesirable result (Section 3.3.5, Land Subsidence – Minimum Thresholds).

3.4.6 Depletions of Interconnected Surface Water and Groundwater – Measurable Objectives

Measurable objectives were not established for depletion of interconnected surface water and groundwater due to the significant data gaps that exist in the MGB regarding this sustainability indicator. As previously noted, the Montecito GSA plans to re-evaluate sustainability criteria associated with this indicator based on the data collected as part of the current grant project aimed at characterizing creek flow.

3.5 MONITORING NETWORK

This section describes the groundwater and surface conditions monitoring network in the MGB and how the network will be used to monitor and document changes in groundwater conditions related to the sustainability indicators relevant to the MGB.

3.5.1 Monitoring Network Objectives

The objective of the monitoring network is to track parameters that demonstrate groundwater conditions to maintain sustainability in the MGB. In order to accomplish this objective, the monitoring network must be capable of the following:

- Monitoring changes in groundwater conditions
- Monitoring groundwater conditions relative to the sustainable management criteria
- Quantifying annual changes in water budget components

Within the MGB there is an existing network of wells used to monitor groundwater conditions. This network includes both dedicated groundwater monitoring wells and production wells. The network is capable of representing groundwater conditions in the MGB. The network will continue to be used to monitor groundwater conditions to assess short-term, seasonal, and long-term trends in groundwater levels and quality. In addition, the Montecito GSA acquired funding through Proposition 68 with which it has implemented additional monitoring capabilities, including additional groundwater monitoring wells and surface water flow gauges (Section 2.1.2.5).

3.5.2 Description of Monitoring Network

The GSP monitoring network for groundwater and related surface conditions in the MGB includes groundwater production wells and dedicated monitoring wells, weather stations, and stream flow gauges. The components of the monitoring network are discussed below in the context of their ability to document representative conditions and demonstrate short-term, seasonal, and long-term trends in groundwater and related surface conditions in the MGB. A discussion of how the monitoring network relates to each of the sustainable management criteria follows this discussion in Section 3.5.5, Monitoring and Reporting Protocols.

3.5.2.1 Groundwater Monitoring

The MGB groundwater monitoring network was established by MWD in 1983. The monitoring network includes 63 wells, the majority of which have been monitored for several decades. Of these, all will be monitored for groundwater levels, 13 will be monitored for water quality, and 12 will be monitored for groundwater production (Figure 3-22, GSP Groundwater Monitoring Network, and Table 3-7). This network has been essential in documenting groundwater conditions across the majority MGB and has been used for this purpose in the past. The existing groundwater well network, along with two new dedicated monitoring wells constructed in Storage Unit 2 and the southwestern part of Storage Unit 3, will be used to monitor groundwater conditions moving forward to assess trends in groundwater levels and quality and to ensure the continued sustainable management of groundwater resources in the MGB. In addition, the Montecito GSA has identified opportunities to expand the current groundwater monitoring network to address existing spatial and temporal data gaps (e.g., Section 3.5.7, Assessment and Improvement of Monitoring Network, and Section 4.1.1, Expand Groundwater Level and Quality Monitoring).

Table 3-7. GSP Groundwater Monitoring Network

Well Name	MWD Well ID	CASGEM Well ID	Well Use	Well Ownership	Zones of Screening	Groundwater Monitoring Networks		
						Elevation	*Quality*	*Production*
Storage Unit 1								
Valley Club 2	1-1	51947	Production	MWD	Alluvium and Bedrock	Yes	Yes	Yes
EVR 8	1-3	N/A	Monitoring	MWD	Unknown	Yes	No	No
N/A	1-4	N/A	Production	Private	Bedrock	Yes	No	No
N/A	1-5	N/A	Production	Private	Unknown	Yes	No	No
N/A	1-6	N/A	Production	Private	Alluvium and Bedrock	Yes	No	No
N/A	1-7	N/A	Production	Private	Unknown	Yes	No	No
N/A	1-8	N/A	Production	Private	Unknown	Yes	No	No
N/A	1-10	N/A	Production	Private	Unknown	Yes	No	No
N/A	1-11	N/A	Production	Private	Unknown	Yes	No	No
N/A	1-13	N/A	Production	Private	Unknown	Yes	No	No
Live Oaks	1-15	N/A	Monitoring	MWD	Alluvium	Yes	No	No
N/A	1-16	N/A	Production	Private	Alluvium	Yes	No	No
Hodges	1-17	N/A	Monitoring	MWD	Alluvium	Yes	No	No
N/A	1-18	N/A	Production	Private	Alluvium	Yes	No	No
N/A	1-18a	N/A	Production	Private	Alluvium	Yes	No	No
T. Mosby	1-19	51941	Production	MWD	Alluvium and Bedrock	Yes	Yes	Yes
N/A	1-21	N/A	Production	Private	Alluvium	Yes	No	No
N/A	1-28	N/A	Production	Private	Bedrock	Yes	No	No
N/A	1-29*	N/A	Production	Private	Bedrock	Yes	No	No
N/A	1-30	N/A	Production	Private	Bedrock	Yes	No	No
N/A	1-32	N/A	Production	Private	Bedrock	Yes	No	No

Table 3-7. GSP Groundwater Monitoring Network

Well Name	MWD Well ID	CASGEM Well ID	Well Use	Well Ownership	Zones of Screening	Groundwater Monitoring Networks		
						Elevation	*Quality*	*Production*
N/A	1-33	N/A	Production	Private	Alluvium and Bedrock	Yes	No	No
N/A	1-35	N/A	Production	Private	Bedrock	Yes	No	No
N/A	1-36	N/A	Production	Private	Bedrock	Yes	No	No
N/A	1-37	N/A	Production	Private	Alluvium	Yes	No	No
N/A	1-38*	N/A	Production	Private	Bedrock	Yes	No	No
N/A	1-40	N/A	Production	Private	Alluvium	Yes	No	No
N/A	1-42	N/A	Production	Private	Alluvium and Bedrock	Yes	No	No
N/A	1-43**	N/A	Production	Private	Bedrock	Yes	No	No
N/A	1-45	N/A	Production	Private	Bedrock	Yes	No	No
N/A	1-47	N/A	Production	Private	Unknown	Yes	No	No
N/A	1-48	N/A	Production	Private	Unknown	Yes	No	No
EVR 3	1-49	51950	Production	MWD	Alluvium	Yes	No	Yes
EVR 4	1-50	51951	Production	MWD	Alluvium	Yes	No	Yes
N/A	1-51	N/A	Production	Private	Unknown	Yes	No	No
N/A	1-52	N/A	Production	Private	Bedrock	Yes	No	No
Las Fuentes	1-53	51948	Production	MWD	Alluvium and Bedrock	Yes	No	Yes
EVR 6	1-54	51952	Production	MWD	Alluvium and Bedrock	Yes	No	Yes
Storage Unit 2								
N/A	2-2	N/A	Production	Private	Unknown	Yes	No	No
N/A	2-3	N/A	Production	Private	Unknown	Yes	No	No
N/A	2-4	N/A	Production	Private	Alluvium	Yes	Yes	No
GSA MW #2	TBD	N/A	Monitoring	MWD	Alluvium	Yes	Yes	No
Storage Unit 3								
Las Entradas 2	3-2	51946	Production	MWD	Alluvium and Bedrock	Yes	Yes	Yes
N/A	3-5*	N/A	Production	Private	Unknown	Yes	No	No
N/A	3-7	N/A	Production	Private	Alluvium	Yes	No	No
Neal	3-8	N/A	Monitoring	MWD	Alluvium	Yes	No	No
N/A	3-9	N/A	Production	Private	Unknown	Yes	No	No
Paden 2	3-12	51942	Production	MWD	Alluvium	Yes	Yes	Yes
N/A	3-15	N/A	Production	Private	Unknown	Yes	No	No
N/A	3-17	N/A	Production	Private	Bedrock	Yes	No	No
N/A	3-19	N/A	Production	Private	Alluvium	Yes	No	No
N/A	3-20	N/A	Production	Private	Alluvium	Yes	No	No

Table 3-7. GSP Groundwater Monitoring Network

Well Name	MWD Well ID	CASGEM Well ID	Well Use	Well Ownership	Zones of Screening	Groundwater Monitoring Networks		
						Elevation	*Quality*	*Production*
Amapola	3-22	51943	Production	MWD	Alluvium	Yes	Yes	Yes
Morgan	3-23	N/A	Monitoring	MWD	Alluvium and Bedrock	Yes	No	No
Underwood	3-24	N/A	Monitoring	MWD	Alluvium	Yes	No	No
Ennisbrook 2	3-25	51944	Production	MWD	Alluvium	Yes	Yes	Yes
Ennisbrook 5	3-26	51945	Production	MWD	Alluvium	Yes	Yes	Yes
N/A	3-27	N/A	Production	Private	Alluvium	Yes	No	No
N/A	3-28	N/A	Production	Private	Alluvium	Yes	Yes	No
SWI MW #2a	3-32	N/A	Production	Private	Alluvium	Yes	Yes	No
GSA MW #1	TBD	N/A	Monitoring	MWD	Alluvium	Yes	Yes	No
Toro Canyon Storage Unit								
N/A	4-4	N/A	Production	Private	Unknown	Yes	No	No
Edgewood	4-6	51949	Production	MWD	Alluvium	Yes	Yes	Yes

Notes: GSP = Groundwater Sustainability Plan; MWD = Montecito Water District; N/A = not available or not applicable; GSA = Groundwater Sustainability Agency; MW = monitoring well; TBD = to be determined; SWI = seawater intrusion.

* Well located immediately outside the Montecito Groundwater Basin boundary.

** Well included in Storage Unit 1 monitoring network; however, well is located in the Toro Canyon Storage Unit.

It should be noted that several wells in the network have 50% or more of their screen in bedrock (Table 3-7). Depending on the local hydrogeologic conditions, groundwater elevations measured in these wells may be more representative of the bedrock formations that underlie that MGB than the principal aquifer itself. These wells will continue to be monitored for groundwater levels. Where data is determined to not be representative of the alluvial aquifer, these measurements will not be used for contour groundwater elevations or to estimate groundwater in storage.

The number of wells measured or sampled in any given year has historically varied due to changes in access to the wells. These changes stem from either physical limitations, such as the 2018 mudslides that destroyed or temporarily prevented access to wells, or from changes to access agreements for private wells. As such, the list of wells in Table 3-7 differs slightly from the groundwater monitoring network presented in Section 2.1.2.1 because three wells that were previously monitored have been destroyed and removed, and four wells have been added, including two existing wells and two new dedicated monitoring wells that are in the process of being constructed. In addition, two new wells that are anticipated to be constructed using grant funds will be added to the network when complete and are also listed in the table.

Because participation by private well owners is voluntary, the Montecito GSA has worked with landowners to secure access to private wells. To incentivize voluntary participation in the groundwater monitoring program, the Montecito GSA provides landowners with copies of water quality analyses and groundwater level measurements for their wells. The Montecito GSA intends to continue this practice moving forward.

3.5.2.1.1 Groundwater Elevation

The majority of the wells in the monitoring network have been measured for groundwater levels semi-annually over the last several decades. MWD's historical groundwater monitoring program included the collection of static

groundwater levels measured in the spring and fall to characterize the differences in seasonal groundwater elevations and evaluate groundwater elevation gradients and to ascertain groundwater storage conditions within the four defined groundwater storage units in the MGB. Several groundwater wells in the monitoring network are equipped with automated groundwater level sensors, and additional sensors will be installed on the remaining RMP monitoring wells during GSP implementation.

Based on the density of the monitoring network wells in each storage unit, the length of the historical record at each well, and the demonstrated use of the monitoring network to ensure sustainable management of the groundwater resources in the MGB, the spatial and temporal coverage of the existing monitoring network is sufficient to characterize groundwater elevation trends in the MGB. Areas for future improvement of the network are identified in Section 3.5.7. Note that Proposition 68 grant funds have been obtained and are being used to improve the monitoring network by installing additional dedicated monitoring wells in data gap areas in Storage Units 2 and 3 and the Toro Canyon Storage Unit.

3.5.2.1.2 Groundwater in Storage

Groundwater in storage in the MGB has been estimated intermittently (e.g., GTC 1974; Hoover 1980; and Slade 1991). Past analyses have focused on estimating the storage capacity in the MGB using static groundwater levels from as many as 23 wells (Slade 1991) and estimates of aquifer properties and thickness (Section 2.2.3.2, Groundwater in Storage). Annual changes in the volume of groundwater in storage have not historically been estimated in the MGB. However, as part of the GSP development, the Montecito GSA received Proposition 68 funding to develop a BNM to estimate and project groundwater storage changes (Section 2.3.1, Surface Water and Groundwater Model).

The Montecito GSA plans to utilize the BNM and measurements of static groundwater levels collected in the MGB to estimate annual changes to groundwater in storage in the MGB moving forward. The groundwater wells used to estimate groundwater in storage as part of the GSP implementation are the same as the wells included in the groundwater elevation monitoring network (Table 3-7).

3.5.2.1.3 Groundwater Quality

MWD routinely monitors groundwater quality in its active municipal supply wells (both raw and treated groundwater quality) and submits the data to the State Water Resources Control Board (SWRCB) in accordance with Title 22 of the California Code of Regulations (CCR). The groundwater quality in municipal supply wells has been monitored since the early 1990s (see Sections 2.1.2.3, Groundwater Quality Monitoring, and 2.2.4.4, Groundwater Quality). Private water companies with active municipal supply wells that provide potable water service within the MGB, including Sea Meadows and Lingate mutual water companies, also routinely monitor groundwater quality as part of Title 22 compliance (SWRCB 2022).

While the existing spatial coverage and temporal resolution of the groundwater quality monitoring network has historically been sufficient to characterize groundwater quality trends in the MGB as there are currently no known groundwater production–related water quality issues in the MGB, improvements to the network are discussed in Section 3.5.7.

3.5.2.1.4 Groundwater Extraction

MWD monitors groundwater extraction from its active groundwater production wells. All of the production wells are equipped with flow meters that record total production in gallons. On a monthly basis, the total volume in gallons produced by each MWD well is recorded and reported in AF.

Groundwater extraction volumes from residential private wells in the MGB, if measured, are not currently publicly available or reported to the Montecito GSA. As part of the BNM development, the Montecito GSA performed a detailed review of available well completion reports, well permit applications, and land use types to estimate the number of active wells in the MGB (Section 2.3.3.1). Using the results from this assessment, the Montecito GSA then estimated private groundwater extractions by subtracting the estimated volume of water delivered to a parcel with an active well from the estimated total parcel water demand. The total water demand for a given parcel was estimated using mapped land use, estimates of irrigable area, and water use factors (Section 2.3.3.1, Groundwater Extraction).

The existing groundwater extraction monitoring network accurately reflects approximately 25% of the total groundwater production in the MGB. The remaining 75% of production from the MGB is estimated and can be improved by additional metering and reporting in the MGB. The Montecito GSA is currently implementing a state grant-funded project that includes voluntary private well metering in order to directly measure, as opposed to estimate, groundwater extraction by private users (see Section 2.1.2.5).

3.5.2.2 Surface Conditions Monitoring

The primary surface conditions that influence groundwater conditions in the MGB are surface water flows and precipitation. The monitoring network for surface conditions is discussed below and in Section 2.1.2.4, Precipitation and Streamflow Monitoring.

3.5.2.2.1 Surface Water

Historically, surface water flows in the MGB have been monitored by one stream gauge located on Montecito Creek that is maintained, and the data collected, by Santa Barbara County Flood Control. The stream gauge has recorded sub-hourly (40-minute intervals) stream discharge and stage data since February 2016. This gauge is designed to measure peak storm flow events in the MGB and is without sufficient resolution to characterize baseflow conditions that represent surface water–groundwater interactions in the MGB. Additionally, this gauge was damaged during the 2018 debris flows experienced in the MGB. Streamflow data for the period from water year 1980 through 1983 is available for an inactive stream gauge located on San Ysidro Creek approximately 650 feet upstream of the MGB's northern boundary (see Section 2.1.2.4).

The existing spatial coverage and temporal resolution of the surface water flow gauges do not provide adequate data to assess short-term, seasonal, and long-term trends in surface water flow conditions in the MGB. The Montecito GSA has implemented a project that includes the installation of additional stream gauges in order to fill this data gap (see Section 2.1.2.5).

3.5.2.2.2 Precipitation

There are two weather stations in the MGB, both maintained, and the data collected, by the County. Precipitation in the MGB has been recorded for nearly a century with measurements dating back to 1926 (see Section 2.1.2.4).

The existing spatial coverage and temporal resolution of the precipitation stations provide adequate data to document short-term, seasonal, and long-term trends in precipitation in the MGB. Additional precipitation monitoring locations are not currently recommended for characterizing surface conditions in the MGB.

3.5.3 Monitoring Network and Sustainability Indicators

The existing groundwater network will be used to monitor and document changes in groundwater conditions related to the sustainability indicators relevant to the MGB. This network includes the wells that have been designated as RMPs where minimum thresholds and measurable objectives have been established (Table 3-3). An assessment of groundwater conditions and the potential for undesirable results will be based on the conditions measured at the RMPs as described in Sections 3.1 through 3.4. The broader groundwater monitoring network will be used to document conditions in the MGB and provide support for recommendations and findings based on the conditions recorded at the RMPs.

3.5.3.1 Chronic Lowering of Groundwater Levels

To monitor conditions related to chronic lowering of groundwater levels, the groundwater monitoring network will be structured to accomplish the following:

- Track short-term, seasonal, and long-term trends in groundwater levels
- Characterize the spring high and fall low groundwater elevations for the aquifer system
- Record groundwater elevations at RMPs for which minimum thresholds and measurable objectives have been established

3.5.3.1.1 Spatial Coverage

The groundwater elevation monitoring well density in the MGB is approximately 7 wells per square mile (MGB is approximately 9.6 square miles). While there is no definitive rule for the density of groundwater monitoring points needed in a basin beyond that required for adequate representation of sustainability conditions, for comparison, the monitoring well density recommended by CASGEM Groundwater Elevation Monitoring Guidelines ranges from 1 to 10 wells per 100 square miles (DWR 2010). Additional DWR guidelines recommend a well network with a density of 1 observation per 16 square miles (DWR 2010, 2016a). Therefore, the density of wells in the monitoring network for the MGB meets the criteria for adequate coverage for chronic lowering of groundwater levels; however, well density alone does not ensure collection of sufficient data to detect changes in groundwater conditions. Spatial (both lateral and vertical) and temporal representation need to be considered in the assessment of the ability of the monitoring network to demonstrate short-term, seasonal, and long-term trends.

The current groundwater monitoring network is densely clustered near the centers of Storage Unit 1 and Storage Unit 3 (Figure 3-22). The Montecito GSA has implemented a state-funded project that installed two new monitoring wells, one in Storage Unit 2 and one in Storage Unit 3 or the Toro Canyon Storage Unit, to improve understanding of MGB conditions, and as data gaps are addressed, more monitoring wells may be recommended (see Section 2.1.2.5). In terms of vertical representation, as discussed in Section 2.2.3, Principal Aquifers and Aquitards, the MGB is considered to consist of a single, unconfined aquifer with isolated areas of semi-confined to confined conditions. Thus, the existing groundwater monitoring network can demonstrate conditions in the primary aquifer.

In the future, to the extent possible, additional dedicated monitoring wells will be incorporated into the existing monitoring network to provide information on groundwater conditions in geographic locations and/or at depths where data gaps are identified. Additional information regarding vertical variation in hydrogeologic characteristics will be acquired with the construction of new monitoring wells.

3.5.3.1.2 Temporal Resolution

Groundwater levels have historically been measured at least semi-annually. Groundwater level data will continue to be collected on a semi-annual basis from the network of groundwater wells to provide groundwater elevation conditions in the spring and fall of each year. Further discussion of the monitoring schedule is provided in Section 3.5.4, Monitoring Network Implementation.

3.5.3.2 Reduction of Groundwater in Storage

To monitor conditions related to reduction of groundwater storage, the groundwater monitoring network will be structured to accomplish the following:

- Track short-term, seasonal, and long-term trends in groundwater in storage
- Calculate year-over-year (spring to spring) change in storage
- Provide data from which lateral hydraulic gradients within the aquifer can be calculated

The requirements for documenting reduction in groundwater storage are similar to those for chronic lowering of groundwater levels (see Section 3.5.3.1, Chronic Lowering of Groundwater Levels) because these two sustainability indicators are related through groundwater elevations.

The spatial coverage and temporal resolution of groundwater elevation data necessary to document groundwater storage changes in the MGB is the same as that necessary to document groundwater elevation changes. The current network of wells is capable of documenting changes to both sustainability indicators.

3.5.3.3 Seawater Intrusion

To monitor conditions related to seawater intrusion, the groundwater monitoring network will be structured to accomplish the following:

- Track short-term, seasonal, and long-term trends in groundwater elevation and chloride concentrations
- Record chloride concentrations in RMPs for which minimum thresholds and measurable objectives have been identified

While gathering additional data on groundwater levels may help establish a relationship between groundwater elevation and chloride concentration, chloride concentration in groundwater is the metric by which seawater intrusion will be assessed (see Sections 3.3 and 3.4). Additionally, while chloride concentrations will be used to evaluate undesirable results associated with seawater intrusion, the Montecito GSA plans to monitor and analyze concentrations of iodide, bromide, silica, and other constituents along the coastline to better characterize the source(s) of chloride measured in Storage Unit 3.

3.5.3.3.1 Water Quality Constituents

Groundwater samples will continue to be collected and analyzed for a suite of general mineral and inorganic constituents including TDS, chloride, nitrate, manganese, and iron (Section 3.1). As part of the state grant-funded projects implemented by the Montecito GSA, several existing wells have been identified within Storage Unit 3 and the Toro Canyon Storage Unit and are being used to collect groundwater level and quality data specific to the seawater intrusion sustainability indicator (Section 2.1.2.5).

3.5.3.3.2 Spatial Coverage

The six groundwater wells at which chloride concentrations and groundwater elevations will be measured are located near the coast in Storage Unit 3 and the Toro Canyon Storage Unit (Figure 3-22). The density of wells that will be used to document seawater intrusion in the MGB is adequate except for in the southwestern part of Storage Unit 3 and the Toro Canyon Storage Unit where additional monitoring is recommended (Section 4.1.2). The Montecito GSA will evaluate the ongoing representativeness of the seawater intrusion monitoring network during the 5-year GSP evaluation process, and seawater intrusion indicators will be reported annually to DWR.

3.5.3.3.3 Temporal Resolution

Groundwater quality samples have historically been collected with insufficient temporal resolution to identify seawater intrusion in the MGB. Groundwater quality samples will be collected and analyzed at least semi-annually to document changes in chloride concentration and other constituents associated with seawater intrusion.

3.5.3.4 Degraded Water Quality

To monitor conditions related to degraded water quality, the groundwater monitoring network will be structured to accomplish the following:

- Track short-term, seasonal, and long-term trends in the hydraulic gradient
- Track long-term trends in groundwater quality for a wide range of constituents
- Measure COPC concentrations at the RMPs for which minimum thresholds and measurable objectives have been identified

3.5.3.4.1 Water Quality Constituents

Groundwater samples will continue to be collected and analyzed for COPCs including TDS, manganese, iron, chloride, and nitrate, in addition to other general mineral and physical parameters.

3.5.3.4.2 Spatial Coverage

The network of wells used to assess groundwater quality includes the 13 groundwater quality RMPs and all drinking water wells monitored for Title 22 compliance. This network will be used to assess groundwater quality degradation related to groundwater production.

3.5.3.4.3 Temporal Resolution

Degradation of groundwater quality occurs on a longer timescale than changes in groundwater elevation. Groundwater quality samples have historically been collected at a frequency required to satisfy drinking water regulatory requirements, which is typically every 1 to 3 years depending on the constituent and if violations have occurred. Although evaluation of the current groundwater quality monitoring frequency indicates it has been sufficient to document long-term trends, groundwater quality samples will be collected and analyzed at least semi-annually in order to document short-term, seasonal, and long-term trends in groundwater quality.

3.5.3.5 Land Subsidence

Based on the subsurface geology, historical InSAR measurements, and projected groundwater levels in the MGB, land subsidence is an undesirable result not likely to occur in the MGB. However, as part of the 5-year GSP evaluation process, the Montecito GSA will review and analyze land subsidence InSAR data made available by DWR to ensure that significant and unreasonable land subsidence resulting from groundwater extraction is not occurring in the MGB.

3.5.3.6 Depletions of Interconnected Surface Water

The depletions of interconnected surface water monitoring network currently rely on the existing groundwater elevation and surface water monitoring networks. Previous assessments of groundwater–surface water interactions in the MGB have been completed using available groundwater level and stream gauge data, and some conclusions have been made (Section 2.2.4.6); however, existing stream gauge and shallow monitoring well data are limited in spatial and temporal resolution and additional data are needed to quantify the degree of stream–aquifer connectivity. The Montecito GSA has implemented a project that aims to further characterize creek flows, interconnected surface water, and GDEs in the MGB, as discussed in Section 2.1.2.5. Based on the results of this characterization, the Montecito GSA may implement additional studies to further define and address this sustainability indicator. These measurements will be incorporated into future updates of the BNM to refine model estimates of stream flows and groundwater–surface water connectivity in the MGB.

3.5.4 Monitoring Network Implementation

3.5.4.1 Groundwater Elevation Monitoring Schedule

Following the guidance provided by DWR (DWR 2016a), groundwater elevation measurements will be collected from all accessible wells in the monitoring network at least two times per year within a 2-week window in order to capture the spring high and fall low groundwater levels. Spring groundwater levels will be collected during the month of April, and fall groundwater levels will be collected during the month of October. By conducting the groundwater sampling for each seasonal event within a 2-week time period, the water level data can be used to generate groundwater elevation contours and assess the hydraulic gradient in the aquifer. Data collection over longer time periods are less useful for analyzing the hydraulic gradient and groundwater elevation contours that are intended to represent a discrete period of time. Pressure transducers will be installed in all RMPs and downloaded at least semi-annually.

3.5.4.2 Groundwater Storage Monitoring Schedule

Groundwater in storage is directly linked to groundwater elevation. Therefore, the schedule for monitoring groundwater in storage is the same as that for monitoring groundwater elevation.

3.5.4.3 Groundwater Quality Monitoring Schedule

Following the guidance provided by DWR (DWR 2016a), groundwater quality monitoring will be completed at least semi-annually at all water quality sampling wells in the monitoring network in order to demonstrate short-term, seasonal, and long-term trends in groundwater quality. Annual analysis of groundwater quality trends will be used to assess whether sampling frequency or the spatial density of samples needs to be adjusted.

3.5.4.4 Groundwater Extraction Monitoring Schedule

Groundwater extraction at all MWD production wells is continuously monitored by meters and total production is recorded and reported on a monthly basis. Groundwater extraction from private wells will continue to be estimated based on parcel-level water budgets with exception of private wells equipped with flow meters and being monitored by the Montecito GSA. The Montecito GSA is currently implementing a state grant-funded project that includes voluntary private well metering in order to directly measure, as opposed to estimate, groundwater extraction by private users, as discussed in Section 2.1.2.5.

3.5.5 Monitoring and Reporting Protocols

Protocols for measuring groundwater levels and sampling groundwater quality are included in the Monitoring Protocols, Standards, and Sites Best Management Practices published by DWR (DWR 2016b). Consistent with the Monitoring Protocols, Standards, and Sites Best Management Practices, depth-to-groundwater level measurements are currently taken from surveyed reference points at the top of the well casing or sounding tube and are measured to a minimum accuracy of 0.1 feet. Spring groundwater level measurements are collected during the month of April, and fall groundwater level measurements are collected during the month of October. Pressure transducer data are downloaded at least semi-annually, and transducer measurements are confirmed with manual depth-to-water measurements to check for electronic drift or cable movement.

The Montecito GSA collects groundwater quality samples in accordance with standard best practices outlined by DWR (2016b) and the U.S. Geological Survey (USGS) National Field Manual for the Collection of Water Quality Data (USGS 2018). Samples are collected under laminar flow conditions using dedicated pumps after depth to groundwater has been recorded and a minimum of three well casing volumes have been purged from the well. Field parameters are measured and allowed to stabilize prior to sampling. Groundwater quality samples are collected in dedicated, labeled sample containers and are transported under chain of custody on ice to a state-certified laboratory.

The Montecito GSA will continue to use the existing protocols described above and consistent with standard best practices as outlined by DWR and USGS when measuring groundwater levels and collecting groundwater quality samples as part of the reporting requirements for this GSP.

3.5.6 Representative Monitoring

RMPs for the MGB were selected from the wider network of monitoring wells used to document groundwater conditions. The broader network of wells includes both dedicated groundwater monitoring wells and production wells. The following primary criteria were used for selection of the RMPs:

- Length of historical data record at the RMP
- Geographic location of the RMP within the MGB
- Known well construction information
- Long-term accessibility and well ownership considerations

Using the criteria listed above, 19 wells were selected as RMPs for the MGB. Of the 19 wells, 17 wells are groundwater elevation RMPs, 13 wells are groundwater quality RMPs, and 6 wells seawater intrusion RMPs (Figure 3-13 and Table 3-3).

Groundwater elevation and groundwater quality RMPs are located in each of the storage units in order to capture groundwater conditions throughout the MGB. Seawater intrusion RMPs are located along the coast in Storage Unit 3 and the Toro Canyon Storage Unit in order to monitor for the potential landward migration of saline water into the freshwater aquifer of the MGB.

The RMPs were selected to ensure that the conditions measured at each site reflect the general conditions in the area. Historical groundwater elevations and groundwater quality were reviewed in selecting the RMPs.

The Montecito GSA will evaluate the ongoing representativeness of the current RMPs during the 5-year GSP assessment and update process. In the event that an RMP must be removed from the list, the Montecito GSA will undertake a review of potential replacement wells in the vicinity.

3.5.7 Assessment and Improvement of Monitoring Network

3.5.7.1 Review and Evaluation of Monitoring Network

The MGB monitoring network will be reviewed and evaluated for effectiveness annually and during each 5-year assessment. The review and evaluation will address uncertainty and data gaps that could affect the ability of the GSP to achieve the sustainability goals for the MGB and will consider localized effects that may not be represented by the RMPs.

3.5.7.2 Identification of Data Gaps

The Montecito GSA has performed an initial assessment of critical data gaps in the MGB through a quantitative global sensitivity analysis of the BNM. The results from this sensitivity analysis identified the following key properties and processes in the MGB as critical to the overall understanding of historical and future groundwater conditions in the MGB:

- The volume and rates of groundwater extraction from the MGB
- The volume and rates of surface water flows entering, recharging, and discharging from the MGB
- The degree to which the Arroyo Parida and Montecito Faults act as barriers to groundwater flow

In addition, several data gaps specific to the spatial coverage and temporal resolution of the groundwater and surface water monitoring networks have been identified as discussed below.

3.5.7.2.1 Groundwater Quality

Groundwater quality samples have historically been collected at a frequency required to satisfy drinking water regulatory requirements, which has been adequate to document long-term trends. However, historical water quality measurement frequencies have not allowed for characterization of short-term and seasonal trends in groundwater quality, and importantly, the relationship between groundwater production and groundwater quality. In order to track short-term and seasonal trends in groundwater quality and better characterize the influence of pumping on groundwater quality, in particular at RMPs where minimum thresholds and measurable objectives for degraded groundwater quality and seawater intrusion have been established, samples need to be collected and analyzed at least semi-annually.

3.5.7.2.2 Groundwater Extraction

Groundwater extraction at all MWD production wells is metered, and total production is reported on a monthly basis. Groundwater extraction from most private wells is not metered, instead estimated based on parcel-level water budgets. The existing groundwater extraction monitoring network reflects approximately 25% of the total groundwater production in the MGB.

3.5.7.2.3 Depletions of Interconnected Surface Water

Surface flows in the MGB have historically been monitored by one stream gauge located on Montecito Creek. As previously noted, this gauge is designed to measure peak storm flow events in the MGB and is without sufficient resolution to characterize baseflow conditions that represent surface water–groundwater interactions in the MGB. The existing spatial and temporal coverage of the surface water flow monitoring network does not provide adequate coverage to assess short-term, seasonal, and long-term trends in surface water flow conditions in the MGB. Installation of stream gauges on other creeks that transect the MGB would improve understanding of the potential impacts of groundwater extraction on depletions of interconnected surface water.

3.5.7.3 Description of Steps to Fill Data Gaps

The Montecito GSA has begun addressing these data gaps through the implementation of state grant-funded projects as discussed herein and in Section 2.1.2.5 and is evaluating opportunities to continue reducing these data gaps through GSP implementation. As an initial step to address data gaps not currently addressed through grant projects, the Montecito GSA has evaluated and proposed several projects in Chapter 4 intended to fill existing data gaps. These projects include the following:

Expanded groundwater level and quality monitoring: This project is designed to fill spatial data gaps in the current groundwater level and groundwater quality monitoring network. Implementation of this project includes pursuit of access agreements to begin monitoring additional groundwater wells in Storage Unit 2 and the Toro Canyon Storage Unit, construction of additional monitoring wells in Storage Unit 2 and the southwestern part of Storage Unit 3, and integration of the newly acquired data and well access into the current representative monitoring network.

Expanded seawater intrusion monitoring network: This project is designed to fill spatial and temporal data gaps in the current understanding of seawater intrusion in the MGB. This project expands on the Montecito GSA's grant-

funded seawater intrusion monitoring program that is currently in place (Section 2.1.2.5) and will add additional monitoring wells in the coastal regions of Storage Unit 3 and the Toro Canyon Storage Unit. This project is anticipated to be implemented through pursuit of access agreements to monitor existing private wells and/or through the construction of new dedicated monitoring wells.

Evaluation of groundwater–surface water interactions: This project is designed to fill data gaps associated with the establishment of sustainable management criteria for the depletion of the interconnected surface water indicator. This project will include the establishment of a shallow well monitoring network near primary creeks in the MGB. This project will be implemented in coordination with the current grant-funded surface water flow monitoring program that is currently being implemented by the Montecito GSA. As noted in Section 2.2.4.6, there are significant data gaps that limit characterization of surface water flows in the MGB. These data gaps are currently being filled through the surface water monitoring grant program, which has funded the installation of 13 surface water monitoring stations across the MGB. These monitoring stations are located along Montecito Cold Springs Creek, Montecito Hot Springs Creek, Montecito Creek, San Ysidro Creek, Buena Vista Creek, Romero Creek, and Toro Canyon Creek. Surface water flows along these creeks are currently being monitored using both out-of-stream and instream methods, including game cameras, painted stage gauges, and siting wells. Monitoring at these 13 sites began in water year 2022, and the data collected as part of this effort will be incorporated into the 5-year GSP and BNM update.

Stakeholder incentive program: This project is aimed at developing incentives for local stakeholders to encourage projects that benefit the MGB. These incentivized programs include, but are not limited to, groundwater extraction well metering and projects that promote infiltration on residential properties (e.g., rain gardens and permeable surfaces).

Basin Numerical Model updates: This project will provide opportunity to incorporate data collected through grant-funded projects and GSP implementation into the BNM for the GSP. Model updates will include annual model extensions through the current water year, in coordination with GSP annual report development, and a detailed update of the model to better support model estimates of surface water flows, surface water–groundwater interactions, and representation of key properties that are currently being assessed through field activities.

Groundwater well registry: This project will result in the development of a groundwater well registry that contains detailed information on well locations, owner contact information, well activity status, estimated extractions, and geologic conditions encountered during well construction. The development of a groundwater well registry will be used to refine modeled estimates of groundwater production from the MGB.

3.6 REFERENCES CITED

CBI (Conservation Biology Institute). 2017. “Steelhead Critical Habitat Streams” [GIS dataset]. National Marine Fisheries Service (NOAA Fisheries). Last modified June 21, 2017. Accessed July 19, 2022.https://databasin.org/maps/new/#datasets=1bf6c7c641f94074974aa0ecd1a8f17e.

Central Coast RWQCB (California Regional Water Quality Control Board – Central Coast Region). 2019. Water Quality Control Plan for the Central Coastal Basin. State Water Quality Control Board. June 2019.

Driscoll, F.G. 1986. Groundwater and Wells. 2nd ed. (p. 667) St Paul, Minnesota: Johnson Screens.

DWR (California Department of Water Resources). 2010. California Statewide Groundwater Elevation Monitoring (CASGEM) Program - Procedures for Monitoring Entity Reporting. December 2010.

DWR. 2016a. Best Management Practices for the Sustainable Management of Groundwater: Monitoring Networks and Identification of Data Gaps. December 2016.

DWR. 2016b. Best Management Practices for the Sustainable Management of Groundwater: Monitoring Protocols, Standards, and Sites. December 2016.

GTC (Geotechnical Consultants Inc.). 1974. Hydrogeologic Investigation of the Montecito Groundwater Basins, County of Santa Barbara, California. Prepared for Montecito Water District by GTC, Burbank, California. January 1974.

Hoover, M.F. 1980. Safe Yield Evaluation of the Montecito Basin and Toro Canyon Area for the Montecito Water District. March 21, 1980.

Montecito GSA (Montecito Groundwater Basin Groundwater Sustainability Agency). 2023. Update on Groundwater Sustainability Plan (GSP). Montecito GSA Townhall. February 21, 2023. PowerPoint slides. https://montecitogsa.com/mtgdocs/7464/Townhall_GSA-GSP_Presentation_2.21.2023_Final_v3.pdf.

MWD (Montecito Water District). 1998. Groundwater Basin Management Plan for the Montecito Water District. November 1998.

MWD. 2021. Final 2020 Urban Water Management Plan. Prepared by Zanjero and Tully & Young. June 2021.

Roscoe Moss Company, ed. 1990. Handbook of Ground Water Development. John Wiley & Sons Inc.

Santa Barbara County. 1995. Montecito Community Plan Update. County of Santa Barbara Resource Management Department. Updated December 1995.

Schnieders, J.H. 2003. *Chemical Cleaning, Disinfection and Decontamination of Water Wells*. St Paul, Minnesota: Johnson Screens.

Slade, R.C. 1991. *Original Report and Addendum Hydrogeologic Assessment Determination of Groundwater in Storage within the Montecito Water District for Montecito Water District*. October 18, 1991.

SWRCB (State Water Resources Control Board). 2022. Safe Drinking Water Information System Drinking Water Watch . Accessed July 19, 2022. https://sdwis.waterboards.ca.gov/PDWW/.

U. S. Geological Survey (USGS). 2016. *Status of Groundwater Quality in the Santa Barbara Study Unit, 2011: California GAMA Priority Basin Project*. Scientific Investigations Report 2016–5112. Prepared in cooperation with the California State Water Resources Control Board. Reston, Virginia: USGS.

USGS. 2018. *General Introduction for the "National Field Manual for the Collection of Water-Quality Data."* (Version 1.1). June 2018. https://doi.org/10.3133/tm9A0.

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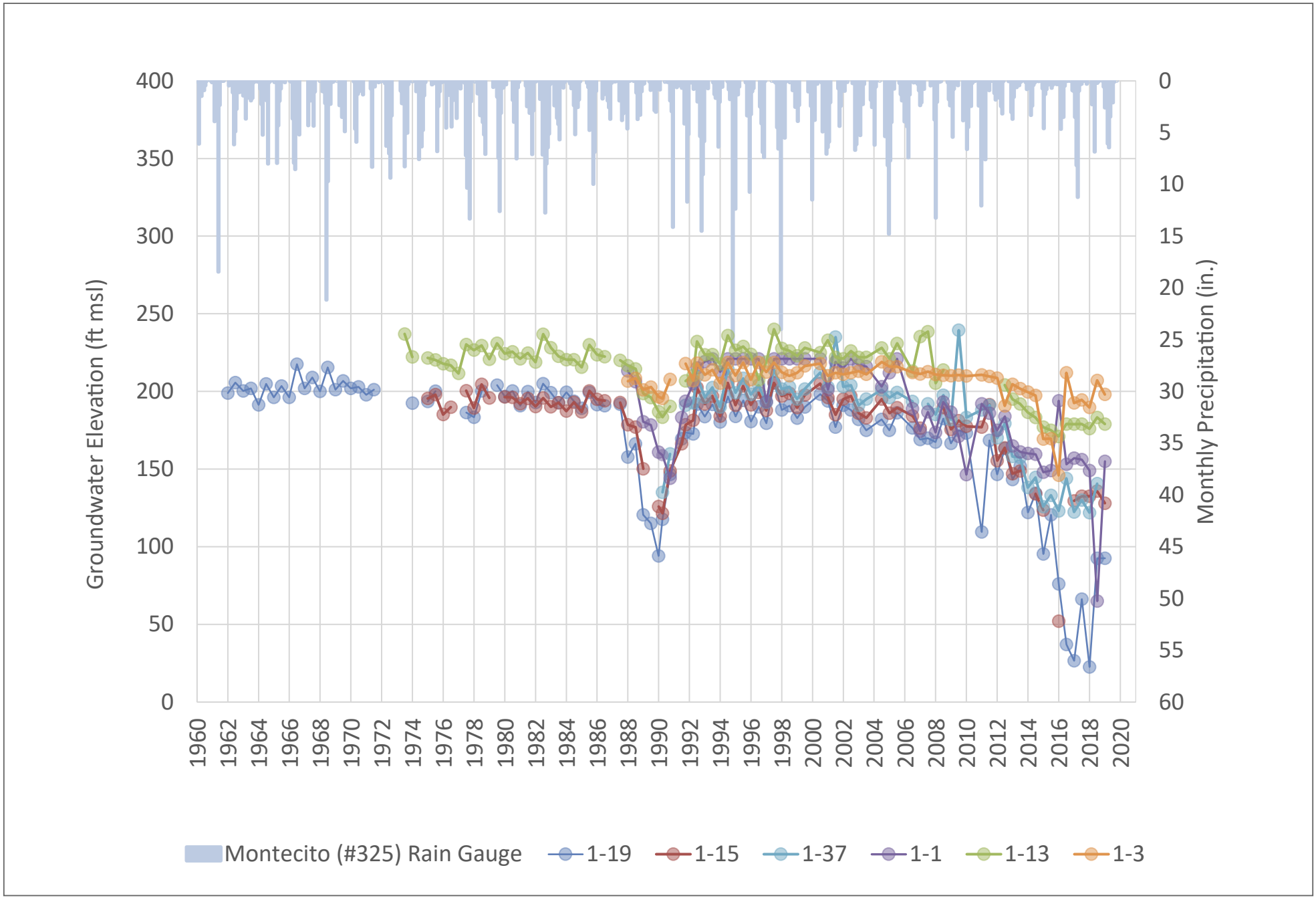


Figure 3-1

Historical and Current Groundwater Elevations in Storage Unit 1 of the MGB

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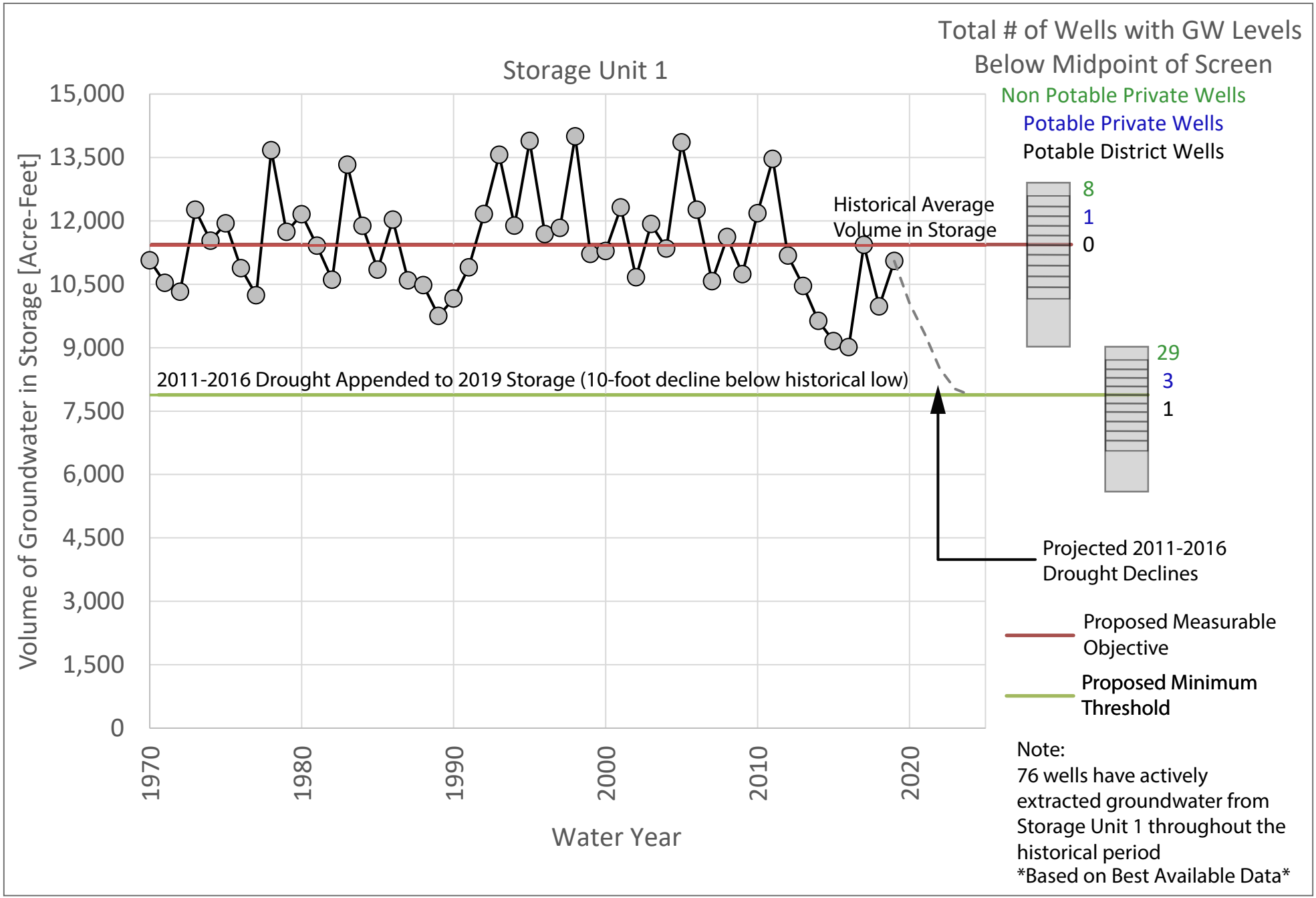


Figure 3-2

Historical Estimated Groundwater in Storage and Well Aeration in Storage Unit 1 of the MGB

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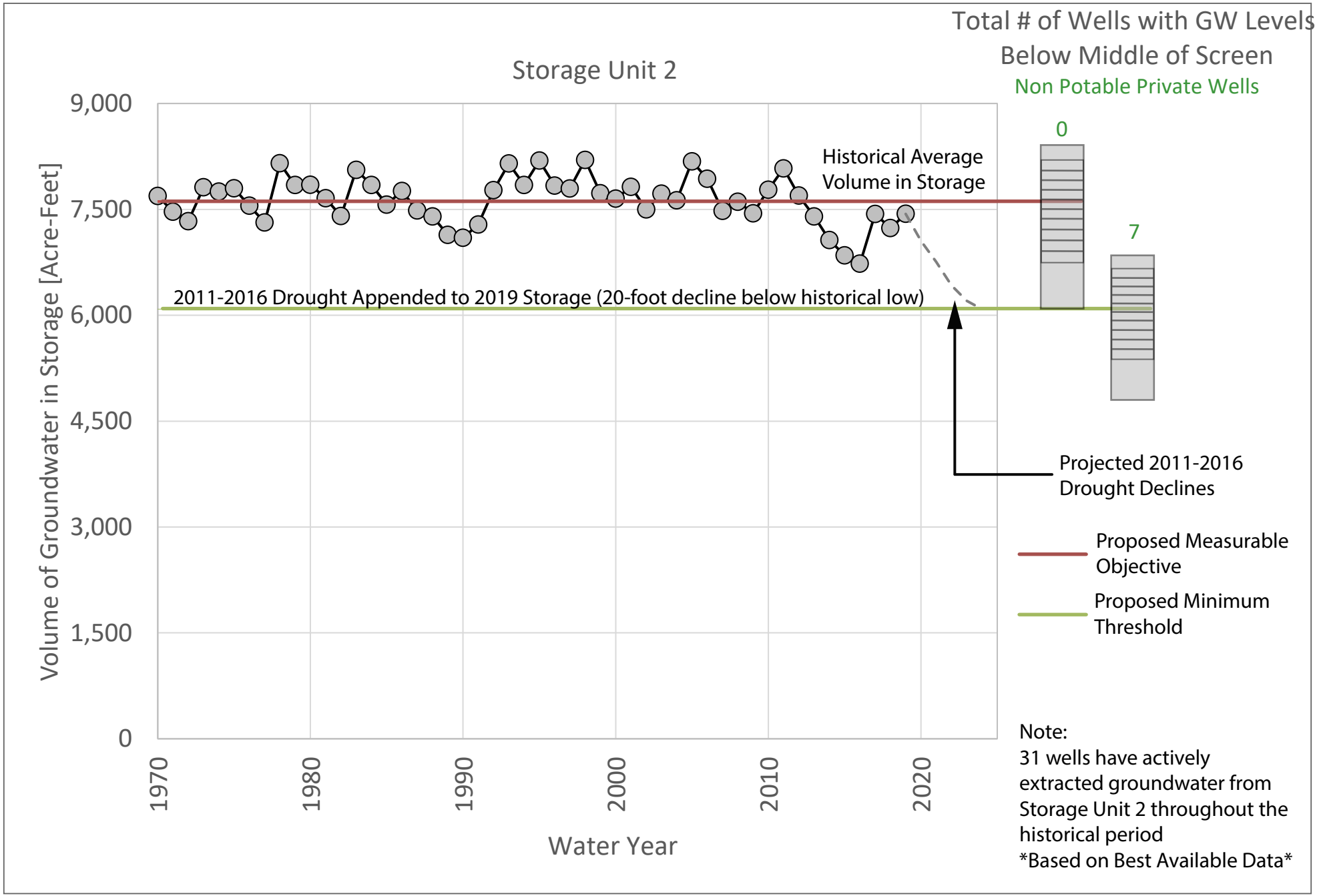


Figure 3-3

Historical Estimated Groundwater in Storage and Well Aeration in Storage Unit 2 of the MGB

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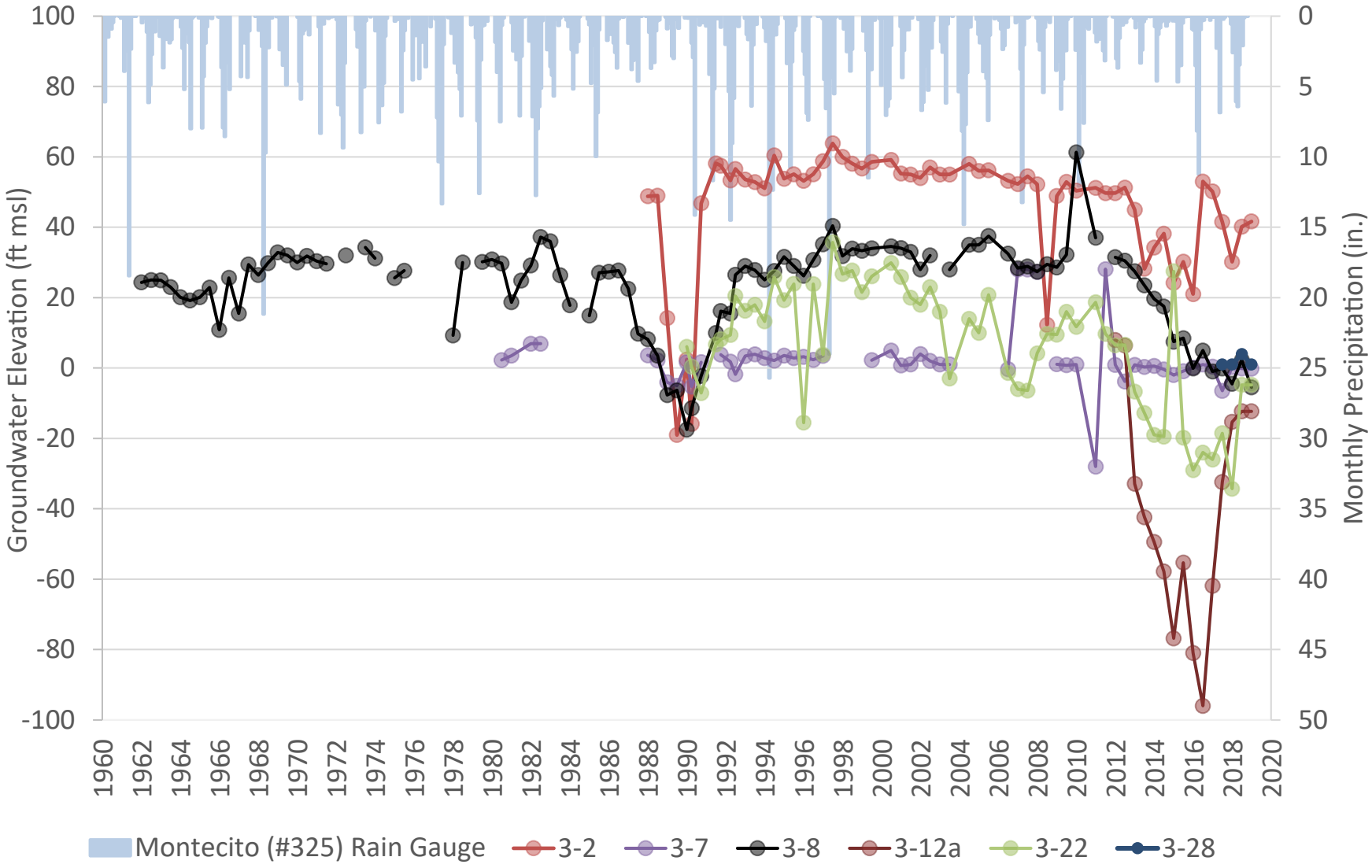


Figure 3-4

Historical and Current Groundwater Elevations in Storage Unit 3 of the MGB

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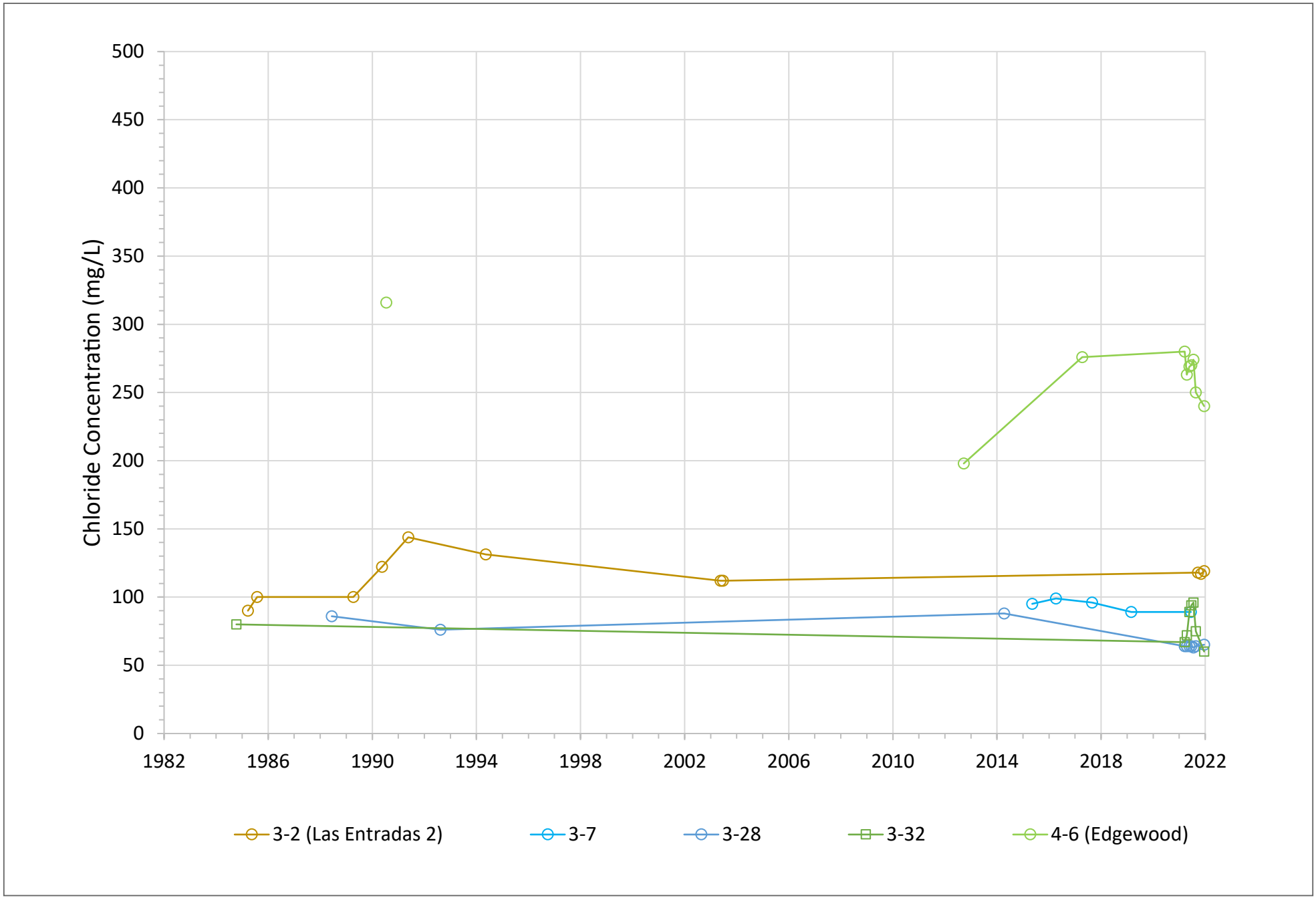


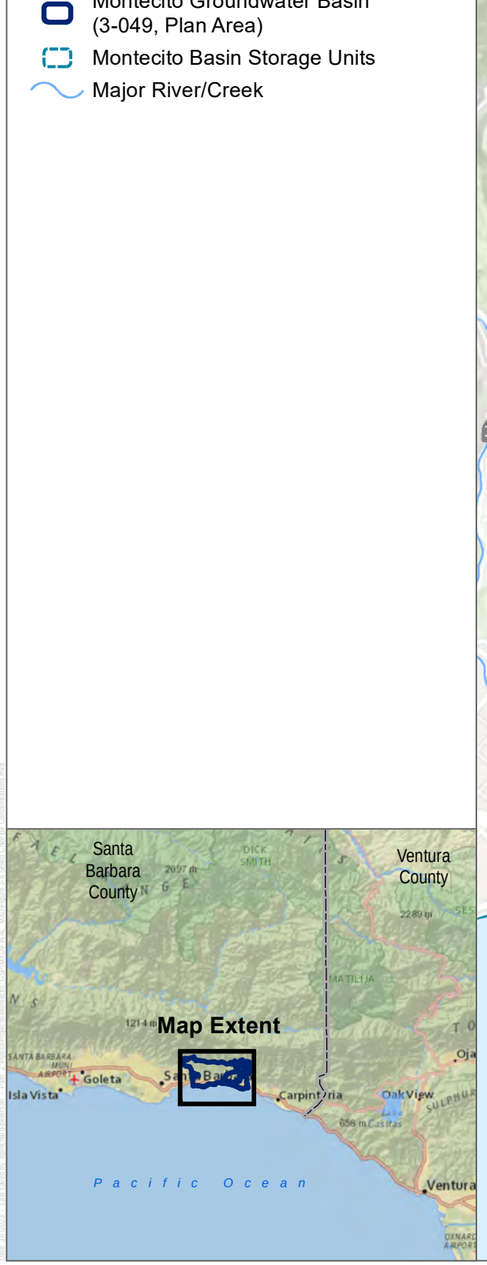
Figure 3-5

Historical and Current Chloride Concentrations Measured along the Coastline of the MGB

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Legend

- Well with Chloride Concentration Measurements Used for Sustainable Management Criteria Development
- Montecito Groundwater Basin (3-049, Plan Area)
- Montecito Basin Storage Units
- Major River/Creek



Storage Unit #1

Storage Unit #2

Storage Unit #3

Toro Canyon Storage Unit

Amapola (3-22)

Ennisbrook 5 (3-26)

Paden 2 (3-12a)

Morgan (3-23)

Ennisbrook 2 (3-25)

Las Entradas 2 (3-2)

SWI Monitoring Well #3

Underwood (3-24)

Edgewood (4-6)

San Ysidro Creek

Montecito Creek

Oak Creek

Romero Creek

Sycamore Creek

Picay Creek

Toro Canyon Creek

Garrapata Creek

144

192

225

101

Pacific Ocean

DATUM: NAD 1983 DATA SOURCE: ESRI; DWR; USGS

DUDEK

0 0.5 1 Miles

FIGURE 3-6

Wells with Chloride Concentration Measurements Used to Evaluate Sustainable Management Criteria for the MGB

Montecito Groundwater Basin Groundwater Sustainability Plan

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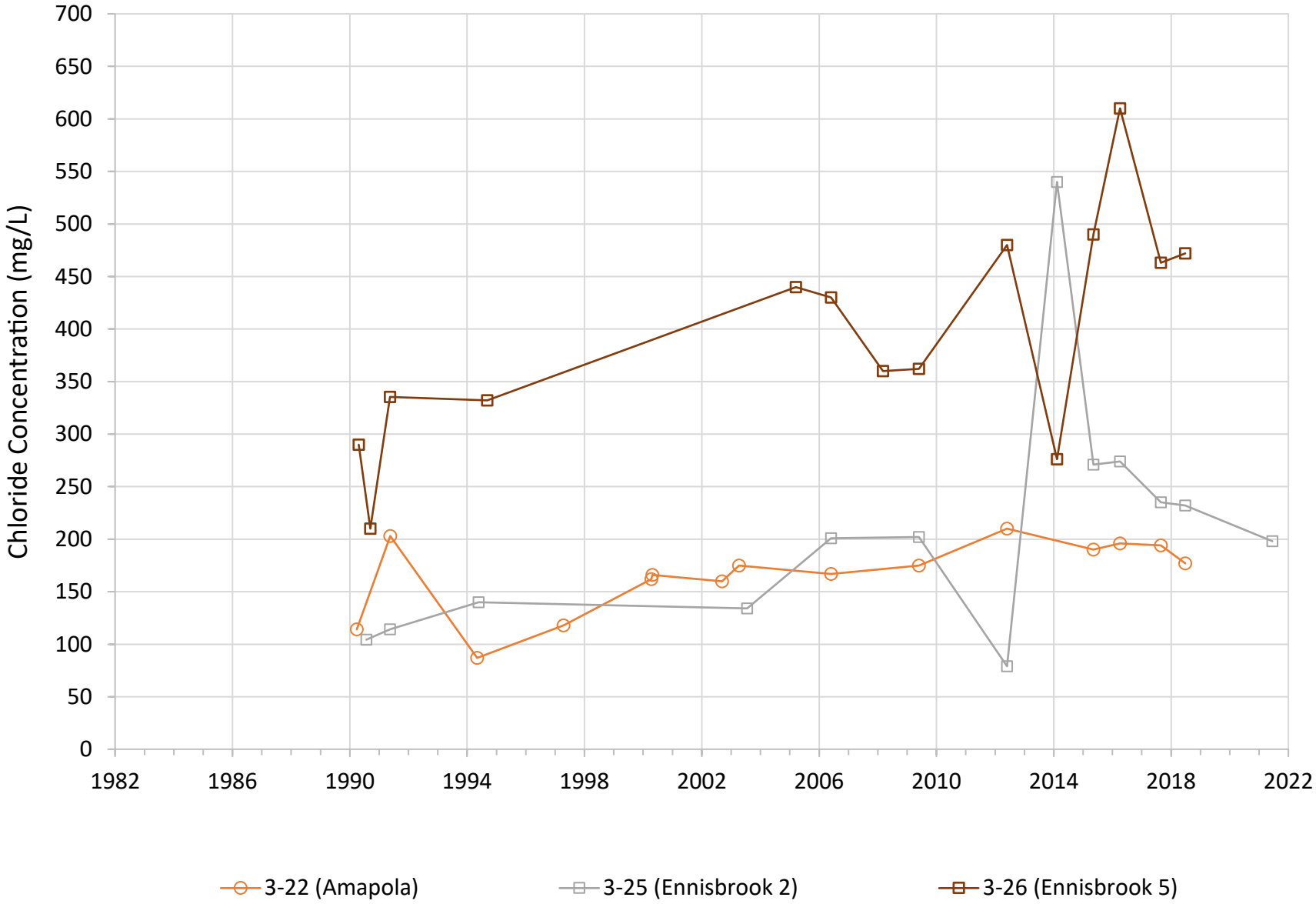


Figure 3-7

Historical and Current Chloride Concentrations Measured in the Inland portions of Storage Unit 3 in the MGB

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Legend

- Groundwater Quality Monitoring Well
- Montecito Groundwater Basin (3-049, Plan Area)
- Montecito Basin Storage Units
- Major River/Creek



Oak Creek
Storage Unit #1
1-19 (T. MOSBY)
1-1 (VALLEY CLUB 2)
192
Picay Creek
Toro Canyon Creek
Garrapata Creek
Romero Creek
San Ysidro Creek
Storage Unit #2
3-22 (AMAPOLA)
3-26 (ENNISBROOK 5)
3-12a (PADEN 2)
3-2 (LAS ENTRADAS 2)
3-25 (ENNISBROOK 2)
Montecito Creek
Storage Unit #3
3-28 (SWI Monitoring Well #3)
Toro Canyon Storage Unit
4-6 (EDGEWOOD)
144
101
225
Sycamore Creek
Pacific Ocean

DATUM: NAD 1983 DATA SOURCE: ESRI; DWR; USGS

DUDEK

0 0.5 1 Miles

FIGURE 3-8

Current Groundwater Quality Monitoring Wells in the MGB

Montecito Groundwater Basin Groundwater Sustainability Plan

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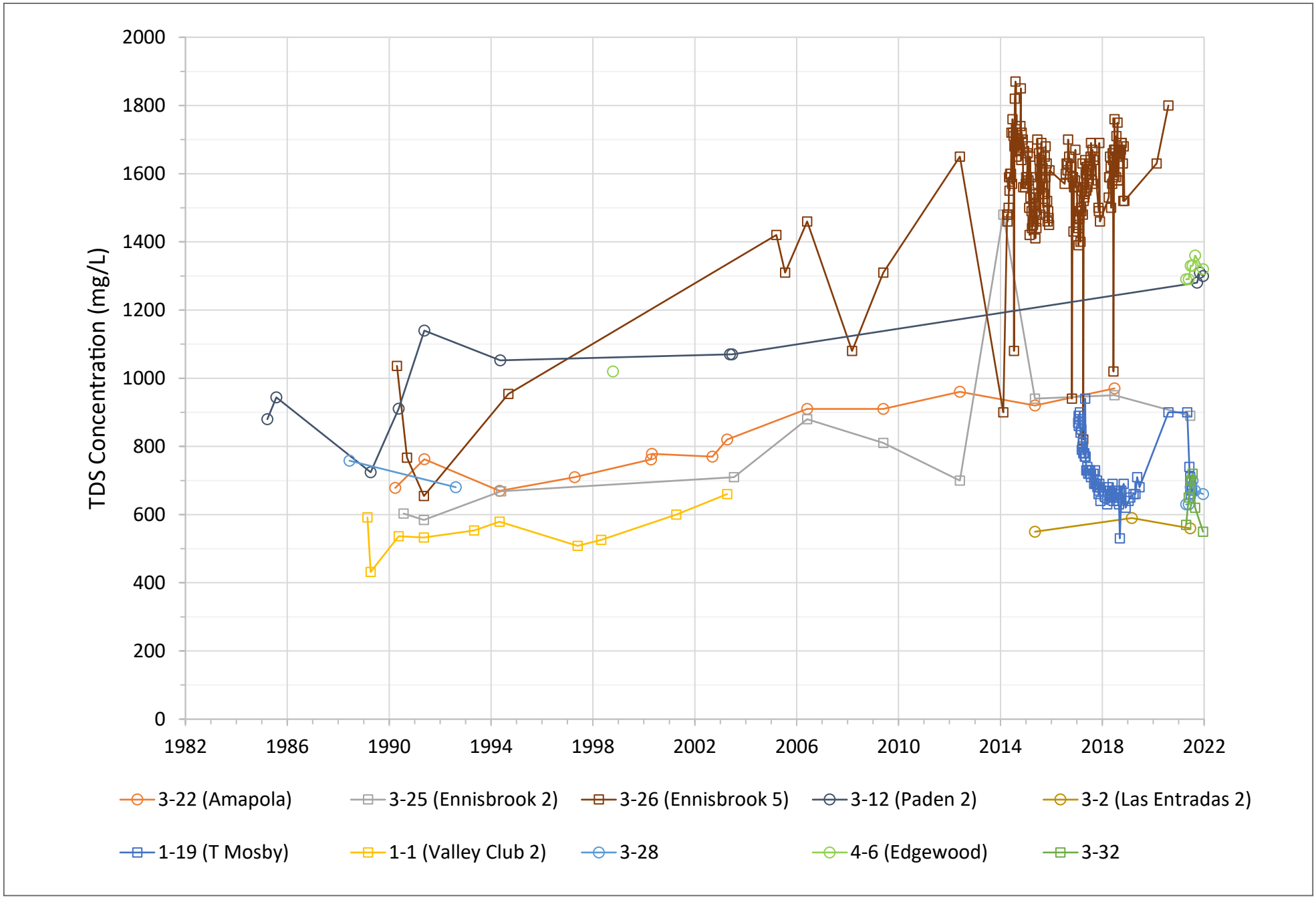


Figure 3-9

Historical and Current Total Dissolved Solids (TDS) Concentrations Measured in Groundwater in the MGB

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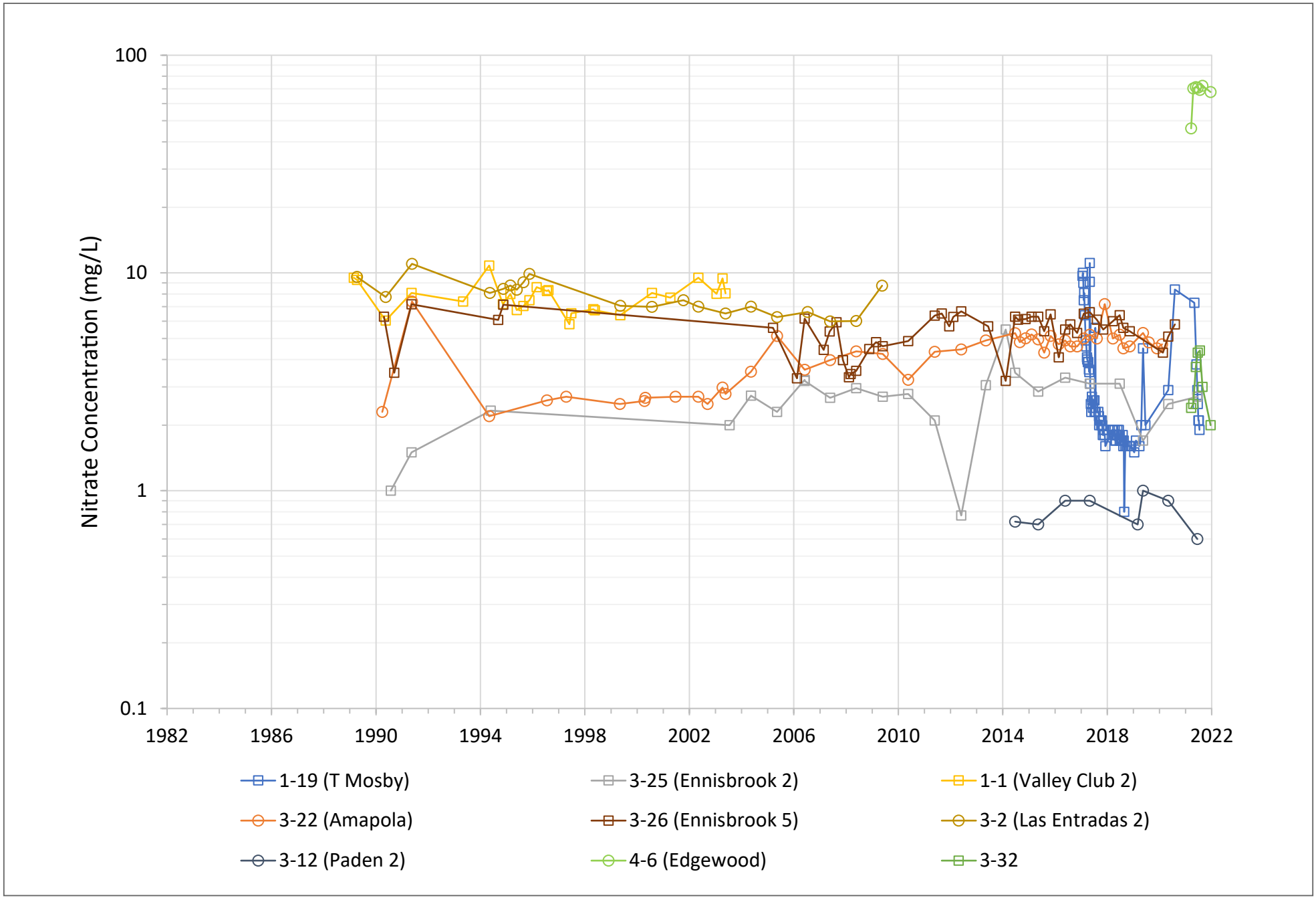


Figure 3-10

Historical and Current Nitrate Concentrations Measured in Groundwater in the MGB

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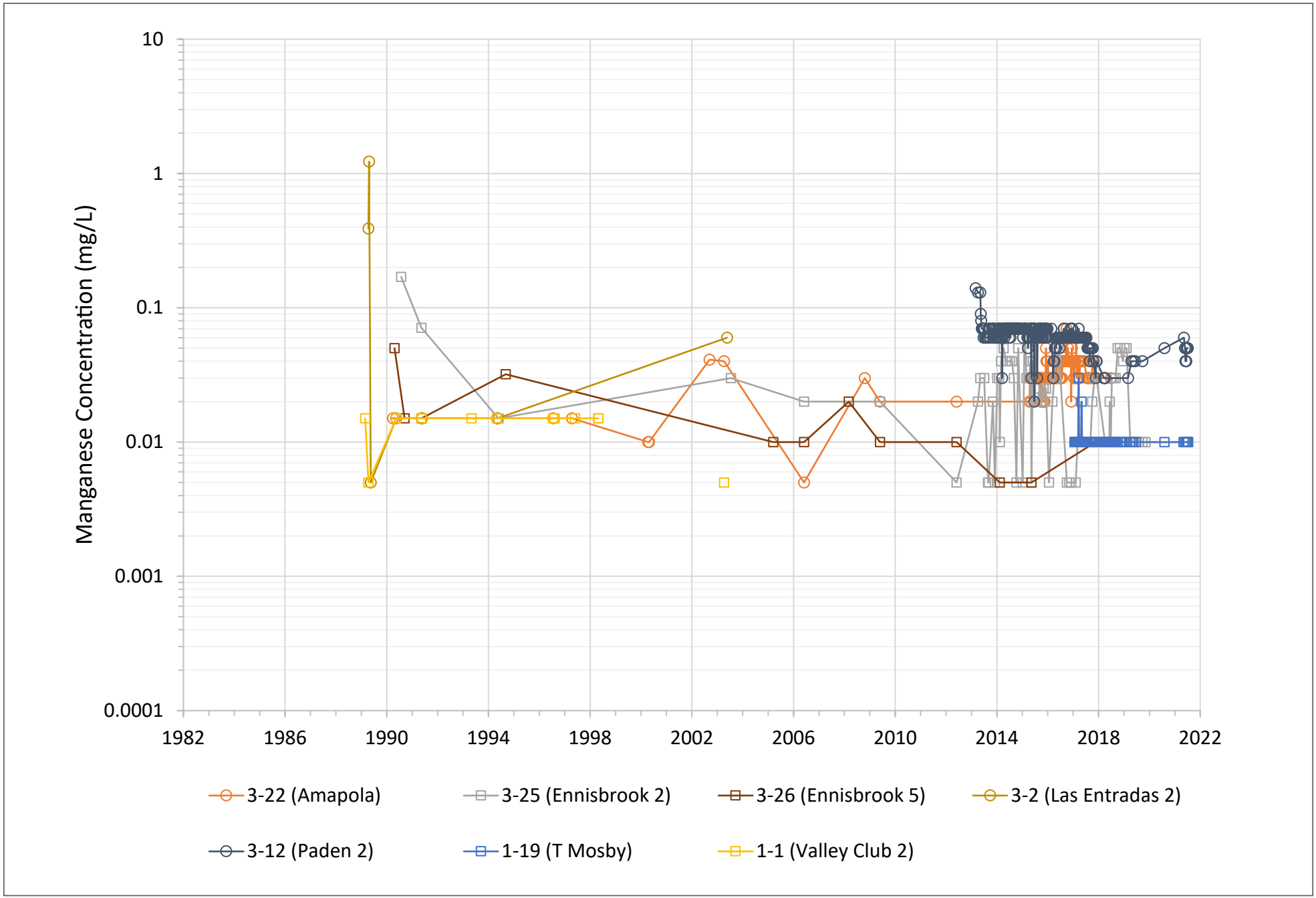


Figure 3-11

Historical and Current Manganese Concentrations Measured in Groundwater in the MGB

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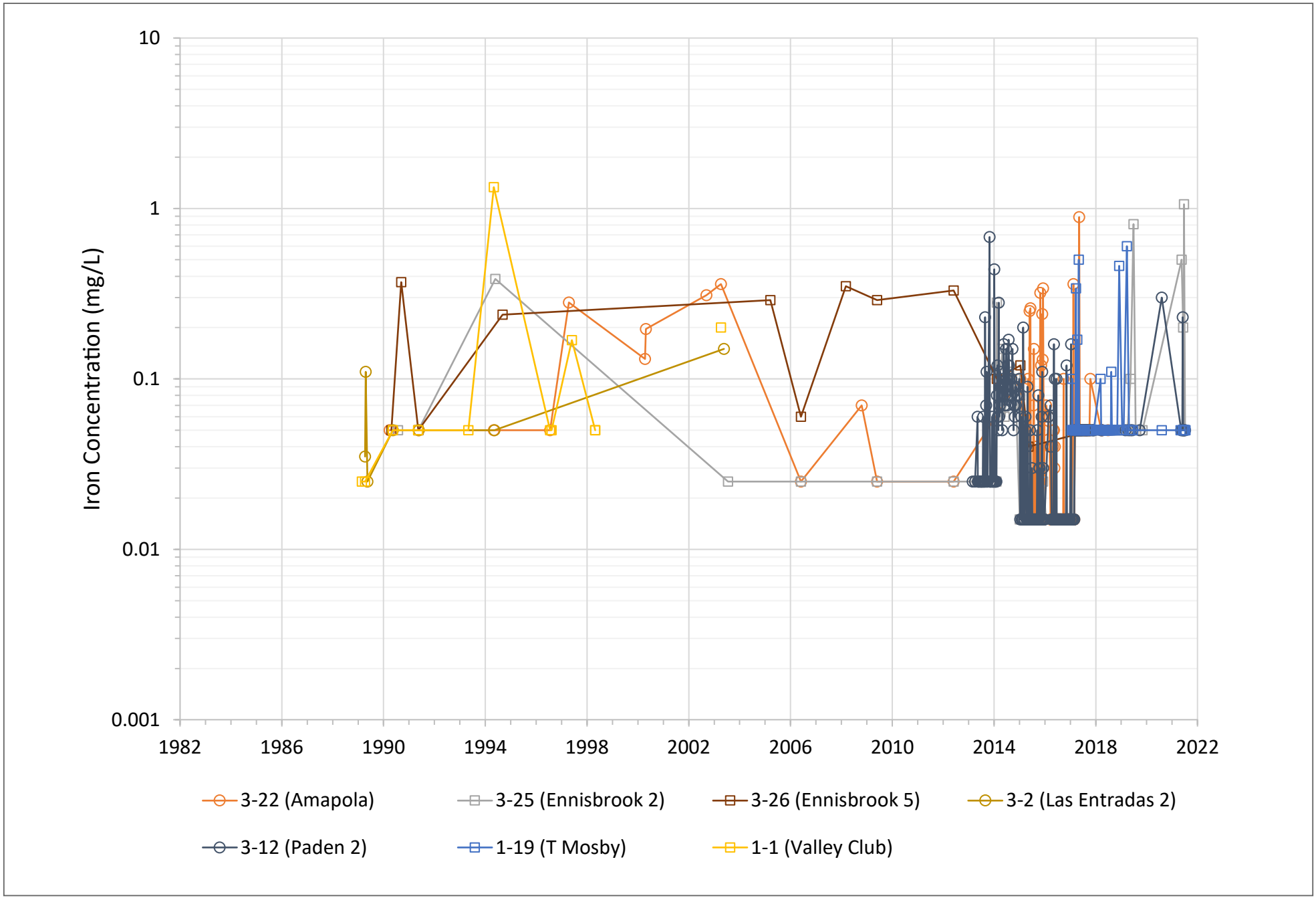


Figure 3-12

Historical and Current Iron Concentrations Measured in Groundwater in the MGB

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Legend

Representative Monitoring Points

Sustainability Indicators Monitored

- GWL, GS
- GWL, GS, GWQ
- GWL, GS, GWQ, SWI
- GWQ
- Montecito Groundwater Basin (3-049, Plan Area)

Montecito Basin Storage Units

- Storage Unit 1
- Storage Unit 2
- Storage Unit 3
- Toro Canyon Storage Unit

Surface Water Features

- Major River/Creek
- Lake

NOTES:
Two new RMP wells
(GSA Monitoring Wells #1 and #2)
were completed in 2022.





DATUM: NAD 1983 DATA SOURCE: ESRI; DWR; USGS; County of Santa Barbara

DUDEK

0 0.5 1 Miles

FIGURE 3-13

Representative Monitoring Points

Montecito Groundwater Basin Groundwater Sustainability Plan

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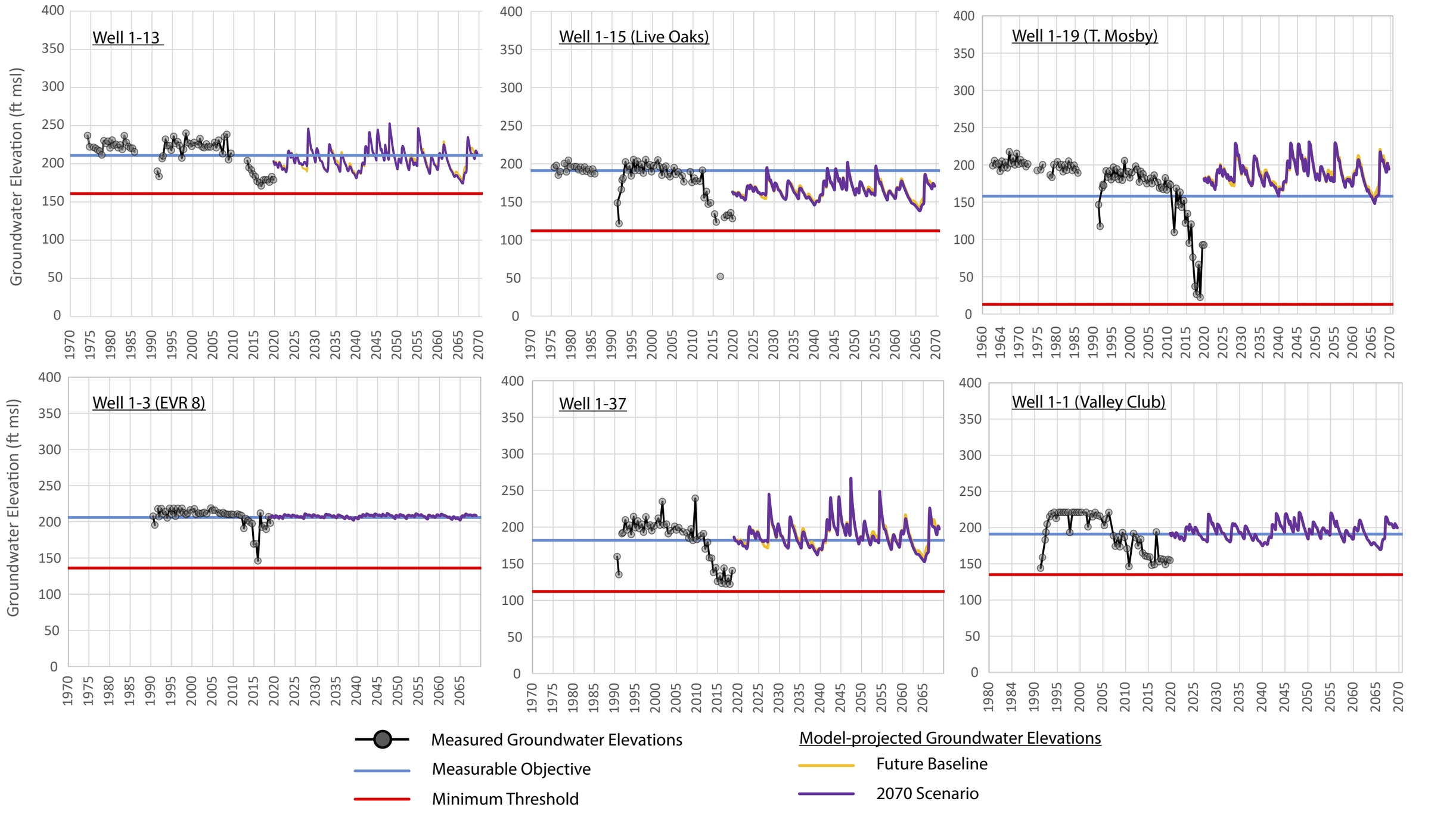


Figure 3-14

Storage Unit 1 Representative Monitoring Points: Historical and Projected Water Levels, Minimum Thresholds, Measurable Objectives

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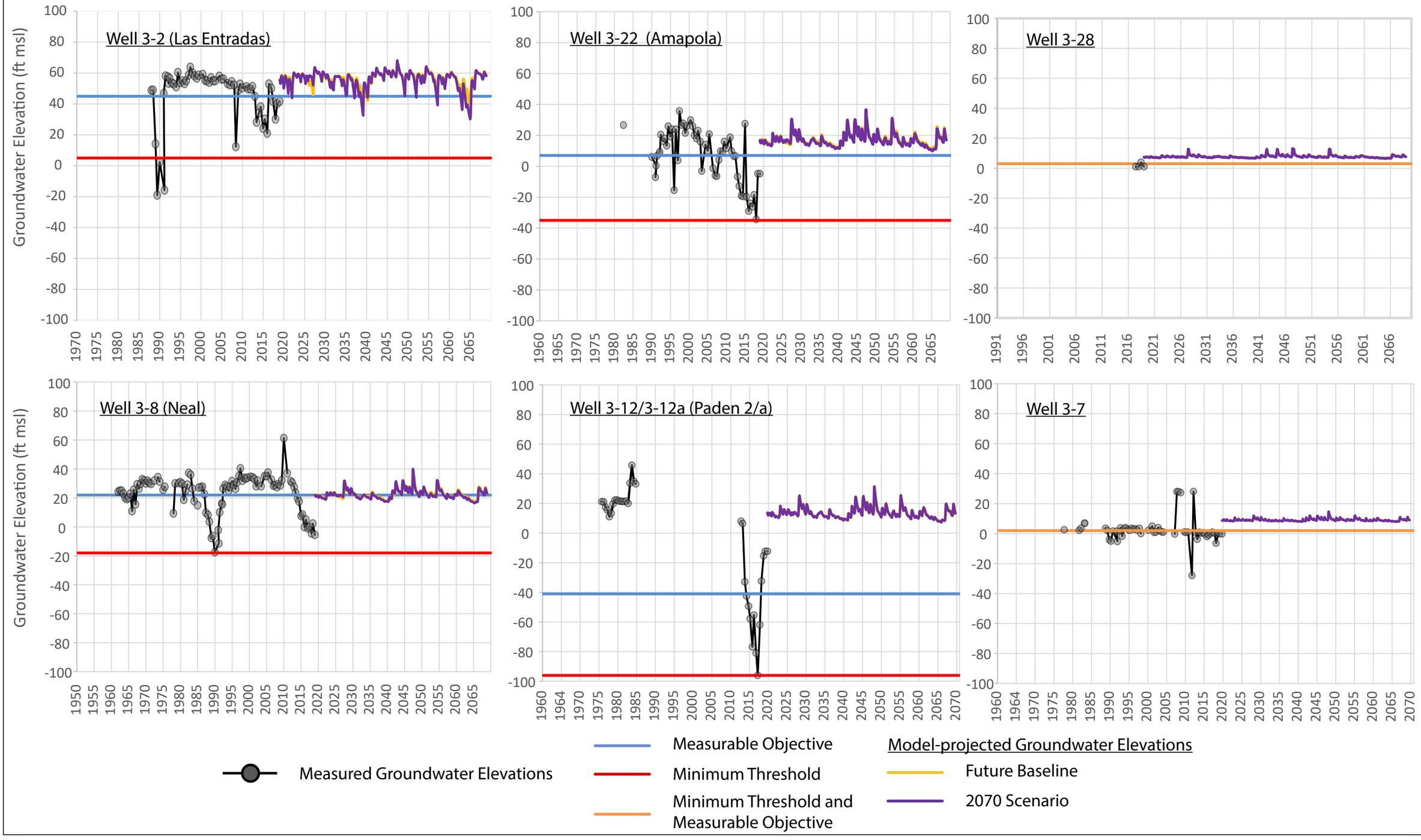


Figure 3-15

Storage Unit 3 Representative Monitoring Points: Historical and Projected Water Levels, Minimum Thresholds, Measurable Objectives

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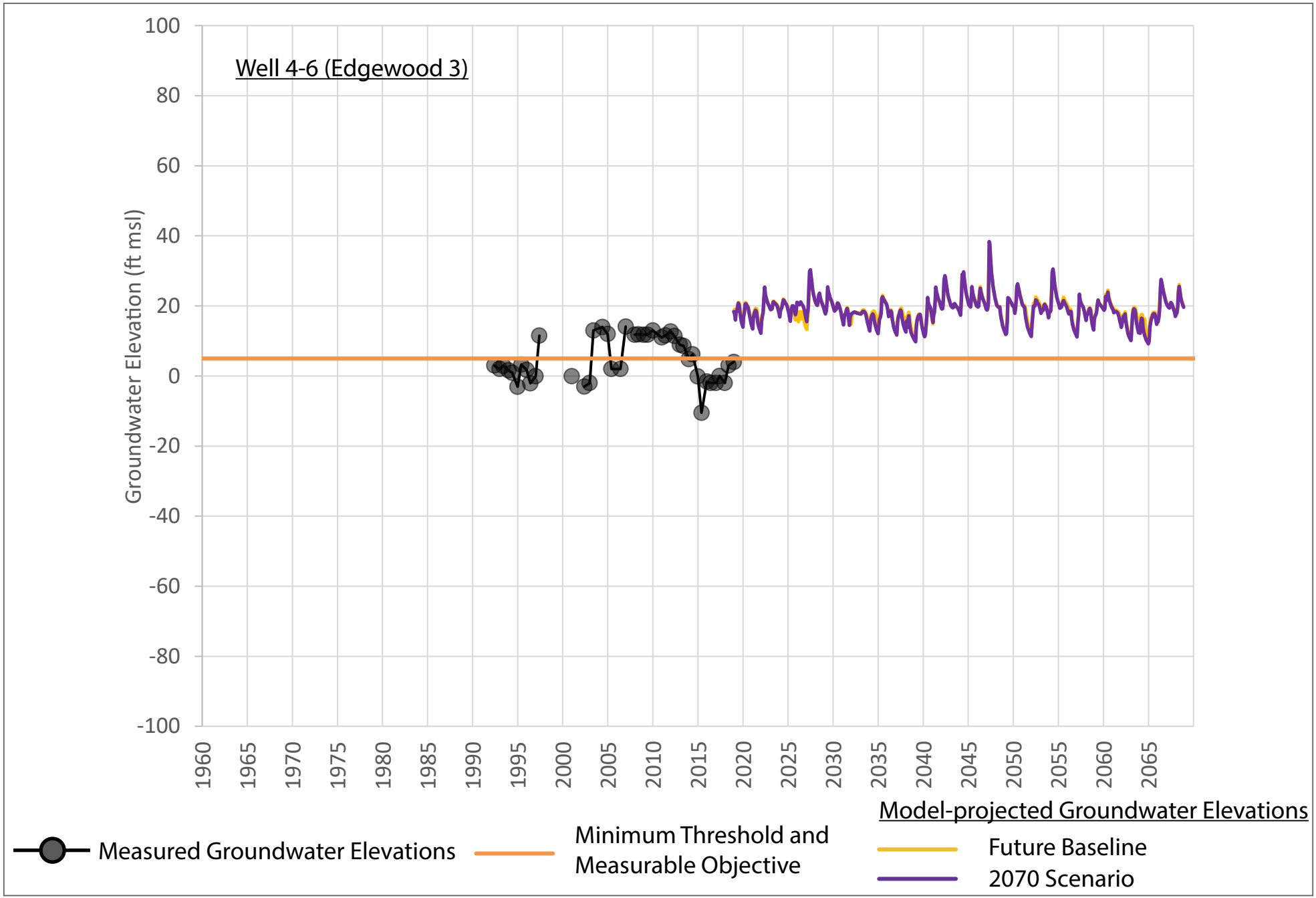


Figure 3-16

Toro Canyon Representative Monitoring Points: Historical and Projected Water Levels, Minimum Thresholds, Measurable Objectives

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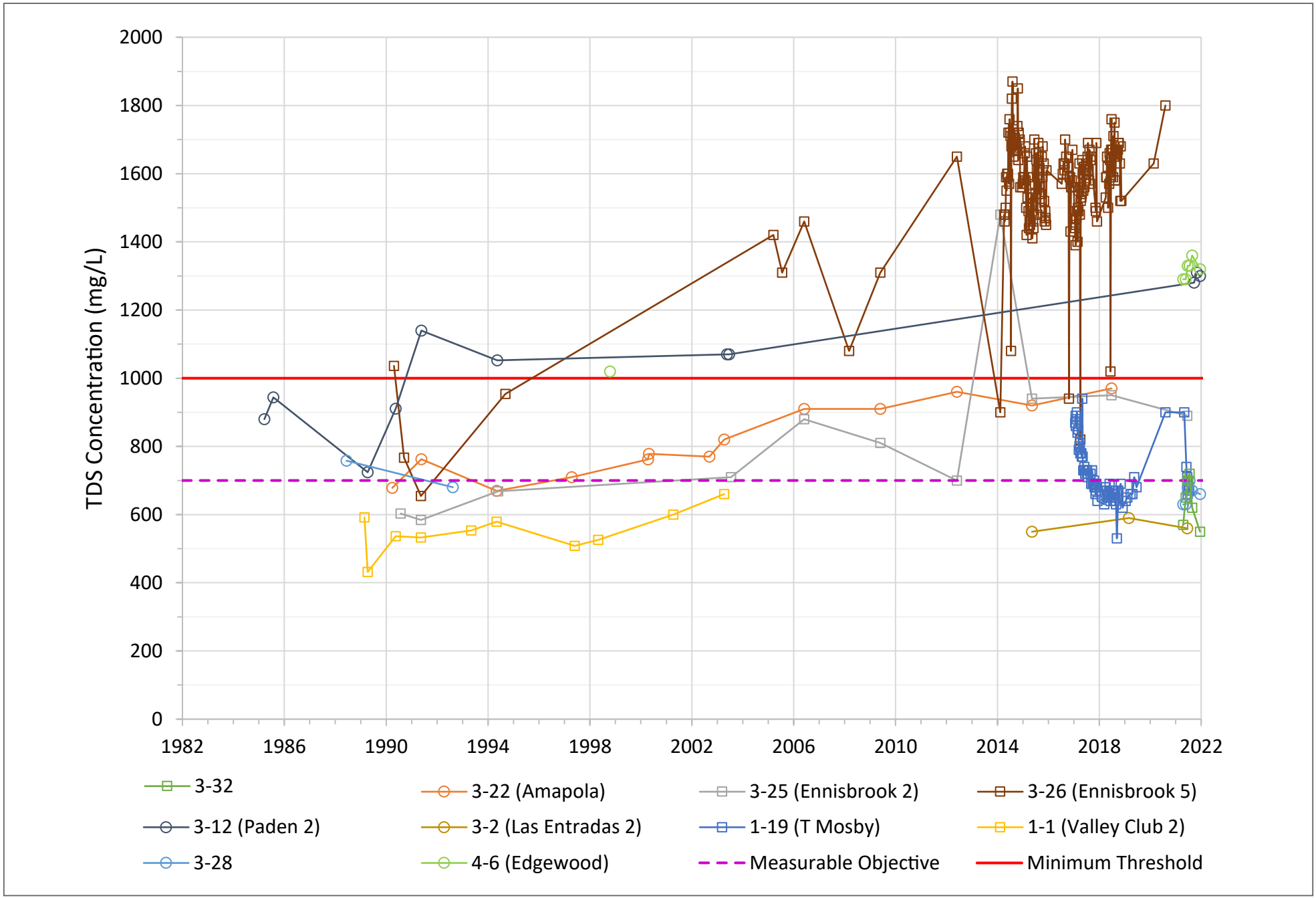


Figure 3-17

Total Dissolved Solids (TDS): Measured Concentrations, Minimum Thresholds, and Measurable Objectives

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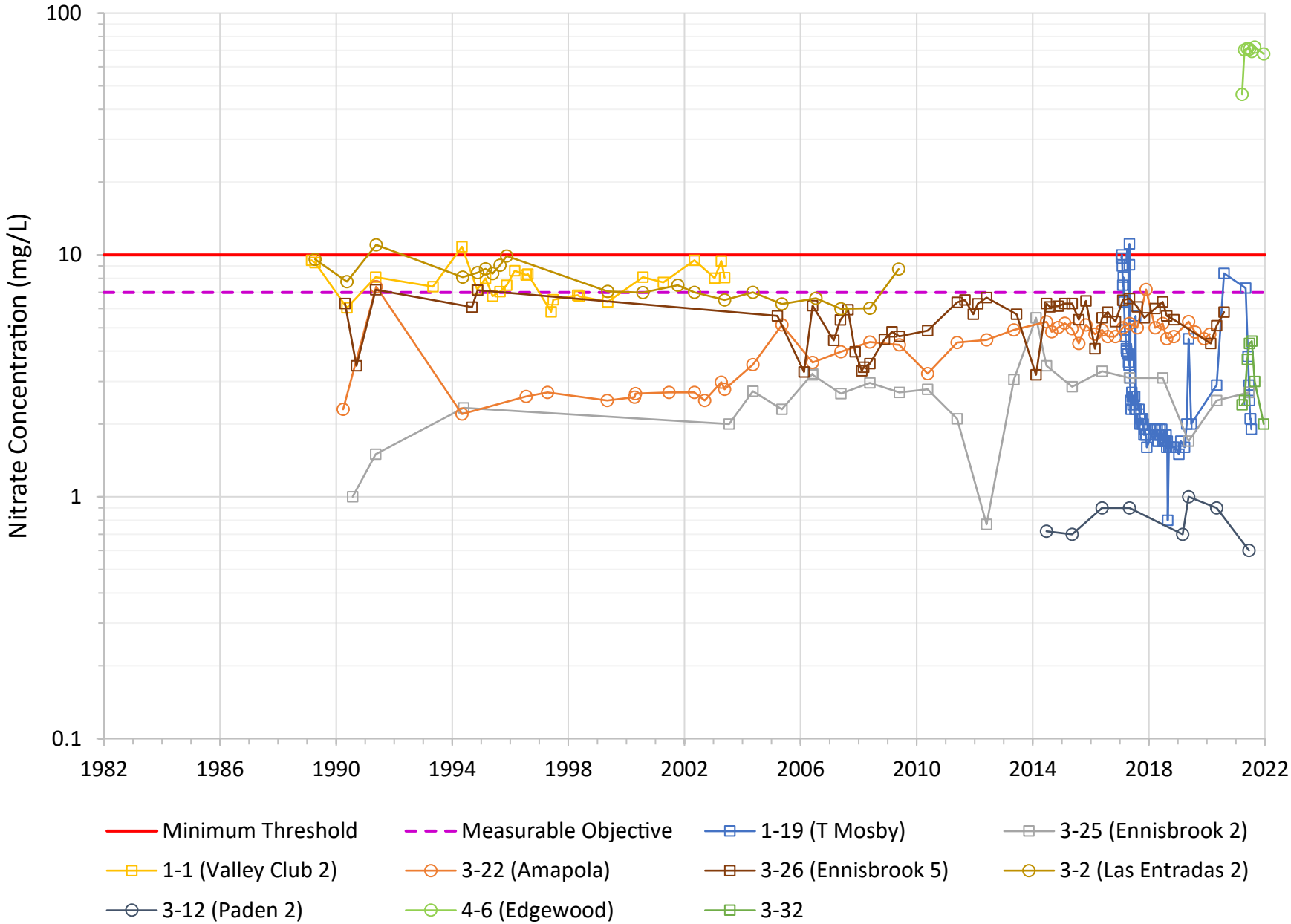


Figure 3-18

Nitrate: Measured Concentrations, Minimum Thresholds, and Measurable Objectives

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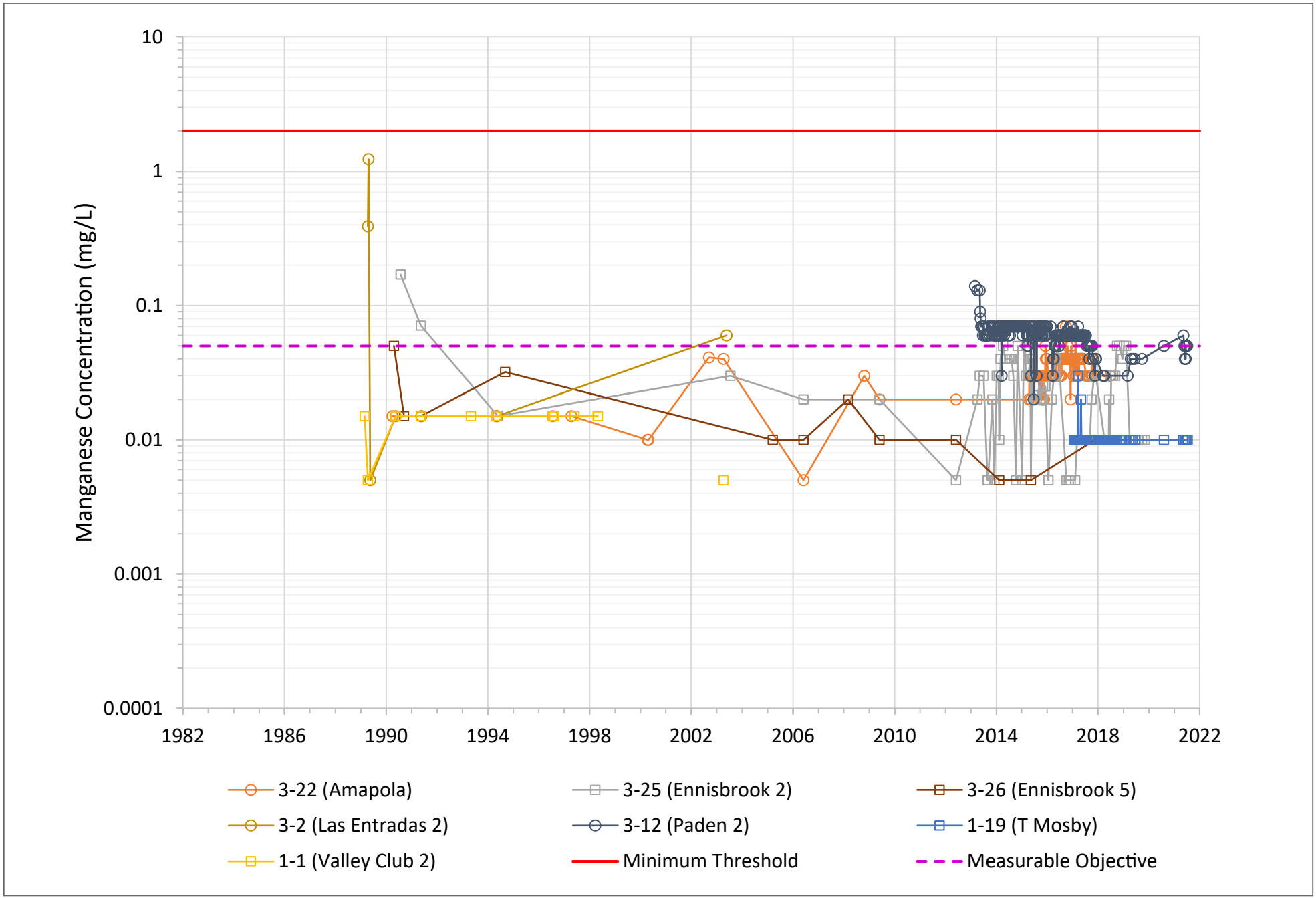


Figure 3-19

Manganese: Measured Concentrations, Minimum Thresholds, and Measurable Objectives

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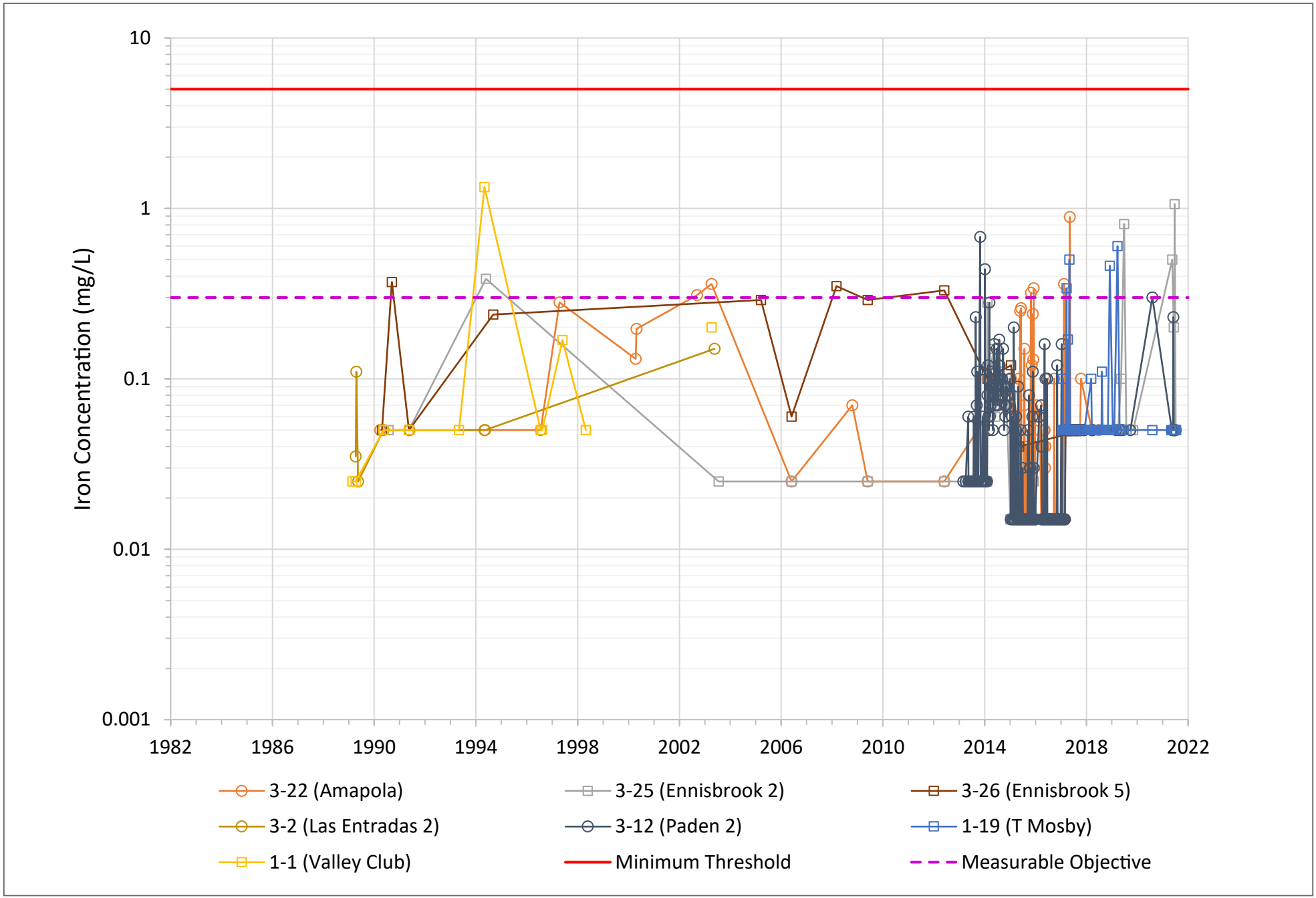


Figure 3-20

Iron: Measured Concentrations, Minimum Thresholds, and Measurable Objectives

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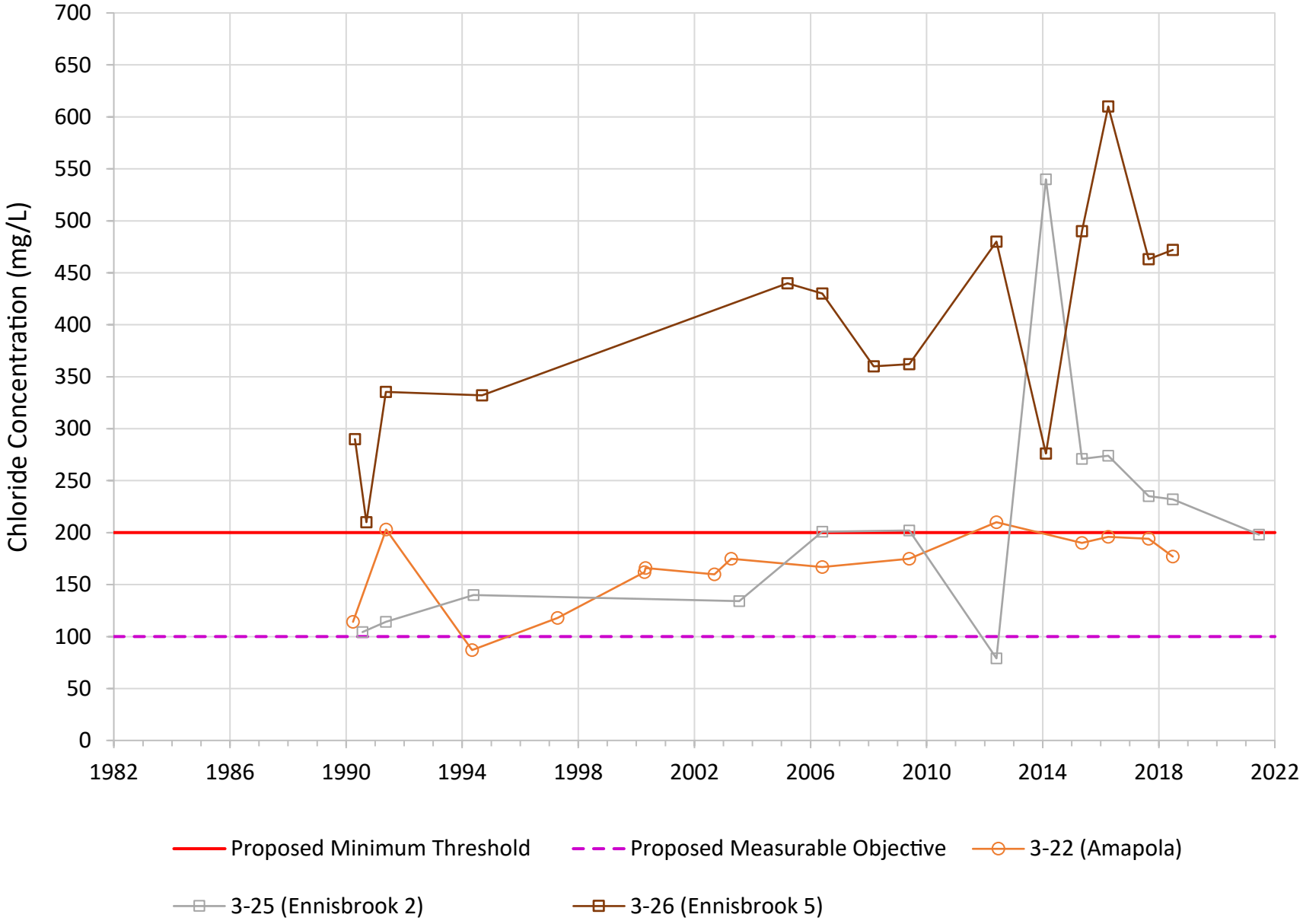


Figure 3-21

Chloride: Measured Concentrations, Minimum Thresholds, and Measurable Objectives

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Legend

- Montecito Groundwater Basin (3-049, Plan Area)

Current Groundwater Monitoring Network

- Groundwater Level
- Groundwater Level and Production
- Groundwater Level and Quality
- Groundwater Level, Quality, and Production

Montecito Basin Storage Units

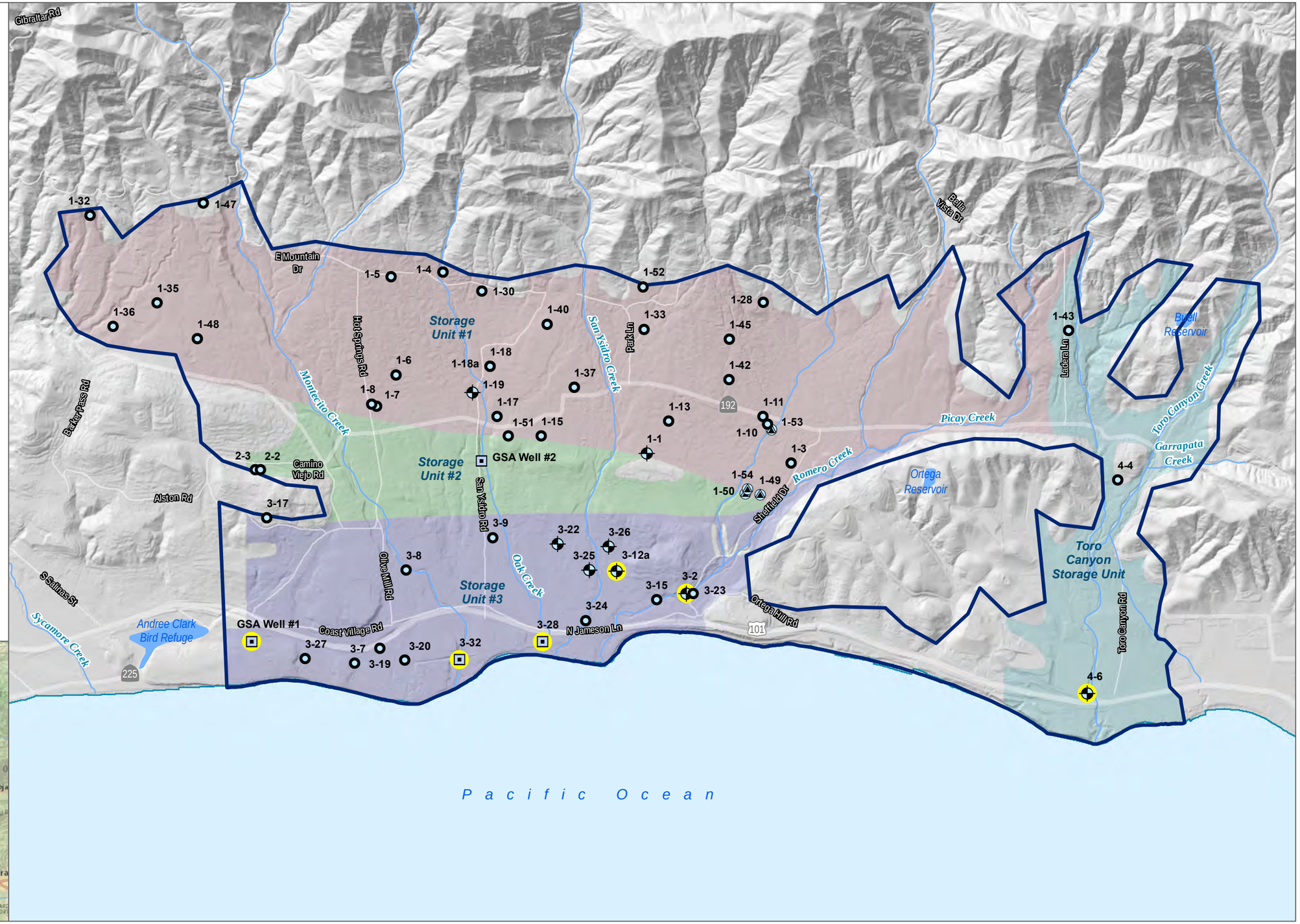
- Storage Unit 1
- Storage Unit 2
- Storage Unit 3
- Toro Canyon Storage Unit

Surface Water Features

- Major River/Creek
- Lake/Reservoir

NOTES:
Two new RMP wells (GSA Monitoring Wells #1 and #2) were completed in 2022. Data from these wells were not available during preparation of the GSP.





DATUM: NAD 1983 DATA SOURCE: ESRI; DWR; USGS; County of Santa Barbara

DUDEK

0 0.5 1 Miles

FIGURE 3-22

GSP Groundwater Monitoring Network

Montecito Groundwater Basin Groundwater Sustainability Plan

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CHAPTER 4
PROJECTS AND MANAGEMENT ACTIONS

The Sustainable Groundwater Management Act (SGMA) requires Groundwater Sustainability Plans (GSPs) to define the projects and management actions determined to be necessary to achieve or maintain basin sustainability, including actions to respond to changing conditions, such as changes to land use and climate. As described in Chapters 2, Plan Area and Basin Setting, and 3, Sustainable Management Criteria, of this GSP, no known undesirable results are currently occurring in the Montecito Groundwater Basin (MGB) based on available information. However, the Montecito Groundwater Basin Groundwater Sustainability Agency (Montecito GSA) has identified data gaps in the MGB (see Section 3.5.7.2, Identification of Data Gaps) and consequently has developed baseline projects and management actions to better characterize groundwater conditions and help inform future actions. In addition, the Montecito GSA has identified several possible future projects and management actions that could be implemented in the future should MGB conditions warrant. These projects are categorized separately from the baseline projects and are not currently planned for implementation based on current MGB conditions.

Baseline Projects and Management Actions

The baseline projects and management actions include actions that are planned during the initial phase of GSP implementation. These projects and management actions are intended to fill data gaps and include expanding the groundwater level and quality monitoring network, expanding the seawater intrusion monitoring network, evaluating groundwater–surface water interactions, developing stakeholder incentive programs, updating the Basin Numerical Model (BNM), and enhancing the groundwater well database (Table 4-1).

Possible Future Projects and Management Actions

The possible future projects and management actions are actions that the Montecito GSA may undertake if required to maintain sustainability. Conditions that could warrant implementation occur when monitoring and/or modeling indicate that undesirable results are occurring or are anticipated to occur. These projects and management actions include developing a supplemental water source for well owners, requiring metering on wells, establishing pumping allocations, and implementing groundwater recharge projects (Table 4-1). These possible future projects and management actions are described in Section 4.2.

Table 4-1. Summary of Projects and Management Actions

Project/Management Action	Measurable Objectives Benefited	Circumstances for Implementation	Schedule
Baseline Projects and Management Actions			
Expand Groundwater Level and Quality Monitoring	GL, GS, WQ, GW-SW*	GSP adoption and funding availability	Prior to first 5-year update (May 2028)
Expand Seawater Intrusion Monitoring Network	GL, GS, SWI		
Evaluate Groundwater–Surface Water Interactions	GW-SW*		
Develop Stakeholder Incentive Programs	GL, GS, WQ, GW-SW*, SWI		
Update Basin Numerical Model	GL, GS, WQ, GW-SW*, SWI		
Enhance Groundwater Well Database	GL, GS, WQ, GW-SW*, SWI		
Possible Future Projects and Management Actions			
Develop/Acquire Supplemental Water for Well Owners	GL, GS, WQ, GW-SW*, SWI	Considered if undesirable results are determined to be occurring and supplemental source(s) and funding are available	Schedule if conditions warrant
Require Well Metering	GL, GS, WQ, GW-SW*, SWI	Considered if undesirable results are determined to be likely to occur	Schedule if conditions warrant
Develop/Impose Pumping Allocations	GL, GS, WQ, GW-SW*, SWI		
Develop/Implement Recharge Projects	GL, GS, WQ, SWI		

Notes: GSP = Groundwater Sustainability Plan; GL = chronic lowering of groundwater levels; GS = reduction of groundwater in storage; WQ = degraded groundwater quality; GW-SW = depletion of interconnected surface water; SWI = seawater intrusion.

* Measurable objectives have not been established for interconnected surface water. Implementation of these projects is expected to improve management of this sustainability indicator and support establishment of measurable objectives as part of Groundwater Sustainability Plan implementation.

4.1 BASELINE PROJECTS AND MANAGEMENT ACTIONS

4.1.1 Expand Groundwater Level and Quality Monitoring

This project is designed to fill spatial data gaps in the current groundwater level and groundwater quality monitoring network to improve general understanding of groundwater conditions in the MGB. Implementation of this project includes gaining access to and monitoring additional existing privately owned groundwater wells in Storage Unit 2 and the Toro Canyon Storage Unit, integrating these wells and the data gathered into the existing representative monitoring network, and upgrading all wells in the representative monitoring network with high resolution groundwater monitoring equipment. In addition to filling existing data gaps, this project will facilitate an improved understanding of the hydrogeologic conceptual model and more accurate numerical modeling.

4.1.1.1 Measurable Objective Expected to Benefit

The measurable objectives that this project will benefit include gathering data to evaluate chronic lowering of groundwater levels, reduction of groundwater in storage, degraded groundwater quality, and surface water–groundwater connectivity.

4.1.1.2 Expected Benefits

Expansion of groundwater level and quality measurements collected by the Montecito GSA will allow for improved monitoring of MGB conditions, more accurate assessment for undesirable results, and improved tracking of the effectiveness of projects and management actions. The additional groundwater level and quality measurements will fill data gaps in key areas of the MGB where no data currently exists and allow for the establishment of additional representative monitoring points (RMPs) for sustainable management of those areas (see Section 3.5.7.3, Description of Steps to Fill Data Gaps). The additional data will improve understanding of groundwater conditions in the MGB, provide additional data for improved MGB numerical modeling accuracy, and inform MGB adaptive sustainable management.

4.1.1.3 Circumstances for Implementation

This project is essential to filling known data gaps and will be implemented during the first 5 years of GSP implementation. Future opportunities to improve and expand the groundwater level and quality monitoring network will be evaluated in annual reports and 5-year GSP updates.

4.1.1.4 Public Noticing

The Montecito GSA maintains a dedicated website and stakeholder notification list and regularly distributes updated Montecito GSA and GSP information. The Montecito GSA will inform the public and stakeholders of this project during future public meetings and through noticing on its website. All required public noticing will comply with all applicable laws.

4.1.1.5 Access

When an existing private well is made available for monitoring, the Montecito GSA will obtain the appropriate access agreements.

4.1.1.6 Permitting and Regulatory Process

The Montecito GSA will make a determination concerning the applicability of the California Environmental Quality Act (CEQA) to the project, which will likely fall within a categorical exemption. After any determination that a categorical exemption applies, a Notice of Exemption will be submitted and filed with the Santa Barbara County Clerk. No permits are necessary for this project.

4.1.1.7 Implementation Schedule

Implementation of this project will begin following adoption of the GSP. The project is anticipated to be completed prior to the first 5-year GSP update.

4.1.1.8 Legal Authority

In accordance with California Water Code (CWC) Sections 10725 through 10726.8, the Montecito GSA has the legal authority to install and monitor groundwater wells within the MGB.

4.1.1.9 Estimated Costs

The estimated cost for this project is $53,000 and is based on expenses from similar projects conducted during GSP development.

4.1.2 Expand Seawater Intrusion Monitoring Network

This project includes the construction of three seawater intrusion monitoring wells and the incorporation of existing private wells into the existing seawater intrusion monitoring program (Section 2.1.2.5, Monitoring Network Grant Programs). Limited historical studies and recent sampling indicates the absence of seawater intrusion in coastal areas, but there remain areas with no or very limited data, including the westerly end of Storage Unit 3 and the Toro Canyon Storage Unit. In addition, the origin of the salinity found in limited areas of Storage Unit 3 remains undetermined. The newly constructed and/or existing private wells added to the seawater intrusion monitoring network will be outfitted with groundwater level and quality monitoring equipment. Routine water quality samples will be collected and analyzed for constituents indicative of incipient seawater intrusion, including chloride, iodide, bromide, silica, and other analytes. This project will also provide additional data on the hydrostratigraphy and hydraulic properties of the principal aquifer in the coastal areas of the MGB through the geologic logging of sediments and aquifer testing performed during the well drilling processes.

4.1.2.1 Measurable Objective Expected to Benefit

In addition to measurable objective for seawater intrusion, implementation of this project will benefit the measurable objectives for chronic lowering of groundwater levels and reduction of groundwater in storage.

4.1.2.2 Expected Benefits

Additional coastal groundwater elevation data and an enhanced definition of coastal aquifer properties will aid in the evaluation of the presence of seawater intrusion in the MGB. The additional groundwater level and quality data will improve the understanding of the groundwater water budget, including underflow leaving the MGB and the relationship between groundwater elevation and contaminant of concern concentrations.

4.1.2.3 Circumstances for Implementation

This project is essential to fill known data gaps and will be implemented during the first 5 years of GSP implementation.

4.1.2.4 Public Noticing

The Montecito GSA maintains a dedicated website and stakeholder notification list and regularly distributes updated Montecito GSA and GSP information. The Montecito GSA will inform the public and stakeholders of this project during future public meetings and through noticing on its website. All required public noticing will comply with all applicable laws, including that for the construction of new monitoring wells.

4.1.2.5 Access

Where feasible, public property and road right-of-way will be used for locating new monitoring wells. When an existing private well is made available for monitoring, the Montecito GSA will obtain the appropriate access agreements.

4.1.2.6 Permitting and Regulatory Process

The Montecito GSA will make a determination concerning the applicability of CEQA to the project, which will likely fall within a categorical exemption. After any determination that a categorical exemption applies, a Notice of Exemption will be submitted and filed with the Santa Barbara County Clerk. Necessary permits may include encroachment permits from Santa Barbara County and/or the California Department of Transportation (Caltrans) and potentially a coastal development permit from the California Coastal Commission or Santa Barbara County, if required. A monitoring well permit will be obtained from Santa Barbara County Environmental Health Services for new well installations.

4.1.2.7 Implementation Schedule

Implementation of this project will begin following adoption of the GSP. The project is anticipated to be completed during the first 5 years of GSP implementation.

4.1.2.8 Legal Authority

In accordance with CWC Sections 10725 through 10726.8, the Montecito GSA has the legal authority to install and monitor groundwater wells within the MGB.

4.1.2.9 Estimated Costs

The estimated cost for this project is $1,186,000 and is based on expenses from similar projects conducted during GSP development.

4.1.3 Evaluate Groundwater–Surface Water Interactions

A significant data gap in the MGB is characterization of shallow groundwater proximal to major creeks and the interconnectivity of surface water and groundwater, potential groundwater-dependent ecosystems (GDEs), and creek flow infiltration. Historical surface water flow data is limited, presenting a significant obstacle to understanding and estimating the degree to which surface water interacts with groundwater in the MGB and the degree to which pumping impacts shallow groundwater conditions along creek corridors. Because of this, the Montecito GSA has postponed designation of sustainable management criteria for this sustainability indicator until adequate data is acquired (Section 3.2.6, Depletions of Interconnected Surface and Groundwater – Undesirable Results). This project will include the construction of approximately 12 shallow wells. Three shallow groundwater monitoring wells near each of MGB's four largest creeks (Montecito, San Ysidro, Romero, and Toro Canyon Creeks) are planned. Once installed, the wells will be regularly monitored for groundwater elevation, providing data that will help to further characterize surface water and groundwater interconnection and the contribution of surface water flow to groundwater recharge. This project, in combination with continued monitoring of stream flows in Montecito GSA's existing surface water flow monitoring program (Section 2.1.2.5), will fill data gaps and likely provide the information needed to consider establishing sustainable management criteria for the depletion of interconnected surface water sustainability indicator.

4.1.3.1 Measurable Objective Expected to Benefit

The measurable objectives for depletion of interconnected surface water will benefit from implementation of this project.

4.1.3.2 Expected Benefits

Shallow groundwater level data in combination with stream flow data will facilitate characterization of groundwater–surface water conditions in the MGB and inform minimum thresholds and measurable objectives for the depletion of the interconnected surface water sustainability indicator, which are not yet defined due to existing data gaps.

4.1.3.3 Circumstances for Implementation

This project is essential to fill known data gaps and will be implemented during the first 5 years of GSP implementation.

4.1.3.4 Public Noticing

The Montecito GSA maintains a dedicated website and stakeholder notification list and regularly distributes updated Montecito GSA and GSP information. The Montecito GSA will inform the public and stakeholders of this project during future public meetings and through noticing on its website. All required public noticing will comply with all applicable laws, including that for the construction of new monitoring wells.

4.1.3.5 Access

Where feasible, public property and road right-of-way will be used for locating new monitoring wells. When an existing private well is made available for monitoring, the Montecito GSA will obtain the appropriate access agreements.

4.1.3.6 Permitting and Regulatory Process

The Montecito GSA will make a determination concerning the applicability of CEQA to the project, which will likely fall within a categorical exemption. After any determination that a categorical exemption applies, a Notice of Exemption will be submitted and filed with the Santa Barbara County Clerk. Necessary permits may include encroachment permits from Santa Barbara County and/or Caltrans and potentially a coastal development permit from the California Coastal Commission or Santa Barbara County, if required. A monitoring well permit will be obtained from Santa Barbara County Environmental Health Services for new well installations.

4.1.3.7 Implementation Schedule

Implementation of this project will begin following adoption of the GSP. The project is anticipated to be completed prior to the first 5-year GSP update.

4.1.3.8 Legal Authority

In accordance with CWC Sections 10725 through 10726.8, the Montecito GSA has the legal authority to install and monitor groundwater wells and stream gauges within the MGB.

4.1.3.9 Estimated Costs

The estimated cost for this project is $685,000 and is based on expenses from similar projects conducted during GSP development and consultant estimates.

4.1.4 Develop Stakeholder Incentive Programs

There are multiple stakeholder incentive programs that the Montecito GSA may implement, including voluntary well metering and residential infiltration projects. A description of each is provided below.

Voluntary Well Metering

The voluntary well metering incentive program is designed to fill data gaps associated with measurement of groundwater extraction in the MGB by providing economic incentive and technical assistance for flow meter installation on private wells. Approximately 15 private wells in the MGB are known to be equipped with flow meters for measurement of groundwater extraction, funded by the Montecito GSA with Proposition 68 grant funds. This project will expand on the Montecito GSA's existing private well metering pilot program that is currently in place (Section 2.1.2.5) by offering approximately 15 additional well meters on a voluntary basis to private well owners at no expense to them. Groundwater extraction data will be collected and processed on a quarterly basis and will be used to estimate extraction rates from similar users throughout the MGB and to refine and/or confirm prior estimates.

Residential Infiltration Projects

The residential infiltration projects incentive program will provide residential property owners a rebate for installation of small-scale infiltration projects that reduce stormwater runoff and increase infiltration such as bioswales and rain gardens. These small-scale infiltration projects both remove pollutants from stormwater and promote groundwater recharge. The Montecito GSA will provide interested property owners guidance on what constitutes an effective infiltration project.

4.1.4.1 Measurable Objective Expected to Benefit

The measurable objectives for chronic lowering of groundwater levels, reduction of groundwater in storage, degraded groundwater quality, depletion of interconnected surface water, and seawater intrusion will benefit from implementation of the stakeholder incentive programs.

4.1.4.2 Expected Benefits

The measurement of groundwater extraction from a greater number of private wells will help to refine and verify prior estimates of total extractions from the MGB, a critical component of the MGB water budget. The implementation of residential infiltration projects will reduce stormwater runoff, improve water quality through filtration, and help enhance groundwater recharge.

4.1.4.3 Circumstances for Implementation

The stakeholder incentive programs will be implemented during the first 5 years of GSP implementation. The potential need for additional stakeholder incentive programs will be evaluated in 5-year GSP updates.

4.1.4.4 Public Noticing

The Montecito GSA conducts ongoing extensive outreach activities related to GSP preparation, including public Montecito GSA Board of Directors (Board) meetings, public workshops, and public Stakeholder Advisory Committee (SAC) meetings. In addition, the Montecito GSA maintains a dedicated website and stakeholder notification list and regularly distributes updated Montecito GSA and GSP information. The Montecito GSA will inform the public and stakeholders of these programs during future public meetings and through noticing on its website. All required public noticing will comply with all applicable laws.

4.1.4.5 Access

The Montecito GSA will provide educational materials and obtain access agreements with property owners where required to complete work.

4.1.4.6 Permitting and Regulatory Process

Implementation of the stakeholder incentive programs are not anticipated to require any permitting or regulatory oversight. If permits are required, the property owner would obtain all necessary permits required for the work.

4.1.4.7 Implementation Schedule

Implementation of the stakeholder incentive programs will begin following adoption of the GSP and will remain an active program pending funding availability. Future opportunities to install well meters and small-scale infiltration projects will continuously be assessed.

4.1.4.8 Legal Authority

In accordance with CWC Sections 10725 through 10726.8, the Montecito GSA has the legal authority to provide financial assistance and guidance to property owners in the MGB to implement projects that support GSP

implementation and sustainable management of the MGB. The Montecito GSA will coordinate with property owners to determine program eligibility, reimbursement amounts, and compliance.

4.1.4.9 Estimated Costs

The estimated total cost for both stakeholder incentive programs is $115,000. The cost estimate for the voluntary well metering incentive program is $70,000 and based on expenses from similar projects conducted during GSP development. The residential infiltration projects incentive program cost is estimated to be $45,000. The cost of these programs may change based on stakeholder participation.

4.1.5 Update Basin Numerical Model

The BNM is a numerical flow model that simulates surface water and groundwater processes across the MGB and the contributing watershed. The BNM is used to estimate components of the water budget, including MGB sustainable yield, water demand, storage changes, and future conditions based on the best available data. This project is required by the SGMA and will incorporate new data collected through GSP implementation. The BNM will be updated and recalibrated once during the first 5 years of GSP implementation to incorporate new data through the implementation of data collection and monitoring projects. It is anticipated that these data will include surface water flows measured along primary drainages of the MGB, shallow groundwater level data collected along primary drainages to characterize groundwater–surface water interactions, groundwater extraction data collected through the Montecito GSA's well metering program, and depth-discrete groundwater level data collected via the Montecito GSA's new multi-completion monitoring wells. In addition to this larger update, the BNM will be updated annually during preparation of the GSP annual reports, and the numerical model results will be compared against data collected through the preceding water year.

4.1.5.1 Measurable Objective Expected to Benefit

The measurable objectives for chronic lowering of groundwater levels, reduction of groundwater in storage, degraded groundwater quality, depletion of interconnected surface water, and seawater intrusion will benefit from implementation of this project.

4.1.5.2 Expected Benefits

Updating the BNM with the most accurate, comprehensive, and recent data collected will ensure simulation of groundwater processes and future conditions are based on the best available data. The updated BNM will be used to support the evaluation and potential update of sustainable management criteria as defined in Chapter 3. It will aid in the development of sustainable management criteria not yet defined due to data gaps, including for the depletion of interconnected surface water.

4.1.5.3 Circumstances for Implementation

New data will be incorporated into the model files as it becomes available and at least annually during preparation of the GSP annual reports.

A larger model update and recalibration is planned for 2024 and a study of groundwater–surface water interaction for 2025. These updates and revisions will support a model-aided reanalysis of the MGB with the first 5-year GSP

update to aid in the re-evaluation of sustainable management criteria, sustainable yield, and other groundwater-related parameters.

4.1.5.4 Public Noticing

The Montecito GSA conducts ongoing extensive outreach activities related to GSP preparation, including public Board meetings, public workshops, and public SAC meetings. In addition, the Montecito GSA maintains a dedicated website and stakeholder notification list and regularly distributes updated Montecito GSA and GSP information. The Montecito GSA will inform the public and stakeholders of these programs during future public meetings and through noticing on its website. The Montecito GSA will inform the public and stakeholders of meetings when topics of sustainable management criteria, projects and management actions, and other GSP parameters based on model updates are being discussed.

4.1.5.5 Access

Updating the BNM will not require any access to property.

4.1.5.6 Permitting and Regulatory Process

Updating the BNM will not require permitting or regulatory oversight.

4.1.5.7 Implementation Schedule

The BNM will be updated as data from the Expand Groundwater Level and Quality Monitoring, Expand Seawater Intrusion Monitoring Network, Evaluate Groundwater–Surface Water Interactions, and Develop Stakeholder Incentive Programs projects becomes available and prior to the first 5-year GSP update.

4.1.5.8 Legal Authority

In accordance with CWC Sections 10725 through 10726.8, the Montecito GSA has the legal authority to update the BNM to support GSP implementation and sustainable management of the MGB.

4.1.5.9 Estimated Costs

The estimated cost for this project is $225,000 and is based on expenses from similar projects conducted during GSP development.

4.1.6 Enhance Groundwater Well Database

The current groundwater well database for the MGB was developed based on publicly available information, including well permits/completion reports obtained from the County of Santa Barbara and the Montecito Water District (MWD). The collection of additional information from private well owners will improve the understanding of groundwater conditions and inform MGB management. This project involves the development of a groundwater well registry that contains relevant information on groundwater wells in the MGB, including location, owner contact information, well activity status, extraction data or estimates, and localized geology (confidentiality will be respected in the development of this project). Participation in the registry will be required of all wells within the MGB. The groundwater well registry will be used to refine modeled estimates of groundwater production.

4.1.6.1 Measurable Objective Expected to Benefit

The measurable objectives for chronic lowering of groundwater levels, reduction of groundwater in storage, degraded groundwater quality, depletion of interconnected surface water, and seawater intrusion will benefit from implementation of this management action.

4.1.6.2 Expected Benefits

The project will provide a more complete source of information on wells in the MGB, including locations, estimated extractions, aquifer properties, and other information for a multitude of uses, including to update the BNM and improve simulation of groundwater processes.

4.1.6.3 Circumstances for Implementation

This project will be implemented following adoption of the GSP and during the first 5 years of GSP implementation.

4.1.6.4 Public Noticing

The Montecito GSA conducts ongoing extensive outreach activities related to GSP preparation, including public Board meetings, public workshops, and public SAC meetings. In addition, the Montecito GSA maintains a dedicated website and stakeholder notification list and regularly distributes updated Montecito GSA and GSP information. The Montecito GSA will inform the public and stakeholders of this project during future public meetings and through noticing on its website. All required public noticing will comply with all applicable laws.

4.1.6.5 Access

The Montecito GSA will obtain access agreements with property owners if needed to access and collect information on private wells and/or as otherwise authorized pursuant to CWC 10725.4.

4.1.6.6 Permitting and Regulatory Process

This project will not require permitting or regulatory oversight.

4.1.6.7 Implementation Schedule

This project will be implemented following adoption of the GSP and during the first 5-year GSP implementation period.

4.1.6.8 Legal Authority

In accordance with CWC Section 10725.6, the Montecito GSA will require registration of groundwater extraction facilities to collect information that will be used to refine modeled estimates of groundwater production from the MGB and inform MGB management. The Montecito GSA will omit any information deemed confidential from public meetings and publicly available materials.

4.1.6.9 Estimated Costs

The estimated cost for this project is $70,000 and is based on expenses from similar projects conducted during GSP development.

4.2 POSSIBLE FUTURE PROJECTS AND MANAGEMENT ACTIONS

4.2.1 Develop/Acquire Supplemental Water for Well Owners

This project would provide an alternative and/or supplemental source of water supply to well owners to achieve a reduction in groundwater use when the existence of undesirable results is determined to be imminent, acute, or chronic. Potential supplemental sources of supply may include imported surface water, desalination, and recycled water. This project would be considered by the Montecito GSA if it is determined necessary to maintain MGB sustainability, a supplemental source of supply is available, and stakeholder support exists to fund such a project. It is anticipated that a condition precedent for this project is the development of a source allocation and metering process.

4.2.1.1 Measurable Objective Expected to Benefit

The measurable objectives for chronic lowering of groundwater levels, reduction of groundwater in storage, degraded groundwater quality, depletion of interconnected surface water, and seawater intrusion would benefit from implementation of this project, should circumstances warrant.

4.2.1.2 Expected Benefits

Providing supplemental water to well owners would reduce demand on groundwater supplies, which would enhance the recovery of groundwater in storage and groundwater elevations. An increase in groundwater in storage and groundwater elevation would benefit water quality and interconnected surface water and protect against seawater intrusion. The project would help to mitigate undesirable results in the MGB if they occur.

4.2.1.3 Circumstances for Implementation

This management action is not intended to be pursued during the first 5-year GSP implementation period. This action may be implemented if undesirable results are determined to be imminent or are occurring based on available data and the sustainable management criteria outlined in Chapter 3.

4.2.1.4 Public Noticing

The Montecito GSA conducts ongoing extensive outreach activities related to GSP preparation, including public Board meetings, public workshops, and public SAC meetings. In addition, the Montecito GSA maintains a dedicated website and stakeholder notification list and regularly distributes updated Montecito GSA and GSP information. The Montecito GSA would inform the public and stakeholders of the availability of supplemental water sources through meetings and noticing on its website. Significant stakeholder involvement would be required for this project given the high cost of acquiring a supplemental water source.

4.2.1.5 Permitting and Regulatory Process

Providing supplemental water may require permitting and regulatory oversight depending on the water source. For example, a recycled water permit from the Regional Water Quality Control Board (RWQCB) would be required to produce and deliver recycled water. The Montecito GSA would ensure that all necessary permits are obtained and would consult the appropriate regulatory agencies prior to implementing a supplemental water project.

4.2.1.6 Implementation Schedule

There is no implementation schedule for this project. The Montecito GSA is not currently pursuing this project because it is not warranted by current MGB conditions. Implementation would be considered in the event undesirable results are determined imminent, occurring, and/or chronic. In the event this project is determined necessary, a schedule would be developed and changes or updates to the schedule would be included in 5-year GSP updates.

4.2.1.7 Legal Authority

In accordance with CWC Sections 10725 through 10726.8, the Montecito GSA has the legal authority to optimize the use of water within the MGB, including through development and acquisition of supplemental water.

4.2.1.8 Estimated Costs

Cost estimates cannot be determined at this time. If implemented, this project is dependent on numerous components that are currently undefined.

4.2.2 Require Well Metering

The Montecito GSA performed an initial assessment of data gaps in the MGB through a quantitative global sensitivity analysis. The results from this sensitivity analysis identified measurement of groundwater extraction from the MGB as a data gap to the overall understanding of historical and future groundwater conditions. However, because available data suggests that the MGB is not experiencing undesirable results that limit groundwater accessibility and usability, the Montecito GSA does not consider mandatory well metering necessary at this time and instead has opted for a voluntary well metering incentive program as described in Section 4.1.4, Develop Stakeholder Incentive Programs. The Montecito GSA may require metering of non-de minimis wells in the MGB in the future if necessary. Metering of wells would obtain information about groundwater extractions consistent with the Montecito GSA's data-driven approach for management of the MGB to avoid undesirable results.

4.2.2.1 Measurable Objective Expected to Benefit

The measurable objectives for chronic lowering of groundwater levels, reduction of groundwater in storage, degraded groundwater quality, depletion of interconnected surface water, and seawater intrusion would benefit from implementation of this project if implementation becomes necessary. Available data suggests that groundwater conditions are currently above the minimum thresholds, and the MGB is not currently experiencing undesirable results related to any of the sustainability indicators.

4.2.2.2 Expected Benefits

Mandatory well metering of non-de minimis wells in the MGB would provide actual groundwater extraction data, which would inform the BNM and subsequent management actions necessary for long-term sustainability of the MGB.

4.2.2.3 Circumstances for Implementation

This management action is not intended to be pursued during the first 5-year GSP implementation period. This action may be implemented if undesirable results are determined imminent or are occurring based on available

data and the sustainable management criteria outlined in Chapter 3. The Montecito GSA will begin assessing this project's feasibility and implementation logistics in the second consecutive water year where a majority of RMPs for any sustainability indicator are below established minimum thresholds.

4.2.2.4 Public Noticing

Mandatory well metering would require substantial public outreach, education, and noticing. The Montecito GSA would solicit public input to understand the potential impacts of metering and the most appropriate method for implementation. The Montecito GSA would gather public input using multiple methods, including public Board meetings, public workshops, public SAC meetings, and noticing on the Montecito GSA website.

4.2.2.5 Permitting and Regulatory Process

Mandatory well metering would not require permitting or regulatory oversight.

4.2.2.6 Implementation Schedule

There is no implementation schedule for this project. The Montecito GSA is not pursuing mandatory well metering at this time based on current conditions. Implementation would be considered if undesirable results are determined to be imminent or are occurring. In the event that this project needs to be implemented, a schedule would be developed, and changes or updates to the schedule would be included in 5-year GSP updates.

4.2.2.7 Legal Authority

In accordance with CWC Section 10725.8, GSAs have the authority to require all non-de minimis groundwater extraction facilities to measure and report extraction volumes.

4.2.2.8 Estimated Costs

Cost estimates cannot be determined at this time. If implemented, this project is dependent on numerous components that are currently undefined.

4.2.3 Develop/Impose Pumping Allocations

This project involves the development of groundwater pumping allocations as a potential future action that could be considered if determined necessary to avoid undesirable results. Pumping allocations would be pursued if the other projects and management actions were determined insufficient to maintain sustainability. Pumping allocations would be developed for wells in the MGB.

4.2.3.1 Measurable Objective Expected to Benefit

The measurable objectives for chronic lowering of groundwater levels, reduction of groundwater in storage, degraded groundwater quality, depletion of interconnected surface water, and seawater intrusion would benefit from implementation of this management action if implementation becomes necessary. Groundwater conditions in the MGB are currently above the minimum thresholds, and the MGB is not currently experiencing undesirable results.

4.2.3.2 Expected Benefits

This project would develop and impose pumping allocations for wells in the MGB. The pumping allocations would establish a maximum amount of groundwater pumping permitting by each well over a specified period of time. A reduction in groundwater pumping would result in enhanced groundwater recovery benefiting water quality and interconnected surface water and protecting against seawater intrusion.

4.2.3.3 Circumstances for Implementation

This management action may be implemented if undesirable results are determined to be imminent or are occurring based on available data, MGB modeling, and the sustainable management criteria outlined in Chapter 3.

4.2.3.4 Public Noticing

Developing a groundwater allocation program would require substantial public input and noticing. The Montecito GSA would solicit public input to understand the potential impacts of the allocation and the most appropriate method for development. The Montecito GSA would gather public input using multiple methods, including public Board and SAC meetings, public workshops, and noticing on the Montecito GSA website.

4.2.3.5 Permitting and Regulatory Process

Developing groundwater pumping allocations would not require permitting or regulatory oversight.

4.2.3.6 Implementation Schedule

There is no implementation schedule for this management action. The Montecito GSA is not pursuing groundwater pumping allocations at this time based on current conditions. Implementation would be considered if undesirable results are determined to be imminent or are occurring. If this management action were to be implemented, a schedule would be developed, and changes or updates to the schedule would be included in 5-year GSP updates.

4.2.3.7 Legal Authority

In accordance with CWC Sections 10725 through 10726.8 , the Montecito GSA has the legal authority to optimize the use of water within the MGB.

4.2.3.8 Estimated Costs

Cost estimates cannot be determined at this time. If implemented, this project is dependent on numerous components that are currently undefined.

4.2.4 Develop/Implement Recharge Projects

This project would involve the development and implementation of projects that result in the recharge of water in the MGB. Recharge projects would increase available supply, mitigate lowering of groundwater levels and reduction of groundwater in storage, and potentially buffer the MGB from impacts of seawater intrusion. Alternatively, recharge projects could be developed and implemented as a proactive step to help reduce the risk of future undesirable results. Potable and/or treated water sources, including purified wastewater, could be used for

injection into existing or new wells, most often during wet periods when a surplus exists. Injection of water near the coast could protect the MGB from seawater intrusion. A pilot project and cost-benefit analysis may be completed prior to implementation of proposed recharge projects.

The Montecito GSA is supporting MWD with its planning of a Groundwater Augmentation Program. The Groundwater Augmentation Program involves the planning for and implementation of a regional indirect potable reuse project that, if implemented, would reduce overall demand on and augment the groundwater supply within the MGB, helping to avoid undesirable results and achieve long-term sustainability. The planning effort involves an environmental review and preliminary design of an advanced water purification facility and the associated distributive infrastructure, including piping/pumping to and injection wells in the Carpinteria Groundwater Basin. The project involves a multi-agency collaboration that benefits the MGB, its stakeholders, and the adjacent Carpinteria Groundwater Basin long term. The project would benefit the MGB with the addition of a potable water supply that would be used to offset the use of pumped groundwater.

4.2.4.1 Measurable Objective Expected to Benefit

The measurable objectives for chronic lowering of groundwater levels, reduction of groundwater in storage, groundwater quality, and seawater intrusion would benefit from implementation of the recharge projects. Groundwater conditions in the MGB are currently above the minimum thresholds, and based on available data, the MGB is not currently experiencing undesirable results related to any of the sustainability indicators. Therefore, implementation of recharge projects for the purpose of addressing undesirable results that are imminent or are occurring is not necessary at this time.

4.2.4.2 Expected Benefits

The project would increase groundwater in storage, which would benefit water quality, protect against seawater intrusion, and reduce the likelihood of undesirable results in the MGB occurring in the future.

4.2.4.3 Circumstances for Implementation

Recharge/reuse projects may be implemented if undesirable results are determined to be occurring or likely to occur based on monitoring at RMPs, MGB modeling, and the sustainable management criteria outlined in Chapter 3.

4.2.4.4 Public Noticing

The Montecito GSA conducts ongoing extensive outreach activities related to GSP preparation, including public Board meetings, public workshops, and public SAC meetings. In addition, the Montecito GSA maintains a dedicated website and stakeholder notification list and regularly distributes updated Montecito GSA and GSP information. The Montecito GSA would inform the public and stakeholders of any groundwater recharge project through meetings and noticing on its website. Significant stakeholder involvement would be required for any recharge project given the high cost of implementation.

4.2.4.5 Permitting and Regulatory Process

Implementation of groundwater recharge projects would require permitting and regulatory oversight. Permits would be obtained where required and could include permits from the County of Santa Barbara, RWQCB, and potentially other regulatory agencies.

4.2.4.6 Implementation Schedule

No recharge/reuse projects are planned at this time. Implementation of projects would only be considered if undesirable results are determined to be occurring or likely to occur. If additional recharge/reuse projects need to be implemented, a schedule would be developed, and changes or updates to the schedule would be included in 5-year GSP updates.

Implementation of the planning phase of the indirect potable reuse project will begin following adoption of the GSP and acquisition of grant funds. The current project scope involves planning components only and is anticipated to be completed during the first 5 years of GSP implementation. The construction phase of the project is subject to availability of funds. A construction schedule will be developed and included in 5-year GSP updates.

4.2.4.7 Legal Authority

In accordance with CWC Sections 10725 through 10726.8, the Montecito GSA has the legal authority to conduct additional studies and implement recharge/reuse projects that support GSP implementation and sustainable management of the MGB.

4.2.4.8 Estimated Costs

Cost estimates cannot be determined at this time. If implemented, these projects will be dependent on numerous components that are currently undefined.

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CHAPTER 5
PLAN IMPLEMENTATION

5.1 IMPLEMENTATION OF THE GSP

Implementation of the Groundwater Sustainability Plan (GSP) involves implementing the baseline projects and management actions outlined in Chapter 4, Projects and Management Actions, as well as various management and administration activities, including data collection and analysis, annual reporting to the Department of Water Resources (DWR), and the periodic review and evaluation of the GSP typically at 5-year intervals. Because undesirable results are not known to be occurring at time of adoption of this GSP, the initial implementation of the GSP focuses primarily on projects and management actions designed to fill known data gaps in the Montecito Groundwater Basin (MGB). In the event that undesirable results are projected to occur or are occurring, the appropriate projects and management actions will be developed and implemented to ensure basin sustainability, and the related scopes, schedules, and costs will be documented in future updates of this GSP.

5.1.1 Baseline Projects and Management Actions

The baseline projects and management actions include expansion of groundwater level and water quality monitoring, expansion of seawater intrusion monitoring, evaluation of the groundwater–surface water interactions, development of stakeholder incentive programs, updating the Basin Numerical Model (BNM), and enhancement of the groundwater well database. Chapter 4 describes the baseline projects and management actions and their related scopes of work, benefits, schedules, and required coordination.

5.1.2 Data Collection, Analysis, and Reporting

Historical hydrogeologic and hydrologic data for the MGB has been collected by multiple entities, including the Montecito Water District (MWD) and the Montecito Groundwater Basin Groundwater Sustainability Agency (Montecito GSA). Historical data used for the preparation of the GSP includes groundwater elevation, groundwater quality, groundwater production, imported water, and surface water flow. Meteorological data used includes precipitation, temperature, and evapotranspiration. Several other agencies have contributed data as well, including the National Oceanic and Atmospheric Administration, the U.S. Geological Survey (USGS), Santa Barbara County (County), and the California Irrigation Management Information System (CIMIS). A description of data sources and programs is provided in Section 2.1.2, Existing Monitoring Programs.

The Montecito GSA received a DWR Sustainable Groundwater Management Grant in May 2020 with which it implemented multiple projects involving data collection and analysis, including seawater intrusion monitoring, private well metering, surface water flow monitoring, development of a BNM, and construction of several groundwater monitoring wells (Section 2.1.2.5, Monitoring Network Grant Programs). These projects have begun to fill identified data gaps, and expansion of these projects is anticipated with GSP implementation as described in Chapter 4. The baseline projects and management actions described in Chapter 4 are anticipated to be implemented during the initial years of GSP implementation. The Montecito GSA anticipates funding these projects through state grants and may also use other sources of funding (Section 5.3.1, Funding Sources). Among other benefits, these projects will fill data gaps associated with groundwater levels and groundwater quality in Storage Unit 2 and the Toro Canyon Storage Unit, seawater intrusion in Storage Unit 3 and the Toro Canyon Storage Unit, interconnection of surface water and groundwater near MGB creeks, and groundwater extractions from private wells throughout the MGB.

The representative monitoring network for the MGB is designed to provide adequate data to evaluate the sustainability criteria established in this GSP and support the sustainability goal. The representative monitoring

network is described in detail in Section 3.5, Monitoring Network. Monitoring of sustainability indicators will evolve with the implementation of the projects and management actions described in Chapter 4, and the data acquired will be reported to DWR with the annual reports and 5-year GSP evaluation and will also be submitted semi-annually to DWR's Sustainable Groundwater Management Act (SGMA) Monitoring Network Module data repository.

5.1.3 Annual Report Preparation

Details of the information that will be included in the annual reports are presented in Section 5.4, Annual Reporting. Should annual reports be produced with the assistance of consultants, the associated costs will be incorporated in the Montecito GSA's operating budget.

5.1.4 Preparation of the 5-Year Evaluation

At least every 5 years following adoption of the GSP, the Montecito GSA will prepare and submit to DWR an agency evaluation and assessment report along with the annual report (23 CCR 356.4). This report will include the status of the implementation of projects and management actions and a summary of the data and information acquired that fill identified data gaps. The report will also include an assessment of the groundwater extractions and conditions in the MGB.

As discussed in Chapter 3, Sustainable Management Criteria, and Chapter 4, Projects and Management Actions, it is anticipated that the first 5-year evaluation prepared following GSP adoption will include the results of the baseline projects and management actions, the data acquired through implementation of the projects and management actions, and re-evaluation of the assumptions and analyses included in the GSP. The sustainable management criteria will be re-evaluated in the context of the newly acquired data and information, in particular for interconnected surface water and groundwater, the establishment of which has been postponed pending the filling of related data gaps (Section 3.2.6, Depletions of Interconnected Surface and Groundwater – Undesirable Results). It is anticipated that the costs to prepare the 5-year evaluations will be incorporated into the GSAs annual operating budget. Details of the information to be provided in the 5-year reports are presented in Section 5.5, Periodic Evaluations.

5.2 GSP IMPLEMENTATION SCHEDULE

The Montecito GSA has developed an implementation schedule for baseline projects and management actions, MGB monitoring activities, and various GSP reporting components (Figure 5-1, GSP Implementation Schedule). Montecito GSA activities occurring beyond the 5-year horizon have not been included in the schedule due to uncertainty in details and timing but will be included in future updates of the GSP.

5.3 ESTIMATED COSTS FOR GSP IMPLEMENTATION

The principal costs components associated with GSP implementation are as follows:

- Implementation of baseline projects and management actions
- Data collection, validation, and analysis
- Annual report preparation
- Management, administration, and other associated activities
- Preparation of the 5-year GSP evaluation

Estimated costs for GSP implementation through 2028 are presented in Tables 5-1 and 5-2. Cost estimates will be reviewed and updated periodically and with each future GSP update.

Table 5-1. GSP Implementation Planning-Level Cost Estimates (2023–2028)

Activity	Estimated Cost	Implementation or Frequency	Anticipated Cost: 2023–2028[a]
Implementation of Baseline Projects and Management Actions[b]			
Expand Groundwater Level and Water Quality Monitoring	$53,000	Prior to 2028	$53,000
Expand Seawater Intrusion Monitoring	$1,186,000	Prior to 2028	$1,186,000
Evaluate Groundwater–Surface Water Interactions	$685,000	Prior to 2028	$685,000
Develop Stakeholder Incentive Programs	$115,000	Prior to 2028	$115,000
Update Basin Numerical Model	$195,000	Prior to 2028	$195,000
Enhance Groundwater Well Database	$70,000	Prior to 2028	$70,000
		Subtotal	***$2,304,000***
Management and Administration[c]			
Staffing (Salary and Benefits)	$355,000	Annually	$1,902,000
Outreach	$15,000	Annually	$85,000
Administrative Expenses[c]	$90,000	Annually	$480,000
Legal	$30,000	Annually	$160,000
Other Expenses (Board Member Comp./Travel)	$10,000	Annually	$54,000
		Subtotal	***$2,681,000***
Ongoing Groundwater Monitoring Program			
Groundwater Extraction Monitoring	$1,000	Quarterly	$20,000
Groundwater Quality Monitoring	$2,500	Quarterly	$50,000
Groundwater Level Monitoring	$5,100	Quarterly	$102,000
Surface Water Flow Monitoring	$29,000	Quarterly	$580,000
Seawater Intrusion Monitoring	$3,700	Quarterly	$74,000
		Subtotal	***$830,000***
GSP Annual Report	$50,000	Annually	$270,000
		Subtotal	***$270,000***
GSP 5-Year Periodic Evaluation			
Report Preparation	$250,000	Single	$250,000
Refinement, Update, and Recalibration Groundwater Model	$100,000	Single	$100,000
		Subtotal	***$350,000***
		Total	**$6,435,000**

Notes: GSP = Groundwater Sustainability Plan; MGB = Montecito Groundwater Basin.
Does not include Groundwater Augmentation Program costs. Assumes 3.5% inflation factor annually. Baseline Projects and Management Projects, GSP Annual Report, and Ongoing Monitoring Program in GSP Years 1, 2, and 3 are all eligible for grant funding through the Department of Water Resources.

[a] All estimates rounded to nearest thousand.

[b] All projects and management actions estimates are based on costs described in Chapter 4 for baseline projects and management actions and run through 2026 to align with potential grant funding, assumes no additional projects and management actions are required, and assumes no undesirable results occur in the MGB. Update Basin Numerical Model includes $15,000/year for MGB model updates in GSP Years 4 and 5.

[c] Administrative expenses includes office space rental, utilities, supplies, and liability insurance.

Table 5-2. GSP Implementation Planning-Level Cost Estimates Detail (2023–2028)

GSP Year	Fiscal Year	Management Cost[a]	Administrative Expenses[b]	Legal	Outreach	Other Expenses	GSP Annual Reporting	GSP Periodic Evaluation (5 Year)	Ongoing Groundwater Monitoring Program	Projects and Management Actions[c]	Total
1	2024	$355,000	$90,000	$30,000	$15,000	$10,000	$50,000	N/A	$307,000	$448,800	$1,305,800
2	2025	$367,000	$93,000	$31,000	$16,000	$10,000	$52,000	N/A	$194,000	$1,099,500	$1,862,500
3	2026	$380,000	$96,000	$32,000	$17,000	$11,000	$54,000	N/A	$152,000	$725,700	$1,467,700
4	2027	$393,000	$99,000	$33,000	$18,000	$11,000	$56,000	$87,000	$87,000	$15,000	$799,000
5	2028	$407,000	$102,000	$34,000	$19,000	$12,000	$58,000	$263,000	$90,000	$15,000	$1,000,000
	Total	**$1,902,000**	**$480,000**	**$160,000**	**$85,000**	**$54,000**	**$270,000**	**$350,000**	**$830,000**	**$2,304,000**	**$6,435,000**

Notes: GSP = Groundwater Sustainability Plan; N/A = not applicable.

All estimates rounded to nearest thousand (excluding projects and management actions). Does not include Groundwater Augmentation Program costs. Assumes 3.5% inflation factor annually. GSP Annual Reporting, Ongoing Groundwater Monitoring Program, and Projects and Management Actions in GSP Years 1, 2, and 3 are all eligible for grant funding through the Department of Water Resources.

[a] Management costs includes agency staff salary and benefits.

[b] Administrative expenses includes office space rental, utilities, supplies, and liability insurance.

[c] All projects and management actions estimates are based on costs described in Chapter 4 for baseline projects and management actions and run through 2026 to align with potential grant funding, assumes no additional projects and management actions required, and assumes no undesirable results occur in the MGB. Includes $15,000/year for MGB model updates in GSP Years 4 and 5.

5.3.1 Funding Sources

Funding for GSP implementation has not been definitively determined but is anticipated to consist of similar sources as used for GSP development, which includes a parcel fee and grant funding. The Montecito GSA's 2020 5-year fee schedule establishes the parcel fee by year and is collected semi-annually on the County property tax roll for all parcels that reside over the MGB. This fee schedule, if determined adequate, could be used to cover a portion of the estimated costs for the first couple years of GSP implementation. Alternatively, the Montecito GSA could consider an updated cost of service analysis and associated fee determination if necessary. In addition to the parcel fee, the Montecito GSA applied for grant funds for implementation activities through the DWR Proposition 68 Sustainable Groundwater Management, Round 2 Grant Program (DWR 2022). A grant award determination is expected in mid-2023. Estimated costs for GSP implementation through 2028 and how they compare with current and potential future funding sources are presented in Table 5-3.

Table 5-3. GSP Implementation Planning-Level Cost Estimates and Funding Sources (2023–2028)

GSP Year	Fiscal Year	Total Estimate Expenses	SGM GSP Imp. Grant Reimbursement Estimates[a]	Prop. 218 2020 GSA Parcel Fee Revenue[b]	Variance Favorable (Unfavorable)	Net Impact Favorable (Unfavorable)
1	2024	$(1,305,800)	$790,800	$801,739	$286,739	$286,739
2	2025	$(1,862,500)	$1,330,500	$818,455	$286,455	$573,194
3	2026	$(1,467,700)	$916,700		$(551,000)	$22,194
4	2027	$(799,000)			$(799,000)	$(776,806)
5	2028	$(1,000,000)			$(1,000,000)	$(1,776,806)
	Total	**$(6,435,000)**	**$3,038,000**	**$1,620,194**	**$(1,776,806)**	

Notes: GSP = Groundwater Sustainability Plan; SGM = Sustainable Groundwater Management.
Does not include Groundwater Augmentation Program costs.

[a] Assumes 100% SGM, Round 2 Grant Award for GSP Annual Reporting, Ongoing Groundwater Monitoring Program, and Projects and Management Actions in GSP Years 1, 2, and 3 from the Department of Water Resources (DWR). Does not contain $45,000 for the Residential Infiltration Projects Incentive Program as it is ineligible for grant reimbursement.

[b] Years 4 and 5 of Groundwater Sustainability Agency parcel fee.

5.4 ANNUAL REPORTING

Section 356.2 of the GSP Emergency Regulations requires that annual reports be provided to DWR by April 1 of each year following adoption of the GSP. For the MGB, the first annual report is due to DWR by April 1, 2024. The Montecito GSA intends to submit these reports in accordance with DWR requirements. These reports will, at a minimum, present the required components pursuant to California Code of Regulations (CCR) Section 356.2, including the following:

- General information, including an executive summary and a location map depicting the basin, jurisdictional boundaries, and subbasin covered by the report
- A detailed description and graphical representation of:
  - Groundwater elevation data from wells identified in the monitoring network
  - Groundwater extractions for the preceding water year
  - Change in groundwater in storage
  - Surface water supply used or available for use

  - Total water use
- A description of progress with GSP implementation

Relevant data, as presented in Section 3.5, will be used to prepare the GSP annual reports. Groundwater elevation information will be presented graphically by hydrographs, including available historical data for key wells and groundwater elevation contour maps (similar to those included as Figures 2-17 to 2-20), illustrating, at a minimum, seasonal high and low groundwater conditions. A written description and interpretation of water year type (Section 2.2.1.1, Precipitation) and the influence of climate and groundwater extractions on water levels will accompany the graphics. Tabular groundwater extraction data from MWD will be reported and include a description of the methods used to measure/estimate total production in the MGB. Surface water supplies, including supplies from agencies described in Section 2.1.1.2, Water Agencies Relevant to the Plan Area, will be reported in a tabular format along with a written description of the primary influences on availability. The results of surface water flow monitoring will be presented in tabular or hydrograph form. Total water use will be reported in tabular format. In addition, annual and cumulative change in groundwater in storage will be reported in tabular and graphical form, illustrating the relationship between recent water usage trends and total volume of groundwater in storage in the MGB.

Annual reports will be made available to the public and MGB stakeholders through the methods described in Section 2.1.7, Notice and Communication, including posting to the Montecito GSA website, sending email announcements, and/or distributing newsletters.

5.5 PERIODIC EVALUATIONS

The Montecito GSA will evaluate the GSP and the sustainability status at least every 5 years and whenever the GSP is amended. Each 5-year evaluation will be provided as a written assessment to DWR and will describe whether GSP implementation, including implementation of projects and management actions, are suitable to maintain a sustainable basin, and will fill any data gaps identified in the MGB. The evaluations will include the following:

- A description of current groundwater conditions for each applicable sustainability indicator relative to measurable objectives and minimum thresholds
- A description of the implementation of any projects or management actions and the effect on groundwater conditions resulting from those projects or management actions
- Revisions, if any, to the MGB setting, definition of undesirable results, minimum thresholds, or measurable objectives
- An evaluation of the MGB setting, considering significant new information and data related to the hydrogeologic conceptual model, land, or water use, and a discussion of any significant changes
- An evaluation of the MGB monitoring network, including representative monitoring points (RMPs) added or replaced, and the suitability of the network to monitor sustainability conditions and fill any identified data gaps
- A description of significant new information that has been made available since GSP adoption, amendment, or the last 5-year evaluation
- A description of relevant actions taken by the Montecito GSA, including a summary of regulations or ordinances related to management of the MGB or the GSP
- Information describing any enforcement or legal actions taken by the Montecito GSA in furtherance of the sustainability goal for the plan area

The Montecito GSA intends to implement the projects and management actions outlined in Chapter 4 of this GSP over the next 5 years. The next 5-year evaluation will include an update on the status of each project and management action defined in the prior GSP, the data obtained or expected, and its impact on the overall management of the MGB. Also included in the 5-year evaluation will be a discussion of the data and information obtained toward the establishment of sustainable management criteria for the interconnected surface water–groundwater sustainability indicator.

5.6 REFERENCES CITED

DWR. (Department of Water Resources). 2022. "Sustainable Groundwater Management Grant Program." *https://water.ca.gov/work-with-us/grants-and-loans/sustainable-groundwater.*

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Task Schedule	2023				2024				2025				2026				2027				2028			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
GSP Submitted to DWR		◆																						
Ongoing GSP Administration	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬
Groundwater Conditions Monitoring	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬
Groundwater Extraction Monitoring	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Groundwater Quality Monitoring	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Groundwater Level Monitoring	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Seawater Intrustion Monitoring	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
GSP Annual Report				▬◆	▬	◆		▬	▬◆			▬	▬◆			▬	▬◆			▬	▬◆			
GSP 5-Year Periodic Evaluation													▬	▬	▬	▬	▬	▬	▬	▬	▬	◆		
Baseline Projects and Management Actions																								
Expand Groundwater Level and Quality Monitoring		▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬									
Expand Seawater Intrusion Monitoring		▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬									
Evaluate Groundwater Surface Water Interactions		▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬									
Develop Stakeholder Incentive Programs		▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬
Update MGB Numerical Model		▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬
Enhance Groundwater Well Database		▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬	▬									

◆ GSP Submitted to DWR

◆ GSP Annual Report Submitted to DWR

● Quarterly Extraction Estimate

● Quarterly Groundwater Quality Sampling

● Quarterly Groundwater Level Monitoring

● Quarterly Seawater Intrusion Monitoring

▬ Prepare Annual Reports

▬ Ongoing GSP Administration

▬ Preparation of 5-year GSP Evaluation

◆ Submit 5-year GSP Evaluation to DWR

▬ Expand Groundwater Level and Quality Monitoring

▬ Expand Seawater Intrustion Monitoring

▬ Groundwater Conditions Monitoring

▬ Evaluate Groundwater/Surface Water Interactions

▬ Develop Stakeholder Incentive Program

▬ Update MGB Numerical Models

▬ Enhance Groundwater Well Database

FIGURE 5-1

GSP Implementation Schedule

Montecito Groundwater Basin Groundwater Sustainability Plan

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Appendix A
Preparation Checklist for GSP Submittal

This appendix contains the *Preparation Checklist for GSP Submittal*, provided by the California Department of Water Resources to support local agencies and Groundwater Sustainability Agencies during the preparation and submission of a Groundwater Sustainability Plan (GSP). The checklist is organized according to the required Plan contents outlined in SGMA and described primarily in California Water Code (CWC) Section 10727. The checklist contains references to the applicable GSP Emergency Regulations sections and CWC sections and provides references to specific content in this GSP.

(This appendix is referenced in Section 1.4 of this GSP.)

GSP Regulations Section	Water Code Section	Requirement	Description	Section(s) or Page Number(s) in the GSP
Article 3. Technical and Reporting Standards				
352.2		Monitoring Protocols	· Monitoring protocols adopted by the GSA for data collection and management	Section 3.5.5
			· Monitoring protocols that are designed to detect changes in groundwater levels, groundwater quality, inelastic surface subsidence for basins for which subsidence has been identified as a potential problem, and flow and quality of surface water that directly affect groundwater levels or quality or are caused by groundwater extraction in the basin	Section 3.5.5
Article 5. Plan Contents, Subarticle 1. Administrative Information				
354.4		General Information	· Executive Summary	Executive Summary
			· List of references and technical studies	Sections 1.5, 2.5, 3.6, 5.6, Appendix F
354.6		Agency Information	· GSA mailing address	Section 1.3
			· Organization and management structure	Section 1.3.1
			· Contact information of Plan Manager	Section 1.3
			· Legal authority of GSA	Section 1.3.2
			· Estimate of implementation costs	Section 5.3
354.8(a)	10727.2(a)(4)	Map(s)	· Area covered by GSP	Section 2.1 /Figure 1-1, Figure 2-1
			· Adjudicated areas, other agencies within the basin, and areas covered by an Alternative	Section 2.1.1/Figure 1-1
			· Jurisdictional boundaries of federal or State land	Section 2.1.1.1, Section 2.1.1.2 / Figure 2-3
			· Existing land use designations	Section 2.1.5 / Figure 2-8
			· Density of wells per square mile	Figures 2-35, 2-36
354.8(b)		Description of the Plan Area	· Summary of jurisdictional areas and other features	Section 2.1
354.8(c)	10727.2(g)	Water Resource Monitoring and Management Programs	· Description of water resources monitoring and management programs	Sections 2.1.3 and 2.1.4
354.8(d)			· Description of how the monitoring networks of those plans will be incorporated into the GSP	Section 2.1.4.5
354.8(e)			· Description of how those plans may limit operational flexibility in the basin	Section 2.1.4.5
			· Description of conjunctive use programs	Section 2.1.4.5
354.8(f)	10727.2(g)	Land Use Elements or Topic Categories of Applicable General Plans	· Summary of general plans and other land use plans	Section 2.1.5

			· Description of how implementation of the GSP may change water demands or affect achievement of sustainability and how the GSP addresses those effects	Sections 4.1.4, 4.2.3, 4.2.4
			· Description of how implementation of the GSP may affect the water supply assumptions of relevant land use plans	Sections 2.4.1, 2.1.5, and Table 2.7
			· Summary of the process for permitting new or replacement wells in the basin	Section 2.1.4.2
			· Information regarding the implementation of land use plans outside the basin that could affect the ability of the Agency to achieve sustainable groundwater management	Section 2.1.5 and Table 2-7
354.8(g)	10727.4	Additional GSP Contents	· Description of Actions related to:	
			· Control of saline water intrusion	Sections 2.2.4.3, 3.2.3, 3.3.4, and 3.4.3
			· Wellhead protection	Section 2.1.4.2
			· Migration of contaminated groundwater	Section 2.2.4.4
			· Well abandonment and well destruction program	Section 2.1.4.2
			· Replenishment of groundwater extractions	Section 2.3
			· Conjunctive use and underground storage	Section 2.3
			· Well construction policies	Section 2.1.4.2
			· Addressing groundwater contamination cleanup, recharge, diversions to storage, conservation, water recycling, conveyance, and extraction projects	Section 2.2.4.4
			· Efficient water management practices	Sections 2.1.4.5 and 2.1.5
			· Relationships with State and federal regulatory agencies	Sections 2.1.1.1, 2.1.7.4, and 2.3
			· Review of land use plans and efforts to coordinate with land use planning agencies to assess activities that potentially create risks to groundwater quality or quantity	Section 2.1.5
			· Impacts on groundwater dependent ecosystems	Sections 2.2.4.6 and 2.2.4.7
354.1		Notice and Communication	· Description of beneficial uses and users	Section 2.1.7.1
			· List of public meetings	Section 2.1.7.2
			· GSP comments and responses	Section 2.1.7.3 and Appendix B
			· Decision-making process	Appendix C
			· Public engagement	Section 2.1.7.5 and Appendix C
			· Encouraging active involvement	Section 2.1.7.5 and Appendix C
			· Informing the public on GSP implementation progress	Section 2.1.7.2 and 2.1.7.5
Article 5. Plan Contents, Subarticle 2. Basin Setting				
354.14		Hydrogeologic Conceptual Model	· Description of the Hydrogeologic Conceptual Model	Section 2.2.2 / Figure 2-11
			· Two scaled cross-sections	Figures 2-13 through 2-16

			· Map(s) of physical characteristics: topographic information, surficial geology, soil characteristics, surface water bodies, source and point of delivery for imported water supplies	Figures 2-4, 2-6, 2-7, 2-11, 2-12A/B, 2-29
354.14(c)(4)	10727.2(a)(5)	Map of Recharge Areas	· Map delineating existing recharge areas that substantially contribute to the replenishment of the basin, potential recharge areas, and discharge areas	Section 2.2.3. Figure 2-33
	10727.2(d)(4)	Recharge Areas	· Description of how recharge areas identified in the plan substantially contribute to the replenishment of the basin	Section 2.3.2 Figures 2-1, 2-33
354.16	10727.2(a)(1)	Current and Historical Groundwater Conditions	· Groundwater elevation data	Section 2.2.4.1, Figures 2-17 to 2-21, Figures 3-14 and 3-15
	10727.2(a)(2)		· Estimate of groundwater storage	Sections 2.2.4.2 and 2.3.5
			· Seawater intrusion conditions	Section 2.2.4.3, Figures 2-22 to 2-26
			· Groundwater quality issues	Section 2.2.4.4, Figures 2-27
			· Land subsidence conditions	Section 2.2.4.5, Figure 2-28
			· Identification of interconnected surface water systems	Section 2.2.4.6
			· Identification of groundwater-dependent ecosystems	Section 2.2.4.7, Figure 2-29, Appendix F
354.18	10727.2(a)(3)	Water Budget Information	· Description of inflows, outflows, and change in storage	Sections 2.3.1 through 2.3.5
			· Quantification of overdraft	Section 2.3.7
			· Estimate of sustainable yield	Section 2.3.8
			· Quantification of current, historical, and projected water budgets	Section 2.3.5
	10727.2(d)(5)	Surface Water Supply	· Description of surface water supply used or available for use for groundwater recharge or in-lieu use	Sections 2.3.5 and 2.3.9
354.2		Management Areas	· Reason for creation of each management area	Section 2.4
			· Minimum thresholds and measurable objectives for each management area	N/A
			· Level of monitoring and analysis	N/A
			· Explanation of how management of management areas will not cause undesirable results outside the management area	N/A
			· Description of management areas	N/A
Article 5. Plan Contents, Subarticle 3. Sustainable Management Criteria				
354.24		Sustainability Goal	· Description of the sustainability goal	Section 3.1
354.26		Undesirable Results	· Description of undesirable results	Section 3.2
			· Cause of groundwater conditions that would lead to undesirable results	Sections 3.2.1 through 3.2.6
			· Criteria used to define undesirable results for each sustainability indicator	Sections 3.2.1 through 3.2.7
			· Potential effects of undesirable results on beneficial uses and users of groundwater	Sections 3.2.1 through 3.2.6

354.28	10727.2(d)(1) 10727.2(d)(2)	Minimum Thresholds	· Description of each minimum threshold and how they were established for each sustainability indicator · Relationship for each sustainability indicator · Description of how selection of the minimum threshold may affect beneficial uses and users of groundwater · Standards related to sustainability indicators · How each minimum threshold will be quantitatively measured	Sections 3.3.1 through 3.3.6 Sections 3.3.1 through 3.3.6 Sections 3.3.1 through 3.3.6 Sections 3.3.1 through 3.3.6 Sections 3.3.1 through 3.3.6
354.3	10727.2(b)(1) 10727.2(b)(2) 10727.2(d)(1) 10727.2(d)(2)	Measureable Objectives	· Description of establishment of the measureable objectives for each sustainability indicator · Description of how a reasonable margin of safety was established for each measureable objective · Description of a reasonable path to achieve and maintain the sustainability goal, including a description of interim milestones	Sections 3.4.1 through 3.4.6 Sections 3.4.1 through 3.4.6 Sections 3.4.1 through 3.4.6
Article 5. Plan Contents, Subarticle 4. Monitoring Networks				
354.34	10727.2(d)(1) 10727.2(d)(2) 10727.2(e) 10727.2(f)	Monitoring Networks	· Description of monitoring network · Description of monitoring network objectives · Description of how the monitoring network is designed to: demonstrate groundwater occurrence, flow directions, and hydraulic gradients between principal aquifers and surface water features; estimate the change in annual groundwater in storage; monitor seawater intrusion; determine groundwater quality trends; identify the rate and extent of land subsidence; and calculate depletions of surface water caused by groundwater extractions · Description of how the monitoring network provides adequate coverage of Sustainability Indicators · Density of monitoring sites and frequency of measurements required to demonstrate short-term, seasonal, and long-term trends · Scientific rational (or reason) for site selection · Consistency with data and reporting standards · Corresponding sustainability indicator, minimum threshold, measureable objective, and interim milestone	Section 3.5.2 Section 3.5.1 Section 3.5.2 Section 3.5.2 Section 3.5.2 Sections 3.5.4 and 3.5.5 Section 3.5.3

		· 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	Tables 2-2 and 3-6; Figure 3-22
		· Description of technical standards, data collection methods, and other procedures or protocols to ensure comparable data and methodologies	Section 3.5.5
354.36	Representative Monitoring	· Description of representative sites	Section 3.5.6
		· Demonstration of adequacy of using groundwater elevations as proxy for other sustainability indicators	Section 3.5.6
		· Adequate evidence demonstrating site reflects general conditions in the area	Section 3.5.6
354.38	Assessment and Improvement of Monitoring Network	Review and evaluation of the monitoring network	Section 3.5.7
		Identification and description of data gaps	Section 3.5.7
		Description of steps to fill data gaps	Section 3.5.7
		· Description of monitoring frequency and density of sites	Sections 3.5.2 and 3.5.4
Article 5. Plan Contents, Subarticle 5. Projects and Management Actions			
354.44	Projects and Management Actions	· Description of projects and management actions that will help achieve the basin's sustainability goal	Sections 4.1 and 4.2
		· Measureable objective that is expected to benefit from each project and management action	Sections 4.1.1.1, 4.1.2.1, 4.1.3.1, 4.1.4.1, 4.1.5.1, 4.1.6.1, 4.2.1.1, 4.2.2.1, 4.2.3.1, 4.2.4.1
		· Circumstances for implementation	Sections 4.1.1.3, 4.1.2.3, 4.1.3.3, 4.1.4.1, 4.1.5.1, 4.1.6.1, 4.2.1.3, 4.2.2.3, 4.2.3.3, 4.2.4.4
		· Public noticing	Sections 4.1.1.4, 4.1.2.4, 4.1.3.4, 4.1.4.4, 4.1.5.4, 4.1.6.4, 4.2.1.4, 4.2.2.4, 4.2.3.4, 4.2.4.4
		· Permitting and regulatory process	Sections 4.1.1.6, 4.1.2.6, 4.1.3.6, 4.1.4.6, 4.1.5.6, 4.1.6.6, 4.2.1.5, 4.2.2.5, 4.2.3.5, 4.2.4.5
		· Time-table for initiation and completion, and the accrual of expected benefits	Sections 4.1.1.7, 4.1.2.7, 4.1.3.7, 4.1.4.7, 4.1.5.7, 4.1.6.7, 4.2.1.6, 4.2.2.6, 4.2.3.6, 4.2.4.6

			· Expected benefits and how they will be evaluated	Sections 4.1.1.2, 4.1.2.2, 4.1.3.2, 4.1.4.2, 4.1.5.2, 4.1.6.2, 4.2.1.2, 4.2.2.2, 4.2.3.2, 4.2.4.2
			· 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.	N/A
			· Legal authority required	Sections 4.1.1.8, 4.1.2.8, 4.1.3.8, 4.1.4.8, 4.1.5.8, 4.1.6.8, 4.2.1.7, 4.2.2.7, 4.2.3.7, 4.2.4.7
			· Estimated costs and plans to meet those costs	Sections 4.1.1.9, 4.1.2.9, 4.1.3.9, 4.1.4.9, 4.1.5.9, 4.1.6.9, 4.2.1.8, 4.2.2.8, 4.2.3.8, 4.2.4.8
			· Management of groundwater extractions and recharge	Sections 4.1.4, 4.1.6, 4.2.2, 4.2.3, and 4.2.4
354.44(b)(2)	10727.2(d)(3)		· Overdraft mitigation projects and management actions	N/A
Article 8. Interagency Agreements				
357.4	10727.6	Coordination Agreements - Shall be submitted to the Department together with the GSPs for the basin and, if approved, shall become part of the GSP for each participating Agency.	Coordination Agreements shall describe the following:	
			· A point of contact	N/A
			· Responsibilities of each Agency	N/A
			· Procedures for the timely exchange of information between Agencies	N/A
			· Procedures for resolving conflicts between Agencies	N/A
			· How the Agencies have used the same data and methodologies to coordinate GSPs	N/A
			· How the GSPs implemented together satisfy the requirements of SGMA	N/A
			· Process for submitting all Plans, Plan amendments, supporting information, all monitoring data and other pertinent information, along with annual reports and periodic evaluations	N/A
			· A coordinated data management system for the basin	N/A
			· Coordination agreements shall identify adjudicated areas within the basin, and any local agencies that have adopted an Alternative that has been accepted by the Department	N/A

Appendix B
Montecito GSA Governance Documents

This appendix contains information relevant to the formation of the Montecito GSA including its partnerships with those regulatory bodies that manage groundwater resources within the neighboring groundwater basins. In addition, this appendix contains information on GSP adoption and letters of support from neighboring regulatory agencies.

(This appendix is referenced in Section 2.1.7 of this GSP.)

MEMORANDUM OF UNDERSTANDING
BETWEEN
THE MONTECITO WATER DISTRICT AND THE CITY OF SANTA BARBARA
RELATED TO SGMA IMPLEMENTATION IN
THE MONTECITO GROUNDWATER BASIN

This Memorandum of Understanding (MOU) is made and effective as of Oct. 9, 2018, by and between the Montecito Water District, and the City of Santa Barbara, collectively referred to herein as "The Parties".

A. In 2014, California enacted the Sustainable Groundwater Management Act ("SGMA"), pursuant to which local agencies may become a Groundwater Sustainability Agency (GSA) and adopt a Groundwater Sustainability Plan (GSP) in order to manage and regulate groundwater in underlying groundwater basins.

B. Montecito Water District (MWD) is a County Water District, organized pursuant to California Water Code §§30000 et seq. with water supply and water management responsibilities within its service area. MWD is also a local agency pursuant to California Water Code §10721(n) with water supply and water management responsibilities within the Montecito Groundwater Basin, DWR Basin Number 3-49 ("Montecito Basin"). As a DWR designated medium priority basin, SGMA requires GSA formation and development of a GSP in the Montecito Basin. The MWD Board of Directors has determined it to be in the best interest of the MWD, its service area, and the public, to act as the GSA for the Montecito Basin in accordance with the requirements of SGMA, and is undertaking necessary steps under SGMA to assume that responsibility.

C. The City of Santa Barbara (City) is a charter city organized pursuant to Government Code §§34000 et seq with water supply, water management and land use responsibilities within its service area. City is also a local agency pursuant to California Water Code §10721(n) with water supply, water management and land use responsibilities within the Santa Barbara Groundwater Basin, DWR Basin Number 3-17. ("Santa Barbara Basin").

D. The Parties wish to coordinate in the implementation of SGMA within the Montecito Basin and provide a framework to ensure that SGMA is implemented effectively, efficiently, and fairly.

E. The Parties wish to cooperate in processing a basin boundary modification such that the contiguous boundaries of the Montecito Basin and the Santa Barbara Basin according to the existing Department of Water Resources ("DWR") Bulletin 118 boundary correspond in general to the jurisdictional boundary of the MWD, said boundary being shown in Exhibits A-1 and A-2 attached to this MOU.

F. The Parties acknowledge that there are certain areas of the City within the territory of the MWD that are provided water service by City. At the time the City annexed these areas, a detachment from the MWD was not simultaneously processed. The Parties intend to cooperate in accomplishing detachment of these areas from MWD and contemplate that those areas would also be excluded from the Montecito Basin and included in the Santa Barbara Basin. These areas are referred to as the Detachment Areas.

G. The Parties acknowledge that there are certain areas of the City within the territory of the MWD that are provided water service by the MWD. These areas are referred to in this MOU as the Coast Village Road Area and the Westmont Area.

NOW THEREFORE, the Parties agree as follows:

1. Purposes

The purposes of this MOU include:

a. Cooperative Working Relationship

To memorialize a cooperative, coordinated, and ongoing working relationship between the Parties that will facilitate SGMA implementation efforts within the Montecito Basin. This includes, but is not limited to, cooperation and coordination concerning the exploration, study and evaluation of approaches and strategies related to the formation of a GSA and preparation and implementation of a GSP for said basin.

b. Basin Boundary Modification

The DWR existing Bulletin 118 boundary between the Montecito Basin and the Santa Barbara Basin does not correlate with the jurisdictional boundary of the Parties. This MOU reflects the desire of the Parties to modify the existing Bulletin 118 boundary at the contiguous boundary between Montecito Basin and Santa Barbara Basin to correlate in general with the jurisdictional boundary of MWD. The areas of current overlap are shown on Exhibits A-1 and A-2 attached to this MOU ("Overlap Area"). The Exhibits also show the Detachment Areas, the Westmont Area, and the Coast Village Road Area.

2. Basin Boundary Modification

a. Application

Consistent with paragraph 1.b., the City will apply to DWR to modify the existing Bulletin 118 boundary at the contiguous boundary of the Montecito Basin and Santa Barbara Basin to coincide in general with the jurisdictional boundary of the MWD. The basin boundary will in general reflect the current jurisdictional boundary of the MWD, except for the Detachment area which will be included in the Santa Barbara Basin. The Westmont Area and Coast Village Road Area which will remain in the Montecito Basin. The application for modification will be submitted by the City as soon as possible through DWR's Basin Boundary Modification Process. The City and MWD agree that the contemplated basin boundary modification is in the best interest of the parties. MWD will support the City in its pursuit of a basin boundary modification along jurisdictional boundaries.

b. The Parties agree that any failure or inability to obtain a boundary modification of the Montecito Basin and Santa Barbara Basin, will not serve to preclude MWD from forming a GSA or preparing a GSP for the Montecito Basin.

However, in the event of failure or inability to obtain a boundary modification, MWD agrees that it will not impose or include as part of a GSP for the Montecito Basin a requirement on property within the territory of the City without the City's consent, which consent will not be unreasonably withheld.

c. No impact on current water service

Within the Overlap Area, MWD has facilities and provides water service to property located within the jurisdiction of the City, and the City has facilities and provides water service to property located within the jurisdiction of MWD, as shown on the Exhibits. Neither the GSP nor the boundary modification contemplated by this MOU are intended to affect or alter existing water service.

3. Formation of Groundwater Sustainability Agency

a. The Parties contemplate that MWD will be the local agency that elects to be the GSA, and file said election with DWR pursuant to Water Code § 10723.8, for the Montecito Basin.

b. Neither MWD, nor City, currently contemplate the City's representation on the Montecito Basin GSA because they have agreed that the Overlap Area is relatively small in comparison to the overall size of the Montecito Basin.

4. SGMA Activities

a. The Parties shall regularly confer on activities to be performed under this MOU, and nothing in this MOU is intended to restrict the range of activities that may be discussed or pursued concerning the implementation of SGMA in the Montecito Basin.

b. The Parties intend that this MOU govern any necessary activities while they are exploring, evaluating and developing GSAs and GSPs for the Montecito Basin. If the Parties identify an activity that they wish to jointly implement, they shall develop the appropriate agreement(s) governing such activity.

5. Costs

Each Party will bear all costs it incurs with respect to its activities under this MOU.

6. Staff

Each Party shall designate a principal contact person for that Party, who may be changed from time to time, and such other appropriate designees, staff members and consultants to participate on such Party's behalf in activities undertaken pursuant to this MOU. The principal contact person for each Party shall be responsible for coordinating meetings and other activities under this MOU with the principal contact person for the other Party Each Party shall make its staff and resources reasonably available for activities under this MOU.

The mutual principal contacts are:

Montecito Water District
Nicholas Turner, General Manager
583 San Ysidro Road,
Santa Barbara, CA 93108
Phone:805-969-2271
Email:nturner@montecitowater.com

City of Santa Barbara
Public Works Department
Kelley Dyer, Water Supply Manager
P.O. Box 1990
Santa Barbara, CA 93102
Phone: 805-564-5571
Email kdyer@santabarbaraca.gov

7. Entire Agreement

This MOU incorporates the entire and exclusive agreement of the Parties with respect to the matters described herein and supersedes all prior negotiations and agreements (written, oral or otherwise) related thereto. This MOU may be amended only by a writing executed by the Parties.

8. Termination

This MOU shall remain in effect unless terminated by the mutual written consent of the Parties, or upon 30 days written notice of termination delivered by one Party to the other that is not withdrawn prior to the specified termination date. No Party shall be liable to the other if it elects to terminate this MOU.

9 Assignment

No rights and/or duties of any Party under this MOU may be assigned or delegated without the express prior written consent of the other Party, and any attempt to assign or delegate such rights or duties without such consent shall be null and void.

10. Indemnification

To the fullest extent permitted by law, the Parties shall defend indemnify, and hold each other (including the directors, officers, employees and authorized volunteers of each party) free and harmless from any and all claims, demands, causes of action, suits, actions, proceedings, costs, expenses, liability, judgments, awards, decrees, settlements, loss, damage or injury of every kind, in law or equity (collectively "Claims") in any manner arising out of, pertaining to, or incident to this Agreement and/or the work and/or services to be performed hereunder. This includes, without limitation, the payment of all actual damages, consequential damages, expert witness fees and attorney's fees and other related costs and expenses, including but not limited to legal costs and expense incurred by the parties in connection with any Claims or in enforcing this mutual indemnification. This indemnity does not include Claims that arise out of the sole active negligence or willful

misconduct of the party request indemnification. Indemnity requirements are not limited to the amount of any insurance available to either party and survive the termination of this Agreement for any reason.

IN WITNESS WHEREOF, the parties have executed this MOU as of the date first above written

MONTECITO WATER DISTRICT

By: _____

W. Douglas Morgan
President, Board of Directors

CITY OF SANTA BARBARA

By: _____

Rebecca J. Bjork
Public Works Director, City of Santa Barbara

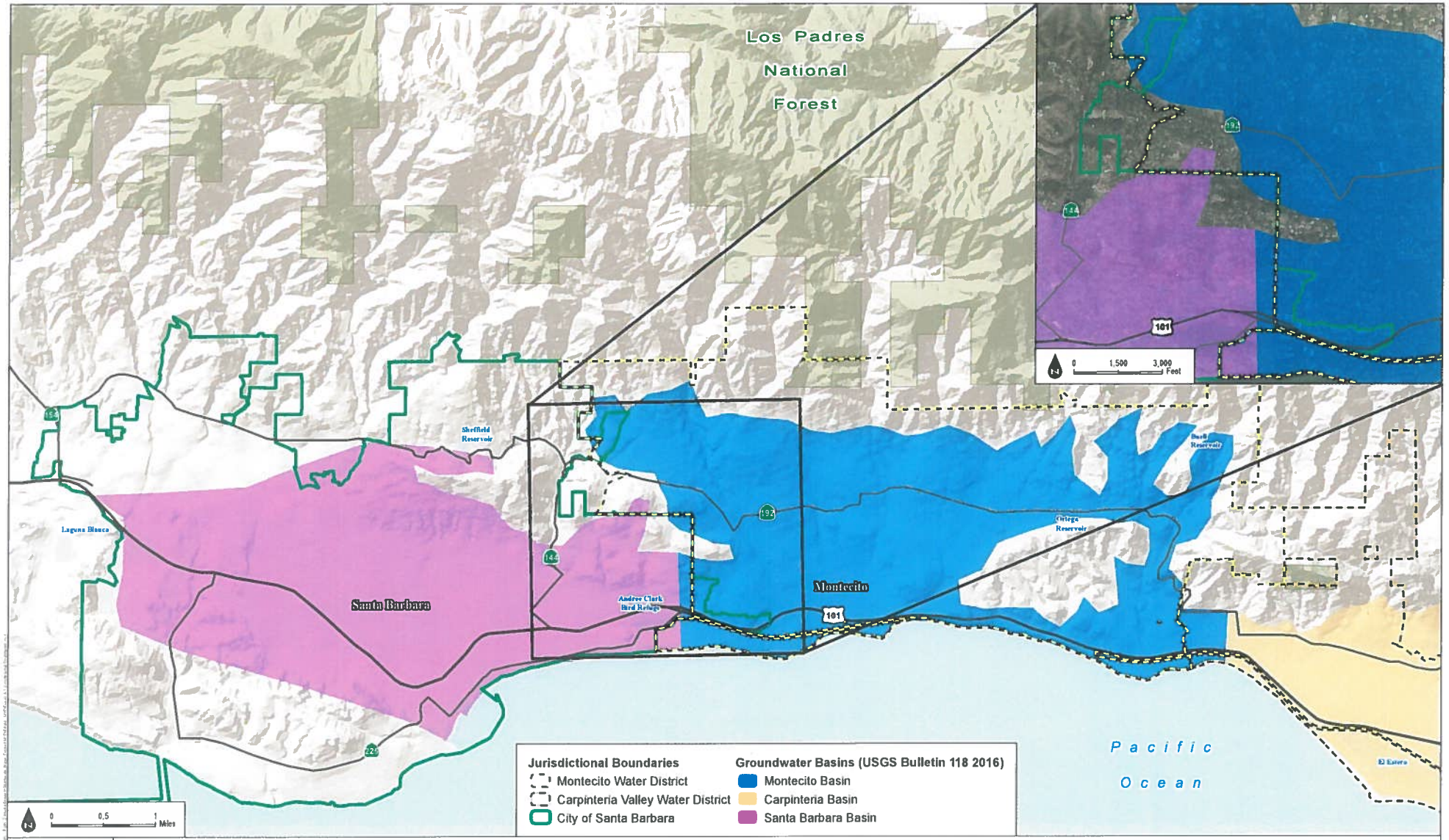
APPROVED AS TO FORM

By: _____

Robert M. Cohen
COHEN & BURGE, LLP
General Counsel, Montecito Water District

By: _____

Daniel S. Hentschke
Assistant City Attorney
City of Santa Barbara



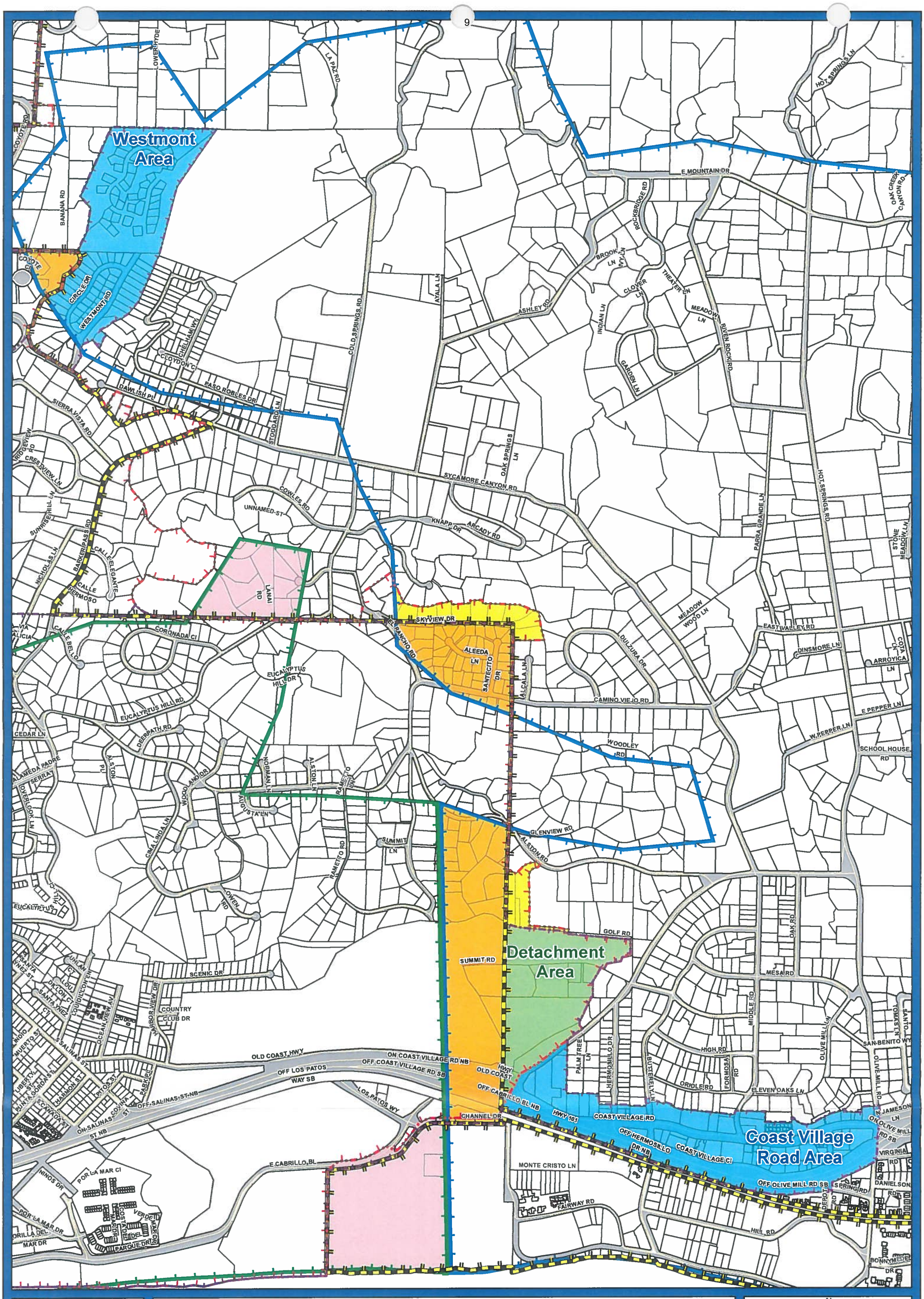
DUDEK

SOURCE: Santa Barbara County; USGS

Montecito Water District

FIGURE A-1

Jurisdictional and Groundwater Basin Boundaries



MONTECITO WATER DISTRICT

Basin, Jurisdiction, & Service Area Overlap
FIGURE A-2

DISCLAIMER
This map is for reference only. Although every e has been made to ensure the accuracy of information, errors and conditions originating from physical sources used to develop the database may be reflected on this map. ZWORLD GIS shall not be liable for any errors, omis ions, dama that result from inappropriate use of this document ve accuracy is claimed for the boundary ines shown here and lines should not be used to obtain coordinate values bearings or distances.

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Prepared by ZWORLD GIS in September 2018
www.zworldgis.com

RESOLUTION NO. 2169

A RESOLUTION OF THE BOARD OF DIRECTORS OF THE MONTECITO WATER DISTRICT DECLARING ITS INTENTION TO BECOME THE GROUNDWATER SUSTAINABILITY AGENCY PURSUANT TO THE SUSTAINABLE GROUNDWATER MANAGEMENT ACT FOR THE MONTECITO GROUNDWATER BASIN

WHEREAS, in September 2014, California passed the Sustainable Groundwater Management Act ("SGMA") enacting Water Code §§10720 – 10737.8; and

WHEREAS, SGMA requires all high and medium priority groundwater basins, as designated by Bulletin 118 issued by the California Department of Water Resources ("DWR"), to be managed by Groundwater Sustainability Agencies ("GSAs"); and

WHEREAS, the Montecito Groundwater Basin/DWR Basin Number 3049 ("Basin") has been designated by DWR as a medium priority basin in its 2018 draft prioritization; and

WHEREAS under the SGMA a local agency or combination of local agencies may elect to become a GSA pursuant to Water Code §10723(a) in order to sustainably manage and regulate a groundwater basin; and

WHEREAS, pursuant to the SGMA, sustainable groundwater management is intended to occur pursuant to Groundwater Sustainability Plans that are created and adopted by GSAs; and

WHEREAS, Montecito Water District is a County Water District, organized pursuant to Water Code §30000 et seq, with water supply and water management responsibilities in its service area; and

WHEREAS, Montecito Water District is a local agency, with water supply and water management responsibilities, overlying the Basin and is therefore also a local agency as defined within Water Code §10721(n); and

WHEREAS, the Montecito Water District desires to form a GSA for the Basin; and

WHEREAS, the Montecito Water District gave notice pursuant to Water Code §10723(b) and Government Code §6066, and a public hearing was held on July 24, 2018 in the County overlying the Basin; and

WHEREAS, after said notice, hearing, and consideration of groundwater conditions for the Basin, the Board of Directors of the Montecito Water District has determined it to be in the best interest of the Montecito Water District, its service area, and the public to act as the GSA for the Basin, and to thereby provide for the sustainable management of the basin; and

WHEREAS, adoption of this resolution does not constitute a "project" under California Environmental Quality Act Guidelines Section 15378; including 15378(b)(5) which excludes from the definition of "project" organizational and administrative activities of government, that will not result in direct or indirect physical changes in the environment.

NOW, THEREFORE, BE IT RESOLVED by the Board of Directors of the Montecito Water District as follows:

1. Montecito Water District shall become the Groundwater Sustainability Agency (GSA) for the Montecito Groundwater Basin, DWR Basin Number 3049 and shall have all the powers granted to a GSA pursuant to the SGMA;

2. That the GSA hereby created shall consider the interests of all beneficial uses and users of groundwater, as required by Water Code section §10723.2

3. The General Manager of Montecito Water District is authorized to: (a) notify the Department of Water Resources (DWR) of the action taken by this resolution, (b) to develop and file with DWR the all applicable information required to be submitted as listed in Water Code §10723.8(a); and (c) to take such further actions as are necessary to carry out the intent of this resolution.

PASSED AND ADOPTED by the Board of Directors of the Montecito Water District this 24th day of July, 2018 by the following roll call vote:

AYES: Directors Frye, Morgan, Plough, and Wicks
NOES: None
ABSENT: Director Shaikewitz
ABSTAIN: None

APPROVED:

W. Douglas Morgan,
President Board of Directors

ATTEST:

Nicholas Turner
Secretary

MEMORANDUM OF UNDERSTANDING BETWEEN THE MONTECITO WATER DISTRICT AND THE CARPINTERIA VALLEY WATER DISTRICT FOR COORDINATION RELATED TO FORMATION OF A GROUNDWATER SUSTAINABILITY AGENCY FOR THE MONTECITO GROUNDWATER BASIN

THIS MEMORANDUM OF UNDERSTANDING (MOU) is made and effective as of August 9, 2017, by and between the Montecito Water District, and the Carpinteria Valley Water District, collectively known as The Parties.

A. In 2014, California enacted the Sustainable Groundwater Management Act (SGMA), Water Code § 10720 *et seq.*, pursuant to which certain agencies may become participants in a Groundwater Sustainability Agency (GSA) and adopt Groundwater Sustainability Plans (GSP) in order to manage and regulate groundwater in underlying groundwater basins.

B. Montecito Water District (MWD) is a County Water District, organized pursuant to Water Code §§30000 et seq. with water supply and water management responsibilities in its service area. MWD is therefore a "Local Agency" for the Montecito Groundwater Basin, DWR Basin Number 3-49, "BASIN" hereafter, as defined by SGMA and is therefore qualified to become a GSA and adopt a GSP for the Basin.

C. Carpinteria Valley Water District (CVWD) is also a County Water District organized pursuant to Water Code §§30000 et seq. with a service area adjacent to the MWD service area and overlying a portion of the BASIN as it is described in DWR Bulletin 118.

D. The Parties wish to modify the boundary definition of the BASIN in DWR Bulletin 118 such that the BASIN lies completely within the MWD service area to simplify management activities of the Basin.

E. The Parties wish to coordinate in the implementation of SGMA within the BASIN and to provide a framework for such efforts to ensure that SGMA is implemented effectively, efficiently, fairly, and at reasonable cost.

F. This MOU does not apply to the activities associated with the formation of a GSA or management of the Carpinteria Groundwater Basin, DWR Basin Number 3-18 which is distinct from the BASIN.

NOW THEREFORE, the Parties agree as follows:

1. **Purpose.** The primary purpose of this MOU is to memorialize a cooperative and ongoing working relationship between the Parties that will facilitate efforts to coordinate on the exploration, study, evaluation, and development of mutually beneficial approaches and strategies to implement SGMA in the BASIN.

2. **Formation of a Groundwater Sustainability Agency (GSA).** The Parties contemplate that the Montecito Water District will be the Local Agency that elects to be the GSA, and file said election with DWR pursuant to Water Code § 10723.8, for the entire BASIN.

   a. No GSA election shall be filed pursuant to Water Code 10723.8 for the BASIN without providing notice to other Parties of the proposed election.

b. The Parties will cooperatively explore, study, and evaluate various approaches and strategies concerning the formation of a GSA and preparation of a GSP for the BASIN. This includes, but is not limited to, the method of formation of a GSA, which may include either an MOA or JPA. None of the parties are obligated through this MOU to execute a subsequent MOA or JPA.

c. Any Party may withdraw from this MOU upon written notice to the other Party.

d. If a Party withdraws from this MOU, this MOU does not preclude the withdrawing Party from electing to be a GSA in accordance with SGMA for all or any portion of the BASIN as applicable.

3. **Basin Boundary Modification.** Parties agree to work together to revise the BASIN boundary as currently defined in DWR Bulletin 118 through DWR's Basin Boundary Modification process in 2018, such that the BASIN lies completely within MWD service area on the East end of the Basin.

4. **Costs.** Each Party is responsible for and shall bear all individual costs it incurs with respect to its activities under this MOU. To the extent that the Parties undertake joint activities under this MOU, the costs of those activities will be divided equally by the Parties. Any request for reimbursement of costs for joint activities shall be supported by documentation supporting the amount requested.

5. **Staff.** Each Party shall designate a principal contact person and any other appropriate staff members and/or consultants to participate on Party's behalf in activities undertaken pursuant to this MOU. Each Party shall make its staff and its expertise reasonably available for activities under this MOU.

6. **Notices.** Any notice required by this MOU shall be in writing and shall be given personally, by facsimile, by electronic mail (email), or by U.S. or certified mail, postage prepaid, to the respective address set forth below.

7. **Entire Agreement.** This MOU incorporates the entire agreement of the Parties with respect to the matters described herein and supersedes all prior negotiations and agreements (written, oral, or otherwise) related thereto. This MOU may be amended, including without limitation to add new Parties only in a writing executed by all of the Parties.

8. **Termination.** This MOU shall terminate upon formation of a GSA for the Basin, by the mutual consent of the Parties, or upon the withdrawal of all Parties.

9. **Assignment.** No rights or duties of any of the Parties under this MOU may be assigned or delegated without the express prior written consent of all of the other Parties, and any attempt to assign or delegate such rights or duties without such written consent shall be null and void.

10. **Confidentiality.** The Parties acknowledge that, in connection with their joint activities under this MOU, each of them may share sensitive and/or confidential information with the other Parties. To the fullest extent permitted by law, each of the Parties shall maintain any information, documents, or materials shared by the other Parties or mutually developed pursuant to this MOU in confidence and shall not voluntarily provide or reveal such information, documents or

materials to any third party without the consent of all Parties to this MOU. If any party receives a request or order from a third party that the receiving Party believes requires it to disclose any such information, documents or materials, the receiving party shall (i) immediately notify the other Parties and provide them with a copy of such request or order, (ii) defer any disclosure of such information, documents or materials for as long as legally permitted, and (iii) cooperate with any other Party that wishes to pursue an order protecting the disclosure of such information, documents, or materials.

11. **Indemnification.** To the fullest extent permitted by law, the Parties shall defend indemnify and hold each other (including the directors, officers, employees and authorized volunteers of each party) free and harmless from any and all claims, demands, causes of action, suits, actions, proceedings, costs, expenses, liability, judgments, awards, decrees, settlements, loss, damage or injury of any kind, in law or equity (collectively "Claims") in any manner arising out of, pertaining to, or incident any work and/or services to this Agreement and the work and/or services to be performed hereunder. This includes without limitation the payment of all actual damages, consequential damages, expert witness fees and attorney's fees and other related costs and expenses, including but not limited to legal costs and expense incurred by the parties in connection with any Claims or in enforcing this mutual indemnification. This indemnity does not include Claims that arise out of the sole active negligence, or willful misconduct of the party requesting indemnification. Indemnity requirements are not limited to the amount of any insurance available to either party and survive the termination of this Agreement for any reason.

IN WITNESS WHEREOF, the Parties have executed this MOU effective as of the date first above written.

MONTECITO WATER DISTRICT

By: _____
Richard Shaikewitz, Board President

APPROVED AS TO FORM
Montecito Water District General Counsel

By: _____
Robert M. Cohen, Cohen & Burge LLP

CARPINTERIA VALLEY WATER DISTRICT

By: _____
Polly Holcombe, Board President

APPROVED AS TO FORM
Carpinteria Valley Water District Counsel

By: _____
Roger Myers, Myers, Widders, Gibson, Jones & Feingold, L.L.P.

materials to any third party without the consent of all Parties to this MOU. If any party receives a request or order from a third party that the receiving Party believes requires it to disclose any such information, documents or materials, the receiving party shall (i) immediately notify the other Parties and provide them with a copy of such request or order, (ii) defer any disclosure of such information, documents or materials for as long as legally permitted, and (iii) cooperate with any other Party that wishes to pursue an order protecting the disclosure of such information, documents, or materials.

11. **Indemnification.** To the fullest extent permitted by law, the Parties shall defend indemnify and hold each other (including the directors, officers, employees and authorized volunteers of each party) free and harmless from any and all claims, demands, causes of action, suits, actions, proceedings, costs, expenses, liability, judgments, awards, decrees, settlements, loss, damage or injury of any kind, in law or equity (collectively "Claims") in any manner arising out of, pertaining to, or incident any work and/or services to this Agreement and the work and/or services to be performed hereunder. This includes without limitation the payment of all actual damages, consequential damages, expert witness fees and attorney's fees and other related costs and expenses, including but not limited to legal costs and expense incurred by the parties in connection with any Claims or in enforcing this mutual indemnification. This indemnity does not include Claims that arise out of the sole active negligence, or willful misconduct of the party requesting indemnification. Indemnity requirements are not limited to the amount of any insurance available to either party and survive the termination of this Agreement for any reason.

IN WITNESS WHEREOF, the Parties have executed this MOU effective as of the date first above written.

MONTECITO WATER DISTRICT

By: _____
Richard Shaikewitz, Board President

APPROVED AS TO FORM
Montecito Water District General Counsel

By: _____ for
Robert M. Cohen, Cohen & Burger LLP

CARPINTERIA VALLEY WATER DISTRICT

By: _____
Polly Holcombe, Board President

Santa Barbara County Public Works Department
Flood Control ♦ Water Agency ♦ Project Clean Water
130 E. Victoria Street, Suite 200, Santa Barbara, CA 93101
PH (805) 568-3440 FAX (805) 568-3434
http://cosb.countyofsb.org/pwd/water

SCOTT D. MCGOLPIN
Director

WALTER RUBALCAVA
Deputy Director

May 5, 2023

California Department of Water Resources
Sustainable Groundwater Management Grant Program
P.O. Box 942836
Sacramento, CA 94236-0001

Subject: Letter of Support for the Montecito Groundwater Basin Groundwater Sustainability Agency's Groundwater Sustainability Plan

To Whom it May Concern:

On behalf of the Santa Barbara County Water Agency, I am writing this letter to indicate support for the Groundwater Sustainability Plan (GSP), which is being considered for adoption by the Montecito Groundwater Basin Groundwater Sustainability Agency's ("Montecito GSA") Board of Directors and subsequent submission to the California Department of Water Resources (DWR) for approval. The Montecito GSA is a single-agency GSA formed by the Montecito Water District in 2018 with the requirement of developing and implementing a GSP pursuant to the Sustainable Groundwater Management Act (SGMA). The draft GSP which is under consideration for adoption provides a clear roadmap for sustainable management of the Montecito Groundwater Basin.

Please feel free to contact me directly at mcyoung@countyofsb.org or (805)568-3546, for questions or additional information.

Sincerely,

Matthew C. Young,
Santa Barbara County Water Agency Manager

Appendix C
Communication and Engagement Plan

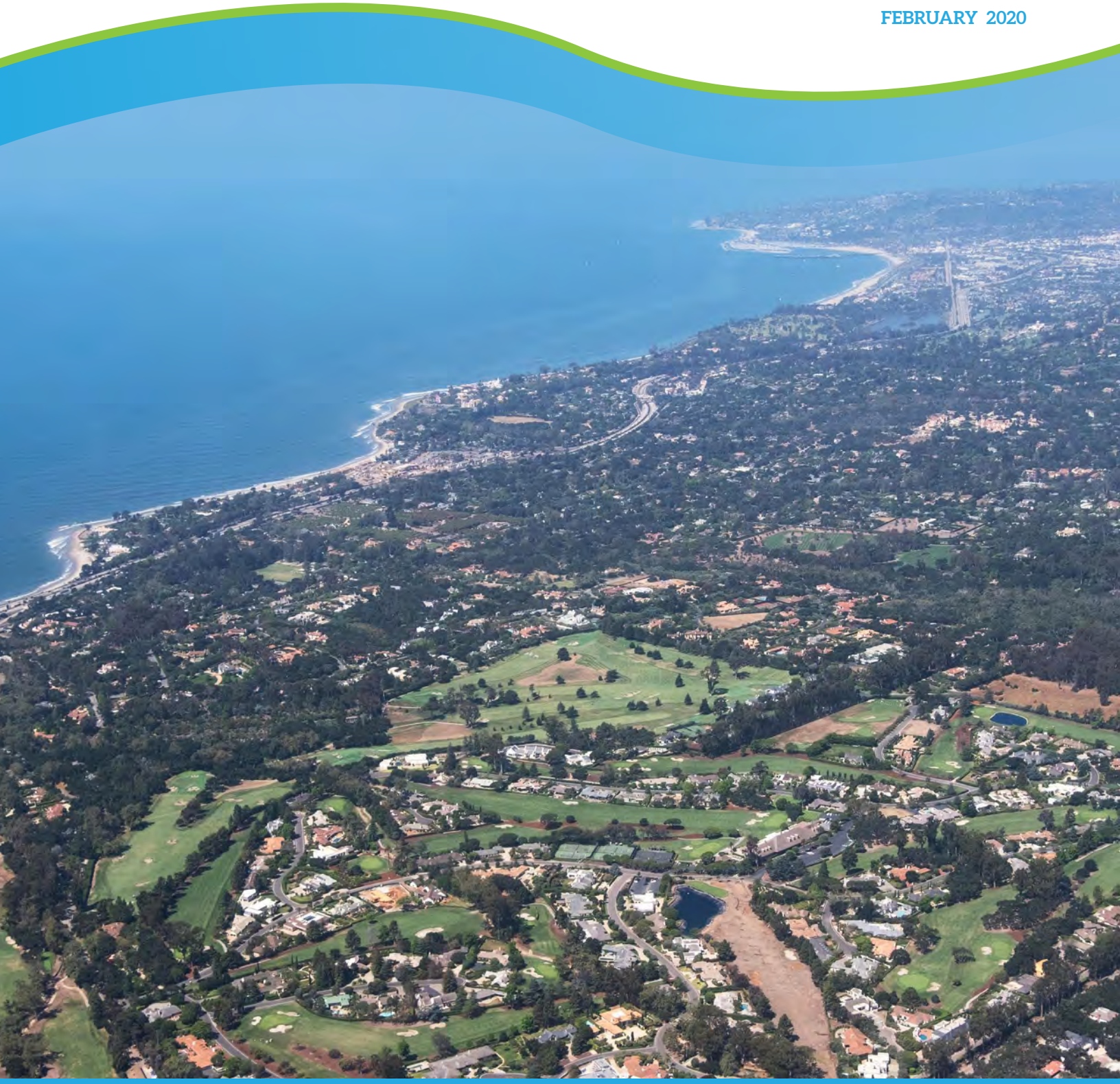
This appendix contains the Communication and Engagement Plan (CEP) for the Montecito GSA (compliant with GSP Emergency Regulations, §354.10 – Notice and Communications). The Communication and Engagement Plan (CEP) is a living document designed to provide a guide for public involvement through the development and implementation of the GSP by defining goals for effective communication and community engagement. The CEP was designed to provide for substantial and sustained public outreach and engagement incorporating the best practices recommended by DWR.

(This appendix is referenced in Section 2.1.7.5 of this GSP.)

Montecito Groundwater Basin
Groundwater Sustainability Agency

Communication & Engagement Plan

FEBRUARY 2020



Prepared by: DUDEK & Groundwater Sustainability Agency Board and Staff

Montecito Groundwater Basin

Groundwater Sustainability Agency Board Members

Cori Hayman, President

Ken Coates, Vice President

Tobe Plough, Director

Floyd Wicks, Director

Brian Goebel, Director

Montecito GSA Office

583 San Ysidro Road, Santa Barbara, California 93108

805.969.2271

Mission Statement

The Montecito Groundwater Basin Groundwater Sustainability Agency's mission is to ensure a reliable and sustainable groundwater supply for the community through effective basin management pursuant to the Sustainable Groundwater Management Act.



Contents

SECTION

Glossary Of Terms/Abbreviations iii

1 / Background On The Sustainable Groundwater Management Act & GroundwaterSustainability Agency Formation 1

2 / Introduction To The Communication & Engagement Plan 5

3 / Purpose, Goals & Outcomes Of Community Engagement 6

4 / Community & Stakeholders 7

5 / Communication Tools & Venues For Engaging 8

Communication Tools 9

Venues For Engaging 11

6 / Implementation Timeline 13

7 / Evaluation & Assessment 14

8 / Conclusion 15

Appendices 16

Glossary of Terms/Abbreviations

Acronym/Abbreviation	Definition
Agency	Montecito Groundwater Basin Groundwater Sustainability Agency.
Aquifer	An underground layer of water-bearing permeable rock, rock fractures, or unconsolidated material (gravel, sand, or silt) that yields significant amounts of groundwater to wells or springs (DWR Bulletin 118).1
CEP	Communication & Engagement Plan
DWR	California Department of Water Resources
Engagement	Efforts made to understand and involve stakeholders and their concerns in the activities and decision-making of the Agency.
Groundwater Basin	An important source of water stored in the earth beneath our feet, in spaces between sand, soils, and fractured rock, is known as an aquifer. Layers of aquifers make up a groundwater basin.
GSA	Groundwater Sustainability Agency.
GSP	Groundwater Sustainability Plans
Montecito Groundwater Basin	The Montecito Groundwater Basin covers 11.5 square miles and is situated in the southwestern coastal area of Santa Barbara County.
SGMA	Sustainable Groundwater Management Act
Stakeholder and Interested Parties	Individuals or parties with interest in the Montecito Groundwater Basin GSP.

1 DWR Bulletin 118, available online at https://water.ca.gov/Programs/Groundwater-Management/Bulletin-118.

1 / Background on the Sustainable Groundwater Management Act & Groundwater Sustainability Agency Formation

The Sustainable Groundwater Management Act

The Sustainable Groundwater Management Act (SGMA), signed into law by Governor Jerry Brown on September 16, 2014, created a framework for statewide groundwater management in California. Sustainable groundwater management is to be implemented by Groundwater Sustainability Agencies (GSAs) through the development and implementation of Groundwater Sustainability Plans (GSPs). Sustainable groundwater management is defined by SGMA as *the management and use of groundwater in a manner that can be maintained during the planning and implementation horizon without causing undesirable results. This avoidance of undesirable results is measured through six sustainability indicators:*

1. Chronic lowering of groundwater levels indicating a significant and unreasonable depletion of supply if continued over the planning and implementation horizon
2. Significant and unreasonable reduction of groundwater storage
3. Significant and unreasonable seawater intrusion
4. Significant and unreasonable degradation of water quality
5. Significant and unreasonable land subsidence
6. Depletion of interconnected surface water and groundwater that has significant and unreasonable adverse impacts on beneficial uses of the surface water

California Water Code Section 10720.5(b) says that nothing in the legislation "determines or alters surface water rights or groundwater rights under common law or any provisions of law that determines or grants surface water rights"

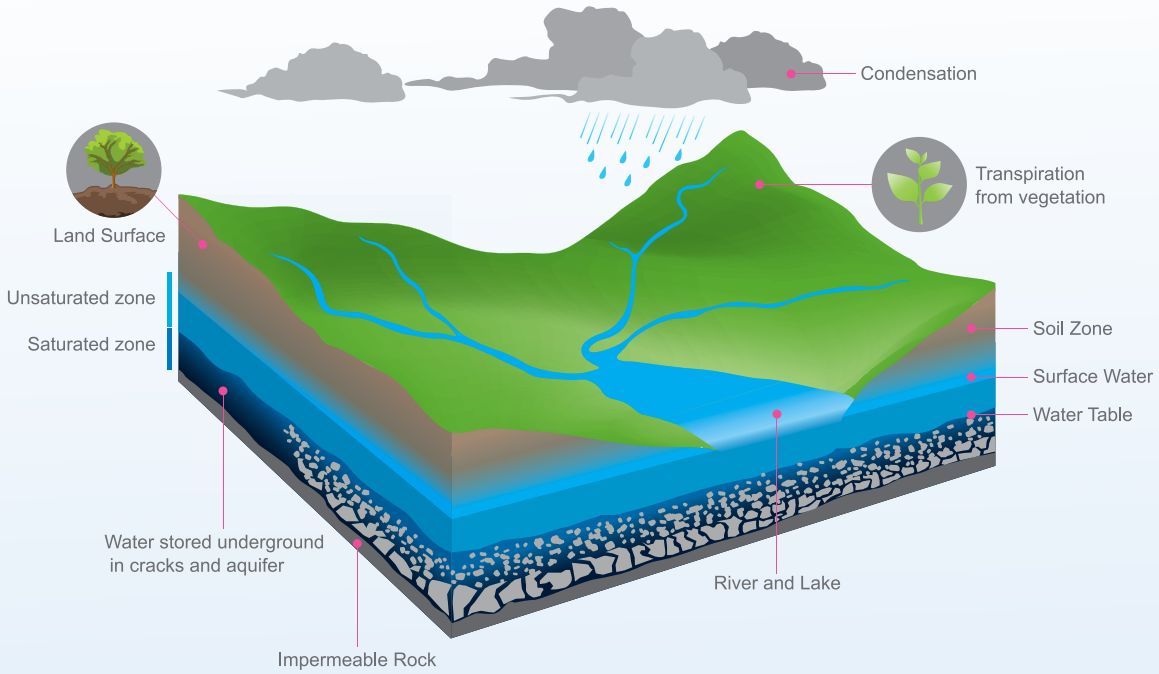
The **Montecito Groundwater Basin** is categorized as a "medium priority" basin by the **California Department of Water Resources** (DWR). Compliance with SGMA is therefore required, including GSA formation and GSP development, adoption, and implementation.

Groundwater Sustainability Agency Formation

As the legislative intent of SGMA is to recognize and preserve the authority of local agencies to manage groundwater, SGMA required the formation of GSAs in critically overdrafted, high-priority, and medium-priority basins. These GSAs form the governance structure responsible for implementing SGMA—specifically, developing the GSP, developing projects toward establishing and maintaining sustainability, and generally realizing the aims of SGMA. Any local agency or combination of local agencies overlying a groundwater basin may form a GSA for the basin. "Local agency" means a local public agency that has water supply, water management, or land use responsibilities within a groundwater basin.
As the local agency, the Montecito Water District initiated a 2-year GSA formation process in 2016, which included community outreach via

conventional mail, email, public notices and public meetings and two stakeholder workshops. A single-agency GSA (which is allowed by SGMA), was formed by the Montecito Water District. Specifically, the Montecito Water District adopted Resolution 2169 on July 24, 2018, thereby giving notice to the California Department of Water Resources (DWR) of its intention to become the GSA pursuant to SGMA for the Montecito Groundwater Basin, designated as DWR Basin Number 3049 ("Basin"). In November 2018, DWR declared Montecito Water District as the exclusive GSA for the Basin, and in April 2019, the GSA held its inaugural meeting.

Groundwater

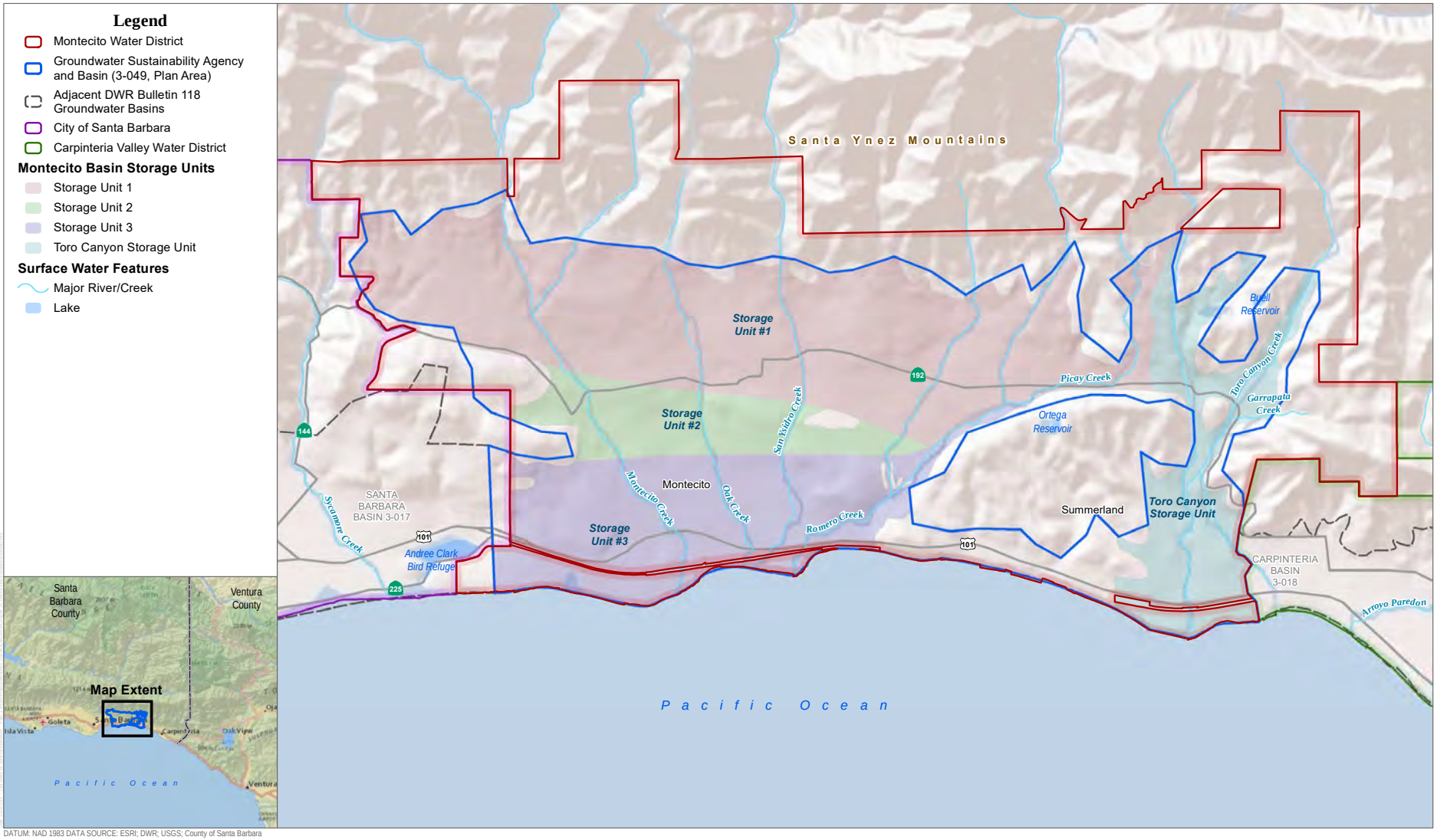


What is Groundwater?

Water gets into the ground mostly through snowmelt and rain seeping into the soil and broken rocks underneath the ground and through overland flow in channels, such as creeks, streams, rivers, and ponds.

The water infiltrating the underground basin moves gradually, pulled by gravity, into the saturated zone of the subsurface. From here, groundwater will flow toward points of discharge, such as rivers, lakes, or the ocean, to begin the cycle anew. Groundwater is collected with wells and pumps, or it can flow naturally to the surface via seepage or springs. Groundwater can be thousands of years old, although typically it is extracted within years or decades after it originally moves underground through small openings within porous material, called aquifers.

The map below illustrates the Montecito GSA Boundary, the Montecito Groundwater Basin Boundary and the Montecito Water District Boundary along with all the storage



DATUM: NAD 1983 DATA SOURCE: ESRI; DWR; USGS; County of Santa Barbara

DUDEK

0 0.5 1 Miles

Montecito Groundwater Sustainability Agency and Basin Boundary

Groundwater Sustainability Plan

A GSP is a required document with statutorily mandated contents, and is ultimately a tool used to help a GSA sustainably manage a basin. The criteria for sustainable management, including determining what is **significant and unreasonable** within the parameters of SGMA for the groundwater basin managed by that GSA, must be assessed, with input from stakeholders, before the GSP can be adopted.[1]

It is the express intent of the Agency to fully engage the community in the process of GSP development in order to implement its mission, comply with SGMA, and serve the residents of the Montecito Groundwater Basin.

Why is Groundwater Important in Montecito?

Public wells owned by Montecito Water District and many private wells draw from the Montecito Groundwater Basin. Groundwater is heavily relied upon for residential use, along with some commercial and agricultural uses. Available data suggests that groundwater levels are low following the most recent and worst drought in the region's history. The Montecito GSA is charged with ensuring sustainable ongoing supply for the basin users, while at the same time avoiding undesirable results.

1 See "What Is Groundwater?" inset for a definition of groundwater and its importance to residents of the Montecito Groundwater Basin, based on the Water Education Foundation's 2015 SGMA Handbook, which is available online at https://www.watereducation.org/sites/main/files/file-attachments/groundwatermgthandbook_oct2015.pdf.

2 Introduction to the Communication & Engagement Plan



DWR released a Guidance Document for Groundwater Sustainability Plan Stakeholder Communication & Engagement in January, 2018. The Guidance Document details best practices to increase transparency in the GSP development process. **This Communication & Engagement Plan (CEP) conforms to the Guidance Document established by DWR, and has been tailored go above and beyond requirements to promote local involvement and reflect the value that the Montecito Groundwater Basin Groundwater Sustainability Agency (Agency) places on local stakeholder participation.**

This **CEP** is a living document designed to provide a guide for public involvement through the development and submittal of the GSP. The anticipated timeline for these activities is through the 3- to 5-year time period in which the GSP is prepared and approved. As the Agency gets closer to completion of the GSP, this CEP may be reviewed and adapted to provide for community outreach and engagement through GSP implementation.

3 Purpose, Goals & Outcomes of Community Engagement

Montecito Groundwater Basin Mission Statement

The Montecito Groundwater Basin Groundwater Sustainability Agency's mission is to ensure a reliable and sustainable groundwater supply for the community through effective basin management pursuant to the Sustainable Groundwater Management Act.

Purpose

The Agency is committed to developing a GSP that is reflective of and responsive to the values and goals of basin stakeholders. The purpose of this CEP is to provide a guide outlining how and when stakeholders and the public can actively engage in the process. This document serves as a tool to support the stakeholders, the public, and the Agency throughout the development of the GSP.

Goals

Effective communication and community engagement are intended to achieve the following goals:

- Enhance public understanding of groundwater resources in the Montecito Groundwater Basin and the purpose and need for a Groundwater Sustainability Plan.
- Engage all interested stakeholders in the Groundwater Sustainability Plan process.
- Increase public knowledge on SGMA regulations, laws and compliance
- Educate public regarding users of groundwater
- Promote informed community feedback throughout the Groundwater Sustainability Plan preparation.
- Coordinate communication and involvement between the Agency and other local agencies (including other Groundwater Sustainability Agencies), elected and appointed officials, and the public.
- Employ a variety of outreach methods that make public participation easy and accessible.
- Respond to public concerns and provide accurate and up-to-date information.
- Manage the Communication & Engagement Plan in a manner that provides maximum value to the public and an efficient use of local agency resources.

Outcomes

The desired outcomes for this CEP are as follows:

1. Provide the public and stakeholders with accurate and up-to-date information in all phases of the Groundwater Sustainability Plan development.
2. Obtain public and stakeholder involvement in the Groundwater Sustainability Plan development process.
3. Consider public and stakeholder input in the development of the Groundwater Sustainability Plan.
4. Succeed in the development of a responsive and well-supported Groundwater Sustainability Plan.

4 / Community & Stakeholders

Stakeholders have interests that can be affected by decisions made by a Groundwater Sustainability Agency; stakeholders often include individuals, businesses, schools, land stewardship organizations, and state government agencies. A vital, ongoing task of the Agency is to proactively solicit engagement and involve diverse representation throughout the GSP development process.

Recognizing that public and stakeholder engagement serves an important function in the successful development and implementation of a responsive and well-supported GSP, the Agency is pursuing a robust engagement program. SGMA (Section 10723.2) calls for consideration of all interests of all beneficial uses and users of groundwater if they exist in the basin, and suggests the following potential stakeholder categories summarized in the table below:

Category of Interest	Potential Stakeholder Group Categories
General Public	• Citizen Groups • Community Leaders
Land Use	• City and County Planning Departments • Regional Land Use Agencies
Private Users	• Private Pumpers • Domestic Users • Schools and Colleges • Mutual Water Companies • Private Water Companies
Urban/Agricultural Users	• Water Agencies • Municipal Water Companies • Resource Conservation Districts • Farm Bureau
Industrial Users	• Commercial and Industrial Self-Suppliers and Groups • Local Trade Associations or Groups
Environmental & Ecosystem	• Environmental Groups
Economic Development	• Chamber of Commerce • Relators Associations and Other Business Associations • State Senator and Assembly Members • Supervisorial Members
Human Right to Water	• Disadvantaged Communities/ Severely Disadvantaged Communities and Environmental Justice
Tribes	• Tribal Government
Federal and State Lands & Others	• National Forest •California Department of Fish and Wildlife • State Lands Commission • State Water Board • Regional Water Quality Control Board • Coastal Commission
Integrated Regional Water Management	• Regional Water Management Group

Stakeholders in Adjacent Basins

Other important stakeholders in the development of the GSP and in ongoing Agency coordination and collaboration include the Carpinteria Valley Groundwater Basin and the Santa Barbara Groundwater Basin. The Agency has Memoranda of Understanding in place for the coordination of groundwater boundary discussions and open dialogue on all SGMA issues with the Carpinteria Valley Water District and the City of Santa Barbara, the only two basins adjacent to the Montecito Groundwater Basin.

It is anticipated that the Agency will collaborate on the development of the GSP with these agencies, as well as with the County of Santa Barbara, which is the land use agency with jurisdiction over the Montecito Groundwater Basin.

The Agency is always seeking to educate the public at large on the importance of groundwater for our community, and engage new members in each of the categories to participate in the GSP development process.

4 Communication Tools & Venues for Engaging

The Agency supports and encourages members of the public and stakeholders to participate in the GSP development process. The Agency will develop and host a variety of opportunities for **Stakeholders & Interested Parties** to participate in the development and implementation of the GSP, including workshops, public hearings, Board and Committee meetings, Advisory Committee meetings, and through written comments. This section summarizes the wide range of communication tools and venues for engaging that will facilitate community participation.

Communication Tools

Stakeholders & Interested Parties List

SGMA requires the development and maintenance of a Stakeholders & Interested Parties list. Public and stakeholder engagement began in 2016 with the GSA formation process and included substantial outreach, community meetings, and the initiation of a Stakeholders & Interested Parties list. The Agency will use the Stakeholders & Interested Parties list developed during Groundwater Sustainability Agency formation as a baseline for the GSP development stakeholder list.

The Agency has and will continue to proactively develop the Stakeholders & Interested Parties list by conducting stakeholder mapping to ensure that the list represents an adequate, balanced, and diverse group of stakeholders. The list is broad and is intended to include anyone who requests to stay informed about SGMA activities and anyone the Agency determines should be informed about the process and/or the outcome of the planning effort.

The Agency's primary method of communicating with all Stakeholders & Interested Parties on the list is via **email**. Join the Stakeholders & Interested Parties email list today in one of three ways:

- **Email info@montecitogsa.com**
- **Visit www.montecitogsa.com**
- **Call 805.969.2271**

Agency Website

Available 24/7, the Agency website will be the primary source of ongoing, up-to-date information for the public. The website is fully operational and can be found at the Agency's website: www.montecitogsa.com.

In addition to being a tool for distributing and archiving meeting and communication materials, the website will serve as an educational resource for the community. It will provide easy access to information on SGMA and local efforts, and be a repository for meeting minutes, draft GSP language, and supplemental information.

The website includes the following information:

- Home page: Navigation to all topics and "what's new" information
- Groundwater General Information and SGMA Resources
- Agency-Specific Information including:
- Meeting schedules, meeting materials, updates, FAQs, etc.
- Substantive information relative to the GSP



Email Updates

Agency staff will send updates to the Stakeholders & Interested Parties list on a regular basis, increasing over time as the GSP is drafted, discussed, and decided upon by the Agency Board. Sign up in one of the three following ways:

- **Email info@montecitogsa.com**
- **Visit www.montecitogsa.com**
- **Call 805.969.2271**

Press Releases

Press releases will be used to announce key milestones in the process, significant aspects of the GSP, and/or developments with the Agency. Press releases will be distributed to local and regional media and the Stakeholders & Interested Parties list.

Public Notices

All Agency Board meetings are noticed in accordance with the Brown Act, and noticed on the Agency website. Agency Board meetings may be noticed in print publications such as Santa Barbara News Press, Montecito Journal, The Independent, and in online publications such as Noozhawk and EdHat.

Informational Materials (Flyers, Advertisements, Postcards)

Flyers and notices (not related to Brown Act compliance) may be posted in public gathering places, including but not limited to libraries, YMCAs, post offices, and local businesses. The Agency may also choose to send out postcards, mailers, or include notices and notifications in mailings to relevant constituents. Advertisements may also be placed in local publications such as Montecito Journal and Montecito Neighbors Magazine.



Venues for Engaging

Board & Committee Meetings

The Agency Board is composed of the five publicly elected members of the Montecito Water District who are sworn to adhere to Agency-specific bylaws, which include compliance with the Brown Act. The Agency Board has formed two committees to date, the Strategic Planning Committee and the Finance Committee, and may form others as determined necessary. All Agency Board and Committee meetings are publicly noticed, open to the public, and provide a forum for public comment.

Regularly scheduled Agency meetings occur quarterly in January, April, July, and October on the second Tuesday of the month. All dates, times, agendas, and location information is on the website (**www.montecitogsa.com**). Check the website for the latest meeting information, as they are subject to change.

Demonstrating a strong commitment to public engagement, the Agency Board is responsible for the following:

- Adopting and overseeing the implementation of the Communication & Engagement Plan
- Receiving public comments made in writing and at Agency Board meetings
- Considering the recommendations of the Stakeholder Advisory Committee and Technical Advisory Committee
- Decision-making and actions for all matters, including financing options, pertaining to developing and implementing the GSP

Advisory Committee Meetings

The Agency Board has acted to form two advisory committees, the Stakeholder Advisory Committee and the Technical Advisory Committee, with the express goal of gaining public involvement. The Advisory Committee members are appointed by the Agency Board.

- **The Stakeholder Advisory Committee** provides local knowledge and insight, and advises and makes recommendations to the Agency Board concerning non-technical aspects of the development of a GSP.
- **The Technical Advisory Committee** provides local knowledge and insight, and advises and makes recommendations to the Agency Board concerning technical aspects of the development of a GSP.

Advisory Committee meetings are open to the public. More details on committee constituents and processes, including meeting locations, times, dates, agendas, and materials are available on the Agency's website: **www.montecitogsa.com.**

Public Meetings & Hearings

Public meetings or hearings are formal opportunities for Stakeholders & Interested Parties to provide comments on programs, plans, and proposals of the Agency. Public meetings and hearings are an important forum for Stakeholders & Interested Parties to share viewpoints and concerns. The Agency will use public hearings to ensure the public is actively engaged in the GSP development and discussions on rates. The Agency may also use less informal public workshops (described below) to solicit feedback and information throughout the GSP development process. The Agency will hold required public meetings and hearings, for example prior to the adoption of any fees and public or adoption of the final GSP.

Public Workshops

Public educational workshops provide more personal and less formal opportunities for Stakeholders & Interested Parties to learn about groundwater, SGMA, funding options, and GSP elements. Workshops can be organized in a variety of ways, such as open houses or traditional presentations with facilitated question-and-answer sessions. The format will be designed to maximize opportunities for public input. Workshops may also be held as GSP elements are being developed.

Tabling

Participation by Agency staff and Agency Board members in tabling at community events, and targeted tabling (presence in public venues) provide more personal and less formal opportunities for Stakeholders & Interested Parties to learn about groundwater, SGMA, funding options, and GSP elements. These venues may be used to solicit feedback from Stakeholders & Interested Parties who may prefer more personal, less formal settings and/or feel more comfortable listening, learning, and expressing themselves in a one-on-one environment.

Presentations/Event Participation/ Agency Collaboration

The Agency has a number of established relationships in the community, and is actively seeking additional opportunities to productively engage with the public and stakeholders. Community organizations, entities, and all others may contact Agency staff by email at **staff@montecitogsa.com**, or by calling 805.969.2271. Agency staff is available to make presentations at meetings, table at events, and write for newsletters or community organizational publications. Contact Agency staff and let us know how we can work together.

Surveys

Online tools, such as Survey Monkey, will be used for stakeholder mapping, to ensure participation from diverse and balanced segments of the community. Surveys may also be used periodically to gather stakeholder ideas and to gather feedback on key issues.

Office & Mailing Address

You are always welcome to come meet with us in person at the Agency office: **583 San Ysidro Road, Santa Barbara, California 93108.**

Input in writing may be provided at the office or via email at any time.

6 Implementation Timeline

The anticipated timeline for GSP development is 3 to 5 years. This CEP will be reviewed and updated periodically during that time. As the Agency gets closer to completion of the GSP, this document may be adapted to provide for community outreach and engagement through implementation.

Years One & Two

(January 2019–December 2021)

In Years One and Two, the Agency Board will hire legal counsel (pending/completed); hire rate/fee consultants (completed); apply for Proposition 1 Groundwater Sustainability Plan funding grant (completed); adopt various documents including bylaws and a CEP (completed/pending); begin development of the GSP; and determine the necessity for a short-term mechanism for funding the Agency.

Years Two–Five

(January 2020–December 2024)

In Years Two through Five, program-specific engagement activities will be focused on development of GSP elements. The GSP will be prepared iteratively and in a logical progression, building on previously developed technical and policy information. Throughout the process of preparing the GSP, background materials along with draft text, figures, and tables for each section will be provided to the Agency staff and Agency Board, and made available for public comment through communication tools and engagement venues as described.

APPENDIX A provides the projected Groundwater Sustainability Plan Development Schedule as of the date this CEP was adopted. The most current version of this document will be maintained on the Agency website: www.montecitogsa.com.

APPENDIX B provides a sample table of engagement activities, including timeframes and key roles. Ongoing communication and engagement tasks and activities of the Agency revolve around the communication tools and venues for engagement, including website maintenance, emailing updates, issuing press releases, creating and disseminating informational materials, and planning and conducting public meetings. These engagement activities will support public outreach and facilitate public input throughout the development process. Project or program-specific engagement activities may be developed to meet the outreach goals of a specific project or program.

7 Evaluation and Assessment



Formal and informal evaluation and assessment tools such as surveys, open forums, discussions and meetings, emails, phone calls, and workshops will be used to solicit ongoing public and stakeholder feedback on the Agency's process, methods, venues, and tools. The Agency will consider input and align outreach with public engagement needs and requirements throughout the GSP development process.

Communication and engagement will be a standing item for discussion on Committee agendas, and will be included on the Agency Board agenda at least annually for discussion, review, and action as appropriate.

This CEP will be reviewed annually by Agency staff, with Agency Board and Committee input, and updated as appropriate with a focus on incorporating tools and techniques that worked well in previous years and modifying or eliminating tools that failed to engage Stakeholders & Interested parties.

8 / Conclusion

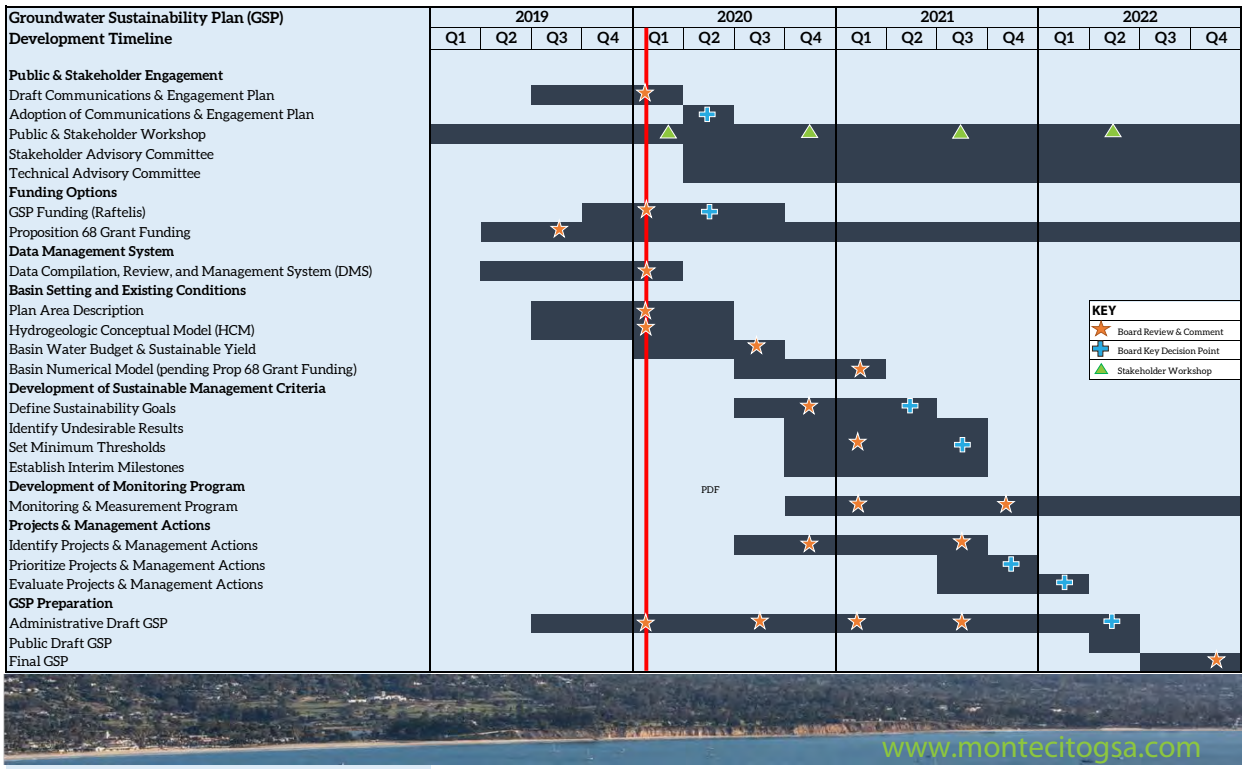


True engagement requires policymakers and the public not only to listen, but also to have a voice.

In keeping with its mission to ensure a reliable and sustainable groundwater supply for the community through effective local management pursuant to SGMA, the Agency will solicit engagement from Stakeholders & Interested Parties and consider that input in the final adopted GSP.

Appendix A
Groundwater Sustainability Plan Development Schedule

Example of the Groundwater Sustainability Plan Development Schedule to be easily accessible for the public. The most current version of this document will be maintained on the Montecito Groundwater Basin Groundwater Sustainability Agency website: **www.montecitogsa.com.**



Appendix B
Communication & Engagement Activities Table

Sample table of engagement activities, including timeframes and key roles (subject to change).

Montecito Groundwater Basin Groundwater Sustainability Agency – Outreach Activities Overview (January 2020)

Activity	Description	Frequency/Timing	Who
Public Meetings (Board)	Public Comment & Attendance	Quarterly	GSA Staff, Board, Public
Public Meetings (Committee)	Public Comment & Attendance	Quarterly or more	GSA Staff, Board, Public
Public Meetings (Advisory Committee)	Public Comment & Attendance	Quarterly or more	GSA Staff, Board, Public
All Basin Postcard Mailing	Print notification / invitation	January, 2020	GSA Staff
Tabling / Community Events	Public Comment & Attendance	Ongoing / as needed	GSA Staff, Board, Public
Public Workshops	Public Comment & Attendance	4 per GSP schedule	GSA Staff, Board, Public
Email Updates	Ongoing Information Delivery	Monthly	GSA Staff
Website	Accessible 24/7	January, 2020	GSA Staff
Advertisements	Ongoing Information Delivery	Monthly / as needed	GSA Staff
Public Notifications	Compliant Information Delivery	Milestones	GSA Staff
Postcards / Mailings	Information Delivery	As needed / required	GSA Staff
Posting of Mailers / Postcards /Flyers	Information Delivery	Ongoing / as needed	GSA Staff
Community Organization Presentations (MA, other)	Information Delivery / Feedback	Ongoing / as needed	GSA Staff, Board, Public



Montecito Groundwater Basin
Groundwater Sustainability Agency

www.montecitogsa.com | 805.969.2271 | 583 San Ysidro Road, Santa Barbara, California 93108.

Appendix D
Response to Comments

This appendix contains a listing of public comments received by the Montecito GSA through Groundwater Sustainability Plan adoption (as is required by GSP Emergency Regulations, §354.10(c)). Additionally, responses to each comment are provided including references to changes in the Plan that resulted from particular comments.

(This appendix is referenced in Section 2.1.7.3 of this GSP.)

Comment Source	Date	Commentor	Subject	Section, Page Number, Figure, Table	Comment or Issue	Addressed By	Response	Status/Notes
TAC Member	9/16/2020	Tim Thompson	Land Subsidence	2.2.4.5	In some basins there are survey data of monuments collected by the County in some areas, so I am wondering if that type of data might exist for the MWD area?	DP	The location of existing survey monuments and continuous global positioning system (CPGS) stations operated by the County of Santa Barbara, UNAVCO, USGS, DWR, and NOAA were reviewed. There are no CPGS stations within or near the basin that can be used for monitoring land subsidence. Yes, the County has survey monuments, at least one of which is in the basin; however, there is currently no plan to regularly survey the monument as the risk for inelastic subsidence in the basin has been determined to be low. (Note that this is a duplicate comment - identical response).	Completed
TAC Member	9/16/2020	Tim Thompson	Groundwater Modeling	2.3.3.2	A better characterization or quantification of groundwater interchange to the west of the basin (towards Santa Barbara) and to the east (towards Carpinteria) will be valuable for long term basin management. I was anticipating that this could be done as part of the groundwater modeling which I understand is currently in process. Will this be the case?	TJ	Yes, this is the case. The Basin Numerical Model will treat the jurisdictional boundaries between the Montecito Groundwater Basin and the Santa Barbara and Carpenteria Basins using a general head boundary condition - this approach allows the model to directly compute rates and volumes of groundwater interchange between Basins throughout time.	Completed
TAC Member	9/16/2020	Tim Thompson	Groundwater Modeling	2.3.3.2	Return flow evaluation would benefit from assessing the quantification of groundwater interchange at most if not all of the parcels in the District, rather than only at the larger parcels.	TJ	The Basin Numerical Model will incorporate return flows for both large and small parcels. Return flow estimates and locations will be based on MWD water delivery rasters that characterize historical deliveries across the basin. These rasters do not directly relate deliveries to individual parcels, but provide delivery volumes at a 500 x 500-ft spatial resolution. Dudek will use these rasters to help characterize initial estimates of return flows, which will be adjusted, as needed, during model calibration.	Completed
TAC Member	9/16/2020	Tim Thompson	Monitoring Wells	NA	Interested in where new monitoring wells will be recommended to fill some of the data gaps	DP, MN	The location for new monitoring wells will be addressed later in the GSP process in Chapter 3 - Sustainable Management Criteria and Monitoring Network. Based on data gaps and location of existing wells, potential locations for new monitoring wells include areas of the Toro Canyon Storage Unit and Storage Unit 2 where groundwater level and quality data are currently sparse. Note that the TAC will be consulted as locations are considered.	Completed
TAC Member	9/16/2020	Tim Thompson	Groundwater Modeling	2.3.3.2	It will be important in the characterization and modeling of Storage Units 1 through 3 to consider the evidence that the aquifer materials are highly heterogeneous. Our thoughts during previous work for MWD were that historical debris flows are a likely mechanism for the formation of these aquifers. We've surely seen that areas such as where many of the MWD wells exist have pretty good yield, whereas not far away yields from other wells area considerably less. This aspect will also likely tie into the discussion that occurred during the meeting regarding the difference in groundwater-in-storage versus recoverable groundwater, i.e. Slade's 1991 estimate. How is this variability being addressed in the model?	TJ	Aquifer heterogeneity will be incorporated into the model to the extent that is required to match historical water level trends in the basin. Development of the model will begin using average values of aquifer properties within a given storage unit. Following the ASTM groundwater model development guidelines, Dudek will initialize aquifer properties using simplified, homogeneous property representations, and introduce zonal heterogeneity as is needed and evidenced by the model's ability to reproduce water levels. Dudek will incorporate, to the best of their ability, depositional setting and understanding when introducing higher levels of heterogeneity into the model. This approach is supported by data on aquifer properties that are largely collected by pumping a test well during development and measuring drawdown at that given well. These tests help characterize transmissivity and specific capacity at the test well, but do not provide information on the length-scales over which these properties are correlated.	Completed
TAC Member	9/16/2020	Steve Bachman	Geology	Figures 2-12 to 2-14	Cross Sections have different scales. Consider making same scale for consistency.	DP	Recommendation noted. Adjustment of the scales will be discussed and considered. The horizontal scale on Figure 2-14 can easily be adjusted to match Figures 2-12 and 2-13. Adjusting the vertical scale on all of the figures would require either eliminating some valuable information from the figures with the larger scales (e.g., Figure 2-12), or adding information that is currently unavailable to extend the scale on the figures with smaller scales (e.g., Figure 2-13).	Completed

Comment Source	Date	Commentor	Subject	Section, Page Number, Figure, Table	Comment or Issue	Addressed By	Response	Status/Notes
TAC Member	9/16/2020	Steve Bachman	Groundwater Modeling	2.3.3.2	How will groundwater-in-storage versus recoverable groundwater be defined/calculated? Will sea-level be used as a reference point?	TJ	Groundwater in storage will be directly computed from the model using calibrated estimates of storage properties, water levels, and basin geometry. The groundwater in storage calculations will provide an estimate of total groundwater stored within the principal aquifer, from land surface to bedrock. Recoverable groundwater will be defined based on the definitions of undesirable results for the basin, which will be addressed in Chapter 3 of the GSP. Sea-level as a reference point will be considered when defining minimum thresholds and measurable objectives for the basin.	Completed
TAC Member	9/16/2020	Rick Hoffman	Monitoring Wells	NA	Suggest targeting higher productive areas for monitoring wells.	DP, MN	Recommendation noted. The installation of new monitoring wells in the more productive areas of the basin will be considered during the well siting and design process. Note that the TAC will be consulted regarding the placement and design of the proposed monitoring wells.	Completed
TAC Member	9/16/2020	Rick Hoffman	Monitoring Wells	NA	Will provide recommendations on regional drilling companies that can construct multi-zone completion monitoring wells.	DP	Great, thank you.	Completed
TAC Member	9/16/2020	Rick Hoffman	Seawater Intrusion	NA	Age of wells to be considered. Suggest using wells with PVC casing vs steal for monitoring network, consider running video logs on wells in network to determine casing condition.	DP	Recommendation noted. The use of PVC for new seawater intrusion monitoring wells and completion of video logs in existing wells will be considered during development of the monitoring network.	Completed
Public	9/16/2020	Steve Slack	Streamflow Monitoring	NA	Requested being informed of locations and gage types when they are installed.	DP, MN	Mr. Slack and the general public will be informed of the locations and gage types installed when the work is completed. A description of the streamflow monitoring network and gage locations will likely be provided in report format. In addition, the project development will be presented at TAC and other public meetings prior to its implementation.	Completed
TAC Member	9/16/2020	Steve Bachman	Seawater Intrusion	2.2.4.3	Seawater Intrusion reference is confusing and should be reworded- refer to Loaiciaga section. As written in the draft the topic of seawater intrusion is referenced as currently occurring which has yet to be determined.	DP	As currently written, the Section 2.2.4.3 does not draw any conclusions, rather it presents the observations and hypotheses presented in previous published works which are speculative but inconclusive. As stated in Section 2.2.4.3, "additional monitoring at regular intervals and with adequate spatial coverage is necessary to establish whether seawater intrusion has occurred and to evaluate and adapt sustainability criteria related to seawater intrusion."	Completed
TAC Member	9/16/2020	Steve Bachman	Seawater Intrusion	2.2.4.3	Noted the advisability of using the northern-most well as an “ambient well” for comparison and it might be good to add another. (Staying within Storage Unit 3).	DP	Recommendation noted. The spatial coverage of monitoring wells will be considered during development of the seawater intrusion groundwater monitoring network.	Completed
TAC Member	9/16/2020	Rick Hoffman	Streamflow Monitoring	NA	Will the program be gaging surface flow only, or shallow sub-surface flow as well?	GSA	Currently, the plan is to design the streamflow monitoring program for monitoring surface flow only; however, monitoring of hyporheic zone flow will be discussed and considered prior to finalizing the streamflow monitoring program.	Completed
TAC Member	9/16/2020	Steve Bachman	Monitoring Wells	NA	Requested that the preliminary design of wells to be reviewed by the TAC.	GSA	Draft monitoring well design and construction details will be presented to the TAC for review and comment when available.	Completed
SAC Member	9/24/2020	Donna Senauer	General	NA	How long will the length of public comment period be for Chapter 2?	GSA	There are two different types of public comment timeframes. First there is a comment period for the public to comment on any element of the GSP. This is open as long as any GSP chapter is in draft. The second is a public review period for entire GSP, which will be 90 days once all the chapters of the GSP had been drafted, reviewed and compiled into a final administrative draft.	Completed
SAC Member	9/24/2020	Stan Roden	General	NA	What is the deadline for committee comments to current draft of GSP Chapter 2?	GSA	The GSA is requesting SAC comments on the Chapter 2 draft by the first week of October 2020.	Completed
SAC Member	9/24/2020	Donna Senauer	General	NA	Are comments preferred as verbal or in written form?	GSA	Comments are preferred to be received in written format via email, dropbox, or hard copy. An Excel spreadsheet will be created and used to track all meeting comments as well as comments on the draft of Chapter 2 of the GSP.	Completed
SAC Member	9/24/2020	Donna Senauer	Monitoring Wells	NA	What regulatory agencies handle permitting for these monitoring wells which only are meant to acquire "monitoring data"?	GSA	All monitoring wells that the GSA intends to drill will be permitted through County of Santa Barbara Department of Environmental Health Services, which is the regulatory agency for monitoring and producing groundwater wells. If the wells are located within the coastal zone, they may also require Coastal Commission approval.	Completed

Comment Source	Date	Commentor	Subject	Section, Page Number, Figure, Table	Comment or Issue	Addressed By	Response	Status/Notes
SAC Member	9/24/2020	Donna Senauer	Monitoring Wells	NA	Clarification on the difference between monitoring wells and producing wells and how it relates to the wells the GSA plans to drill.	GSA	Monitoring wells will not be permitted as extraction wells, and the GSA believes that monitoring wells will not be able to be converted to extraction wells for the life of the wells. GSA will confirm with Legal on this issue.	Completed
SAC Member	9/24/2020	Donna Senauer	Streamflow Monitoring	NA	Could the GSA use the one operational gage in the Basin	GSA, MN	Data from the existing stream gage on Montecito Creek monitored and maintained by the County of Santa Barbara will be used to the extent that the data are made available and are determined to be of use (e.g., of sufficient temporal resolution). Data being used for calibration of BNM.	Completed
SAC Member	9/24/2020	Donna Senauer	General	NA	Is the Groundwater Sustainability Parcel Fee proportional to acreage and, if so, recommends that this be more-widely publicized	GSA	Yes, the fee is proportional to the parcel acreage that overlies the groundwater basin. More information will be added to the GSA website on this subject.	Completed
SAC Member	10/5/2020	Donna Senauer	Land Subsidence	2.2.4.5	In some basins there are survey data of monuments collected by the County in some areas, so I am wondering if that type of data might exist for the MWD area?	DP	The location of existing survey monuments and continuous global positioning system (CPGS) stations operated by the County of Santa Barbara, UNAVCO, USGS, DWR, and NOAA were reviewed. There are no CPGS stations within or near the basin that can be used for monitoring land subsidence. Yes, the County has survey monuments, at least one of which is in the basin; however, there is currently no plan to regularly survey the monument as the risk for inelastic subsidence in the basin has been determined to be low.	Completed
SAC Member	10/5/2020	Donna Senauer	General	NA	Needs consistency with identifying acronyms with their associated description (am certain there will be an intro with equivalencies).	DP	An abbreviations and acronyms list will be included with the GSP.	Completed
SAC Member	10/5/2020	Donna Senauer	General	NA	Always reference the origin date of any Act etc. (i.e. Porter Cologne etc.).	DP	The origin dates of all Acts referenced in the GSP have been added.	Completed
SAC Member	10/5/2020	Donna Senauer	Jurisdictions	2.1	Need clarity on a descriptive where 'a 210 acre portion of the eastern edge of the City of Santa Barbara' lies.	DP, MN	Figure 2-2, Water Purveyors within and adjacent to the Groundwater Sustainability Agency Boundary shows where the City of Santa Barbara overlaps the basin. The complexity of the boundary does not lend itself to a narrative.	Completed
SAC Member	10/5/2020	Donna Senauer	Jurisdictions	2.1	'Coincident with' needs more clarity when described… coincident term should be actually 'one and the same basin' or 'interconnected'… i.e. the parameters of the boundaries are on 'paper only' for purposes of jurisdiction, particularly with the MGB coastal groundwater basin.	DP	Coincident in this context means 'occupying the same place or position,' meaning the basins share a mutual boundary.	Completed
SAC Member	10/5/2020	Donna Senauer	Regulatory	2.1.1.1	Santa Barbara County: no mention of EHS (division of County Public Health)as the permitting agency for the County for groundwater well development EXCEPT for well applications within the Coastal Zone… a Coastal Development Permit (CDP) is required FROM THE COUNTY and is a ministerial review from P&D…. NOT THE COASTAL COMMISSION. ONLY IF P&D denies or approves the groundwater CDP and there is an appeal, the appeal FIRST goes to the MPC for review, and if MPC action approves the appeal or denies, THEN the MPC decision, if appealed, goes on to the Coastal Commission for Substantial Issue determination review and de novo action etc. The Coastal Commission is NOT the originating approval/permitting authority for groundwater well development in the MGB Coastal Zone.	DP	Additional information on groundwater well permitting in the Coastal Zone has been added to Section 2.1.4.2, Groundwater Well Permitting.	Completed
SAC Member	10/5/2020	Donna Senauer	Private Water Companies	2.1.1.2	No mention that these private municipal water companies have been required to report extraction data and quality metrics to the State, County and MWD since their inception. Believe it is quarterly but could be monthly.	DP	See Section 2.1.4.3 for additional information on the requirements of water companies defined as public water systems. Information on private water companies in the MGB have been incorporated into the GSP where available. Single-Parcel and Multiple-Parcel/State Small Water Systems are regulated by the County.	Completed
SAC Member	10/5/2020	Donna Senauer	Monitoring Wells	2.1.2.1	Need clarity on if MWD is collecting data for 'all' MWD active/some inactive wells only or 'all' wells etc.. as it reads.	DP	Revised sentence so it reads: "Under its groundwater monitoring program, MWD has been collecting semi-annual, static groundwater levels for all active and some inactive MWD groundwater production wells since 1983, occurring each spring and fall for high and low season groundwater levels." Additionally, the sentence after provides clarification in the case it is unclear to the reader.	Completed

Comment Source	Date	Commentor	Subject	Section, Page Number, Figure, Table	Comment or Issue	Addressed By	Response	Status/Notes
SAC Member	10/5/2020	Donna Senauer	Water Use	2.1.3.3	When referencing 'per capita' use, must always state each time mentioned it is per capita PER DAY for consistency . Would be good to see if indoor (public health and safety) usage could be cited out from the total GPPPD).	DP, MN	Text has been revised to ensure "per capita per day" is used throughout GSP. Public health and safety usage is not directly relevant to the GSP and would be difficult to determine.	Completed
SAC Member	10/5/2020	Donna Senauer	Water Use	2.1.3.3	In Table 2-4, is the citation of Ag Deliveries referencing MWD non potable groundwater supply or other… is that in addition to MWD GW extraction metrics.	DP	Agriculture deliveries include water conveyed through the MWD system for agricultural use. Agriculture deliveries have been removed from Table 2-4 as they are not part of the MWD municipal supply portfolio.	Completed
SAC Member	10/5/2020	Donna Senauer	Water Sources	2.1.3.3	Should state why Jameson's production supply is diminished to 10% of MWD total production …. silting due to fires, debris flow etc., (and not economic to de-silt).	DP	Added following text to GSP: "due to naturally occurring reservoir siltation." Although wildfire has likely exacerbated natural siltation, conclusions cannot be made without including a reference or data.	Completed
SAC Member	10/5/2020	Donna Senauer	Water Sources	2.1.3.3	Again 'per capita' should include per day (GPD). Reference to GSI 2020 should be specified as the GSI(spelled out,). MWD Groundwater Augmentation Feasibility Study; also cite the MSD/MWD argumentation study 2017?). "7: 'With groundwater being an important LOCAL source(LOCAL should be added).	DP	Text has been revised to ensure "per capita per day" is used throughout GSP. Acronyms within citations are not defined in body text of GSP, but instead defined in References section. The appropriate references are currently cited in the GSP. Added the word "local" to the sentence to clarify that groundwater is an important local source of supply.	Completed
SAC Member	10/5/2020	Donna Senauer	Regulatory	2.1.4.2	This section should be integrated with the information in 2.1.1.1 (or at least provide a reference to this section). COSB EHS now in fact does bi monthly well application and status reports which includes location, depth and proposed use on its website… but not pumping capacity. 'MGB is not designated as critically overdrafted'… would add 'at this time' (there truly are no data/metrics that supports that it is not in an overdraft state…in fact the Loaiciga Report to the Coastal Commission 2015 does cite overdraft conditions.).	DP	Section 2.1.1.1 references Section 2.1.4. Added "at this time" to the sentence regarding MGB's status.	Completed
SAC Member	10/5/2020	Donna Senauer	Regulatory	2.1.5.1	Paragraph 4: first sentence: The MONTECITO Community Plan.. cite MGMO, MLUDC also which is found later in. Would include additional CDP/CDH permit requirements within the CZ .. Inland and CZ have different codes/regs. Groundwater Resource Section: last sentence should add 'gross groundwater supply……rather than just water supply.	DP	The abbreviation "Community Plan" is presented earlier in the text and used throughout GSP instead of the full name of plan. Additional language describing well permitting requirements in the Coastal Zone has been added to GSP. Unable to locate referenced sentence that describes groundwater supply. Page number needs to be provided in order to review sentence.	Completed
SAC Member	10/5/2020	Donna Senauer	Management Plans	Table 2-7	Goal 1: ..and to eliminate prolonged overdraft (delete prolonged). Goal 2: delete 'where feasible'. Goal 3: although MGB is not determined to be 'critically in overdraft', term 'seriously or prolonged overdraft' could be applied. Policy 2-3: "To be determined"?.	DP	All of the text in Table 2-7 that describes a "Goal" or "Policy" is verbatim from the referenced general and community plans. Therefore, it is not appropriate to modify the text.	Completed
SAC Member	10/5/2020	Donna Senauer	General	2.2.1.2	Temperatures 'within'.. should rather be in the vicinity of.'	DP	The sentence has been revised to read "in the vicinity of."	Completed
SAC Member	10/5/2020	Donna Senauer	Groundwater Levels	2.2.2	Date & citation needed for 'More recent groundwater elevation contour maps".	DP	The sentence has been revised to include a reference to Section 2.2.4.1, Groundwater Elevation Data, where the data and maps are described in greater detail. The groundwater elevation contour maps referenced were created as part of the data analysis associated with the GSP.	Completed
SAC Member	10/5/2020	Donna Senauer	General	NA	Paragraph 2: 'amsl' needs to be spelled out: Above Mean Sea Level) then going forward can be cited as AMSL.	DP	All references have been changed to msl, mean sea level. It is included in the acronyms list.	Completed
SAC Member	10/5/2020	Donna Senauer	Groundwater Levels	2.2.4.1	Paragraph 2: There should be a mention of the relationship of the increased amount of groundwater water well developments during the drought to the increased groundwater extractions… which is quantified by EHS data from 2007-2019.	DP	A description of groundwater extractions and the increase in the number of production wells in the MGB during the last drought is provided in Section 2.3.3, Outflow from Groundwater System. Section 2.2.4.1, Groundwater Elevation Data, is based on empirical data and focused on groundwater flow direction and changes in groundwater elevation over time.	Completed
SAC Member	10/5/2020	Donna Senauer	Seawater Intrusion	2.2.4.3	Paragraph 1: add and cite 'hydraulic head' descriptive. Last sentence: add many coastal aquifers globally as well as in the United States, west coast (cite examples: Salinas etc. etc.).	DP	Replaced "groundwater levels" with "hydraulic head" and added descriptive footnote with citation. Modified last sentence of paragraph to read "Seawater intrusion associated with groundwater overdraft has occurred to some degree in many coastal aquifers around the world, as well as the West Coast of the United States." Since this is an introductory paragraph to seawater intrusion in the MGB and not a review of seawater intrusion in all coastal groundwater basins, it is not appropriate to make assertations as to conditions in other basins.	Completed

Comment Source	Date	Commentor	Subject	Section, Page Number, Figure, Table	Comment or Issue	Addressed By	Response	Status/Notes
SAC Member	10/5/2020	Donna Senauer	Seawater Intrusion	2.2.4.3	Para 2: cite the 'several studies'; cite a 'few studies'. Be specific as to the referenced studies. STRIKE/ELIMINATE: ' THE RESULTS OF THE STUDIES THAT HAVE BEEN COMPLETED THUS FAR HAVE GENERALLY BEEN INCONCLUSIVE AS TO THE AREAL AN VERTICAL EXTENT OF SEAWATER INTRUSION, OR ITS OCCURRENCE AT ALL.' This statement is not supported by historical data, is not accurate and should not be included.	DP	Added in text citations for referenced studies. Because the studies on seawater intrusion that have been completed thus far have relied on limited empirical data, the general statement is accurate. The sentence states that at this time it is not known if seawater intrusion has occurred.	Completed
SAC Member	10/5/2020	Donna Senauer	Seawater Intrusion	2.2.4.3	Para 9: starting in sentence two: if these wells are MWD production wells, this citation and description needs to be added for clarity.	DP	Added text to GSP indicating that wells Ennisbrook 2 and 5 are MWD production wells.	Completed
SAC Member	10/5/2020	Donna Senauer	Groundwater Quality	2.2.4.4	Again, for well citations, indicate clearly if these wells are MWD production wells.	DP	Added text to clarify that the wells monitored by MWD are MWD production wells.	Completed
SAC Member	10/5/2020	Donna Senauer	Groundwater Quality	2.2.4.4	Summary of Groundwater Quality Standards Para 2: MCL reference: spell out at first citation with a footnote 19	DP	MCL is spelled out earlier in the GSP in Section 2.1.4.1 on pg. 2-19. A descriptive footnote is provided in Section 2.2.4.4 on pg. 2-68.	Completed
SAC Member	10/5/2020	Donna Senauer	Groundwater Dependent Ecosystems	2.2.4.7	Best for clarification in the following Ecosystems: clearly reference MWD production wells vis-a-vis private THROUGHOUT.	DP	Section 2.2.4.7 is planned to be revised to include a more robust analysis of potential GDEs. When the section is revised, clarification on well ownership will be included.	Completed
SAC Member	10/5/2020	Donna Senauer	Groundwater Dependent Ecosystems	2.2.4.7	Para 2: last sentence: identify which are the three units that are identified as potential GDE' that have NO WELLS in the vicinity.. again, is this MWD production wells or ANY wells.	DP	Section 2.2.4.7 is planned to be revised to include a more robust analysis of potential GDEs. When the section is revised, clarification on well ownership will be included.	Completed
SAC Member	10/5/2020	Donna Senauer	Groundwater Dependent Ecosystems	2.2.4.7	Sycamore Creek Tributaries -wells within 500ft …. How proximal exactly.	DP	Section 2.2.4.7 is planned to be revised to include a more robust analysis of potential GDEs. When the section is revised, clarification on exact distance to stream channel will be included.	Completed
SAC Member	10/5/2020	Donna Senauer	Groundwater Dependent Ecosystems	2.2.4.7	Para 2: 'bgs'. Define: Below Ground Surface….equivalent to 'Depth to Water' use one term or the other for consistency.... but not interchangeably.. if the equivalency is the same…. Also 'groundwater level measurements?? Too many descriptives used.	DP	Section 2.2.4.7 is planned to be revised to include a more robust analysis of potential GDEs. When the section is revised, use of a single descriptive for referencing groundwater levels will be considered.	Completed
SAC Member	10/5/2020	Donna Senauer	Groundwater Dependent Ecosystems	2.2.4.7	Oak Creek -again, which wells are the citations referencing: MWD or private	DP	Section 2.2.4.7 is planned to be revised to include a more robust analysis of potential GDEs. When the section is revised, clarification on well ownership will be included.	Completed
SAC Member	10/5/2020	Donna Senauer	Groundwater Dependent Ecosystems	2.2.4.7	San Ysidro 2nd para: three wells are private… not MWD…say so	DP	Section 2.2.4.7 is planned to be revised to include a more robust analysis of potential GDEs. When the section is revised, clarification on well ownership will be included.	Completed
SAC Member	10/5/2020	Donna Senauer	Groundwater Dependent Ecosystems	2.2.4.7	3rd para: there are 5 private groundwater wells on ONE property between Santa Rosa and the creek… newest added about 3 yrs. ago…would have to affect the health of the creek and groundwater …. The reference since '2012 is interesting MWD Amapola there too (which is in a resting state). -last sentence: vegetation health reference should include more than just the debris flow.	DP	Section 2.2.4.7 is planned to be revised to include a more robust analysis of potential GDEs. When the section is revised, an evaluation of the potential impacts of production from the wells located at the referenced property on GDEs will be included. Also, reference to measured NDVI and NDMI trends will be included in addition to impacts of debris flow.	Completed
SAC Member	10/5/2020	Donna Senauer	Groundwater Dependent Ecosystems	2.2.4.7	THERE IS A NEXUS of stream/creek to groundwater depletion from adjacent wells extraction.	DP	If empirical data are available that indicate there is a nexus between groundwater pumping and streamflow depletion, it will be included in the GSP. Currently, field data are limited so it is not appropriate to draw any conclusions as to the degree of stream-aquifer connectivity.	Completed
SAC Member	10/5/2020	Donna Senauer	Groundwater Extraction	2.3.2	Number of Groundwater Wells (add Estimated)	DP	The estimated current number of wells in the MGB is provided in Table 2-18.	Completed
SAC Member	10/5/2020	Donna Senauer	Groundwater Extraction	2.3.2	Table 2-18: 496 Private groundwater well count is not predicated nor supported on all available data.	DP	The estimated number of wells presented in Table 2-18 is based on all data and information available at this time, as described in Section 2.3.2. Well data and information is being updated with recently available data.	Completed
SAC Member	10/5/2020	Donna Senauer	Groundwater Extraction	2.3.2	Table 2-19: should cite Loaiciga 2015 report data (skipped from Slade to Dudek, leaving out Loaiciga).	DP	Loaicigia (2015) simply presents a summary of groundwater extraction estimates provided in previous studies. The extraction estimates presented in Loaicigia (2015) are included in Table 2-19.	Completed
SAC Member	10/5/2020	Donna Senauer	Seawater Intrusion	2.3.2.1	Delete second sentence: it creates bias that the Rincon Fault precludes significant seawater intrusion….	DP	The word "postulated" is included in the sentence to communicate to the reader that previous studies have hypothesized that the Rincon Fault is a barrier to seawater intrusion, but the studies have been inconclusive.	Completed

Comment Source	Date	Commentor	Subject	Section, Page Number, Figure, Table	Comment or Issue	Addressed By	Response	Status/Notes
SAC Member	10/5/2020	Donna Senauer	Figures	NA	Overall, consistency with legend identifiers would be most helpful… i.e. all MWD production wells same icon, same with monitoring wells…. Throughout….etc. etc.	DP	Use of consistent symbols on GSP figures will be considered.	Completed
SAC Member	10/5/2020	Donna Senauer	Figures	Figure 2-5	Indicate MWD wells (rather than just production wells)	DP	Section 2.1.2.2 and Table 2-2 provide information on wells monitored for groundwater production.	Completed
SAC Member	10/5/2020	Donna Senauer	Figures	Figure 2-20	Not sure what this is: Mosby and Neal identified… what are the other two… also indicate sub basins where they are located	DP	Figure 2-20 shows hydrographs for four key groundwater wells, one located in each storage unit. The T. Mosby and Neal well names are included in addition to their numerical identifiers. The other two wells (wells 2-2 and 4-4) are private wells monitored by MWD. The MGB subbasins are labeled and symbolized by the black line. See Section 2.2.4.1 for additional information.	Completed
SAC Member	10/5/2020	Donna Senauer	Figures	Figure 2-22	Identify AGF ABD ASF Distribution Station in the Coastal Zone Sub Basin #3.... understand this is from GEOTRACKER but does need a bit of further clarification if possible.	DP	See Section 2.2.4.4 and Table 2-15 for a description of the sites shown on the map.	Completed
SAC Member	10/5/2020	Donna Senauer	Figures	Figure 2-24	Legend at bottom needs more clarity in reference to: 64'. Groundwater Level (feet bgs) 1977 Year of last measurement….	DP	Each well on the figure is labeled with a groundwater level in feet below ground surface and date of measurement, which is what the legend is attempting to communicate. Edits to the figure legend so that it is more clear to the reader will be considered.	Completed
SAC Member	10/5/2020	Donna Senauer	Figures	Figure 2-26	What are the metrics for 'irrigated areas' what does that mean.	DP	See Section 2.3.1.5 for additional information. In summary, the map shows areas of substantial irrigation based on review of aerial imagery.	Completed
SAC Member	10/5/2020	Donna Senauer	Figures	Figure 2-29	Note if these are 'verified permitted wells'. Should be stated that this is an estimate rather than an exact count of all existing wells.	DP	As stated in Section 2.3.2, the total number of wells in the MGB reported in Table 2-18 and Figure 2-29 is an estimate.	Completed
SAC Member	10/6/2020	Donna Senauer	Metering	NA	MWD had a water meter moratorium in place for xxxxx amount of years which contributed to the increase in water well drilling and development during those drought years.	MN	Information on the water meter moratoriums of 1973 and 2014 has been added to Section 2.1.3.3.	Completed
SAC Member	2/9/2023	Cheryl Trosky	Chapter 2	2.1	Chapter 2.1 raises more questions than it answers. The Draft accurately noted the California Department of Water Resources established Montecito Groundwater Basin as a very low priority basin. It mentions the MGB priority was changed but does not give a reason for the DWR change from very low to a medium priority basin. The subsequent MGB status change to a medium priority basin was by request of the Montecito Water District Board. In response to this request DWR reprioritized MGB to a medium priority basin thereby necessitating the formation of a Ground Water Sustainability Agency funded by taxpayer dollars costing $2.4M annually. Currently the document mentions there was a change in priority but needs to detail what precipitated the change. The Draft, in many locations, documents the projected 50-year GSP model along with historical data determines the MGB is stable with no indication of over drafting or undesirable results. It is assuring to note that after years of in-depth analysis, studies, monitoring and considerable expenditure the MGSA confirms DWR's evaluation from the outset. Armed with this information the MGSA decided mandated metering of wells be a possible future project, if warranted, but not a baseline project. Yet mandated well metering is referenced in 3.5.2.1.4, 3.5.7.2 and in chapter 44-2, 4.2.2. The January 30, 2023 GSA Finance Committee	GSA, MN	Comments noted.	Completed
SAC Member	2/9/2023	Cheryl Trosky	Figures		Chapter 3, figure 3-2 should be accompanied by a graph from an earlier presentation detailing three management action thresholds. This	GSA, MN	Several draft scenarios were examined toward selecting appropriate SMCs. It is not appropriate nor possible to include information on all potential scenarios. Not included.	Completed
SAC Member	2/9/2023	Cheryl Trosky	General		Why are the MWD wells exempt from the rules imposed on private wells?	GSA, MN	As producers of potable water for a public water system, the MWD wells are subject to more stringent requirements than those for private wells. In addition, they are subject to the same requirements through the GSP.	Completed

Comment Source	Date	Commentor	Subject	Section, Page Number, Figure, Table	Comment or Issue	Addressed By	Response	Status/Notes
SAC Member	2/9/2023	Cheryl Trosky	General		It would be helpful to have a definition of the acronyms.	GSA, MN	An acronym table will be included in the Admin Draft.	Completed
SAC Member	2/9/2023	Cheryl Trosky	Chapter 2		There is a typo in chapter 2 on 2-77 third paragraph, second sentence reads 'sweater' and I think it might mean seawater?	GSA, MN	Corrected.	Completed
TAC Member	2/21/2023	Steve Bachman	Chapter 4	4.1.5	Groundwater modeling: It is not clear exactly what will be performed and when during a model update. From the budgeting, it looks like a single update in the first 5 years. Is that "update" a recalibration of the model using the new data (a larger task, but worth the effort), or is it simply to run the model using the new data and see how well it matches reality (more of a verification, lesser effort), The section on Circumstances for Implementation says that the model will be "updated" as new data become available; because new monitoring data become available all the time, this doesn't make any sense. I think you want to say once during first 5-year period.	TJ	Revised language in Section 4.1.5	Completed
TAC Member	2/21/2023	Steve Bachman	Chapter 4	4.1.6	Well Database: Confidentiality is always a concern when private wells are involved. It is possible to keep parts of the database confidential (this has been done for years in Ventura County where the well databases are extensive — thousands of wells). It is not helpful to basin management to just exclude confidential information from the database as stated in the Legal Authority section, It can just be excluded from public documents.	GSA, MN	Section updated to clarify that confidentiality will be maintained including in publicly available databases.	Completed
Public	3/27/2023	Glyn Davies	Multiple	Multiple	Refer to Letter, Appendix D, Page D-9	GSA	See Attached Letter and GSA Response dated 5/8/2023	Completed
Public	3/31/2023	Gregg Zachritz	Funding	Chapter 5	It seems to me a parcel tax does not capture the outsized impact parcels with private wells have on ground water sustainability. Consequently, the owners of such parcels should shoulder an outsized share of the costs. I understand that larger parcels pay a larger parcel tax, but that tax remains the same whether they have a private well or not. I'm looking for something along the lines of a "private well tax". The costs should be shared equitably, not equally.	GSA	The Montecito GSA Groundwater Sustainability Fees adopted in 2020 are for the purposes of funding the costs during the first 5 years of GSA operations, including development of the regulatorily required Groundwater Sustainability Plan. Future changes in fees would be established by a subsequent cost of service study and public notice process, likely to be conducted during 2024 if new fees were to be implemented in 2025. That may be when your comment would have most relevance, as the current fee schedule is set. Please feel free to comment again in the future, particularly if/when a new fee schedule is being considered	Completed
Public	4/5/2023	John Watson	Multiple	Multiple	Refer to Letter, Appendix D, Page D-15	GSA	See Attached Letter and GSA Response dated 5/8/2023	Completed

Comment Source	Date	Commentor	Subject	Section, Page Number, Figure, Table	Comment or Issue	Addressed By	Response	Status/Notes
Public	5/15/2023	Glyn Davies	Multiple	Multiple	Refer to Letter, Appendix D, Page D-29	GSA	In response to 2.b on Page 3 of your comment letter: The MWD Urban Water Management Plan includes a normal year, single year, and multi-year drought risk assessment as prescribed by DWR. DWR requires a 5-year drought risk assessment, which is dicussed further in the UWMP. The GSP does not assume a single dry year in its future availability and demands, please refer to Section 2.3.5.3.1 for additional information on future simulated climate conditions.	Completed

Received by MB GSA via Email 3/27/2023

Nick Kunstek

Groundwater Specialist

Montecito Groundwater Sustainability Agency

Nick,

Before discussing my observations and comments on the GSA/GSP I want to thank and recognize the hard work and concerted effort put forth by the board and staff of the GSA. Without such hard graft the report, currently under review, would not be the extensive and comprehensive report that currently exists for the community's review.

Having said that I see no benefit in understating my concerns. Without some revisions the plan will be fatally flawed and will not accomplish the goal for which you all have worked so hard. Having been so critical, I believe it is incumbent on me to first state my observations and concerns clearly and then propose solutions.

Why is the plan fatally flawed.

1. It is has long been recognized in business and governmental management that 'if you cannot measure **IT,** you cannot manage **IT**.' The present plan has no ability to accurately measure freshwater withdrawals versus incoming freshwater renewable volumes to the Montecito Groundwater Basin.
2. The present plan reveals no effective plan to **manage or measure** the extraction by any person (stakeholder) who chooses to independently access the groundwater which is owned by all stakeholders. In my view a stakeholder is any person residing in Montecito whether an owner or temporary renter of the smallest studio apartment.
3. Any stakeholder can presently access the Montecito Groundwater Basin and **withdraw any amount** of the 'community owned' freshwater for whatever reason. There exists the famous example of the 'Tragedy of the Commons' in the United Kingdom. Historically each village had a sizeable plot of land, generally near the village centre, where if a sheep or cattle farmer needed to graze his or her livestock, should some unforeseen tragedy on their own grazing land occur, they were permitted to use the 'commons'. Thus, saving their livestock until their own grazing land was restored. Unfortunately in many villages the farmers first used the common land in order to preserve their own perfectly usable land. Thus, when the 'commons' were critically needed by a farmer, due to misfortune, they were already overgrazed, and a tragedy occurred for that farmer. Due to the ability for some stakeholders to

independently withdraw unlimited, and unmeasured, quantities of water, and for the Agency, as part of the current GSP, to not have the ability to measure and regulate those groundwater withdrawals of the Montecito groundwater basin we may likely experience own 'tragedy of the commons'.

4. The United Nations World Water Development Report of 2022 states, 'unlocking the full potential of groundwater will require strong and concerted efforts to manage and use it sustainably. And it starts by making the invisible visible.' **The current plan keeps the invisible-invisible**.

How can the GSB become a plan that will avoid the above fatal flaws?

1. The same United Nations Report of 2022 also states, **'in the absence of any form of community or government control it is unlikely that an optimal combination of groundwater services will develop in a given area and that all inhabitants will share equally in the benefits of the groundwater.'** One can assume that a family in a rented or small workers cottage is using tens of thousands of gallons, perhaps hundreds of thousands of gallons, less water annually than a family of four living on large acreage surrounded by lush green grass. That is not equitable sharing of the benefits of the Montecito groundwater along with the appropriate proportional costs of such water.
2. The Groundwater Sustainability Agency has the legal authority to require meters on **all** private wells.
3. The Groundwater Sustainability Agency **has the legal authority** to stop or at a minimum, manage the drilling of new private wells.
4. The United Nations Report also states that "causes of overuse include **'open access' and a lack of a level playing field**." In my analysis the current draft of the GSP is flawed for this and other reasons.
5. The United Nations report states the obvious, 'long-term groundwater storage depletion occurs when groundwater discharge exceeds groundwater recharge.' **Without the ability measure** the groundwater depletion by existing or future unregulated and unmeasured wells this is an obvious risk to all stakeholders.
6. Then there is the **community support required** to make any potential plan effective and successful. I have not spent any time or effort to garner support for my personal views; however, I can assure you that there are a considerable number of residents who are not comfortable with the current policies regarding wells. Currently, they are in my opinion the silent majority, but if and when the inevitable Montecito water crisis occurs in the future, and if you move forward without solving the '**measuring problem'** they will likely not remain silent and the GSP and the GSA will legitimately come under attack.

It is with my best wishes for a successful and effective GSP that I submit these observations,

Glyn Davies

BS, MPA

Montecito Groundwater Basin
Groundwater Sustainability Agency

BOARD OF DIRECTORS:
Brian Goebel, President
Ken Coates, Vice President
Cori Hayman, Director
Floyd Wicks, Director
Tobe Plough, Director

General Manager
and Board Secretary:
Nick Turner

5/9/2023

Glyn Davies

Re: Comments on the Draft Groundwater Sustainability Plan

Dear Mr. Davies,

This letter is in reply to your comment letter submitted on March 27, 2023, regarding the Montecito Groundwater Basin Groundwater Sustainability Agency's (Montecito GSA) Draft Groundwater Sustainability Plan (GSP).

First, thank you for providing comments and taking an active role in the development of the GSP. On behalf of the Montecito GSA, we wanted to provide a written response to your communication of March 27, 2023. While an attempt has been made to address your main points, please receive this as an open dialogue. Our goal is to provide clarifying information and we recognize that the discussion may be ongoing.

With regard to your letter, it seems that the focus is suggesting that the GSA could do more with regards to measuring groundwater extractions through metering wells.

Please note that:

- The GSP does include a current project to enhance the groundwater well database by creating a groundwater well registry (Section 4.1.6). This project involves the development of a groundwater well registry that contains relevant information on groundwater wells in the Montecito Groundwater Basin (MGB), including location, owner contact information, well activity status, extraction data or estimates, and localized geology. Participation in the registry will be required of all wells within the MGB.
- The GSP also includes a Possible Future Project to Require Well Metering (Section 4.2.2). This possible future project would require installation of well meters on all non-de minimis groundwater extraction facilities to measure and report extraction volumes within the MGB [Water Code Section 10725.8]. The GSA is not authorized to regulate de minimis users, those extracting less than 2-acre feet per year for domestic purposes. More information on this project can be found in Section 4.2.2 of the GSP.
- The Montecito GSA is not pursuing mandatory well metering at this time based on current and modeled future conditions of the MGB which indicate that no undesirable conditions are occurring, nor are they forecast to occur.

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- The GSP, in accordance with SGMA, provides for ongoing monitoring of sustainability indicators to identify the potential or likely onset of undesirable results, including significant and unreasonable reduction in groundwater in storage and lowering of groundwater levels. Specific projects and management activities are designated for implementation as additional information becomes available and conditions warrant. Note that nothing in SGMA allows for the alteration or override of existing property rights associated with groundwater use.
- The topic of requiring well metering was discussed at length by the Montecito GSA at numerous Advisory Committee and Board of Directors meetings over the course of GSP development. (All previous meeting materials are available on the Montecito GSA's website here: www.montecitogsa.com)
  The permitting of new groundwater wells in the MGB is under the jurisdiction of Santa Barbara County (County). More information on this and the relationship between the Montecito GSA and the County can be found in Section 2.1.4.2.

Regarding the need for additional measuring, it is important to recognize that considerable data has been collected and modeled to support the GSP and Montecito GSA's current understanding of the MGB. Data is available from numerous sources and both historic and expanded monitoring programs will continue as an integral part of the GSP. This data will be used to assist in updating the GSP as groundwater conditions change in the future. More information on data used in creating the GSP and the GSA's monitoring efforts can be found in Section 2.2.1, 3.5, and 4.1.

Additionally, extensive **Estimating of Groundwater Extractions** has been performed attendant to the development of the GSP. Historical groundwater extractions were estimated for the period from water year 1950 through 2019 as part of this GSP development and were designed to estimate extraction volumes on a well-by-well basis. Below is a summary of this process; more information on this can be found in Section 2.3.3.1:

- A detailed review of District records, the Santa Barbara Environmental Health Services' well completion report database, and the California Department of Water Resources well completion report database was performed to identify wells that might be constructed and active within the MGB boundaries.
- The estimated groundwater extraction rate at each well was calculated by computing the difference between the parcel's estimated irrigation demand and Montecito Water District's estimated delivery to each parcel.

Groundwater well extraction estimates will be updated and enhanced as the GSP is implemented. The GSP is subject to annual reporting and periodic 5-year evaluations and may be modified as necessary to address changing conditions.

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In summary, the Montecito GSA describes itself as being “data driven” and the proposed Baseline projects (Section 4.1) all contribute to increasing the knowledge about the MGB extractions, and other factors over time. The goal is to continue to take incremental actions, as needed, to protect this important source of water for all stakeholders.

Again, thank you for your comments and participation in this process.

Sincerely,

Nick Turner
General Manager

CC:
Brian Goebel, Montecito GSA President
Nicholas Kunstek, Groundwater Specialist

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JOHN WATSON

To: Nick Turner and Nick Kunstek
Montecito Groundwater Sustainability Agency
583 San Ysidro Road
Montecito, CA 93108

RE: Comments on the DRAFT Groundwater Sustainability Plan

Date: April 5, 2023

Dear Nick,

I believe that the Draft Montecito Sustainable Groundwater Plan (PLAN) has left about $4,250,000 PER YEAR on the table…

Before I make specific comments, let us remember that the State of California "owns" all of the surface and groundwater in the State, and as such, has a right to mandate types of and quantities of use of "its" water as evidenced by the fact that they required this PLAN to be prepared.

I would like to compliment you and Dudek, the consultant that the Montecito Groundwater Sustainability Agency (MGSA) hired to do the research and number crunching for the PLAN, for providing a thorough and comprehensive technical report. Technically Remarkable.

However, I believe that by myopically following the Department of Water Resources' (DWR's) *Groundwater Sustainability Plan (GSP) Annotated Outline*, the MGSA has employed a paradigm (approach, assumptions and attitude) that "legalizes" the existing well owner's uses, and quantities of use for at least the next 50 years, the time horizon mandated by the DWR.

WATER WASTE

This paradigm ignores the State's PURPOSE requirements delineated in the *Sustainable Groundwater Management Act* (SMGA), codified in California Water Code Section 10720.1:

> *(b) To enhance local management of groundwater consistent with rights to use or store groundwater* ***AND SECTION 2 OF ARTICLE X OF THE CALIFORNIA CONSTITUTION***. (Emphasis added)

This section of the State Constitution states (in part):

> *It is hereby declared that because of the conditions prevailing in this State the general welfare requires that the water resources of the State be put to beneficial*

*use to the fullest extent of which they are capable, and that **THE WASTE** or unreasonable use or unreasonable method of use **OF WATER BE PREVENTED*** (Emphasis added*)*

While the definition of water "Waste" is not defined in State Law, at the same time that the SGMA was launched by Governor Brown's 2015 Executive order B-29-15, he also mandated a "refresh" of the Water Efficiency Landscape Ordinance (WELO) [Footnote 1] found in Title 23 of the California Code of Regulations (CCR), the same section of the CCR that deals with the specifications for this PLAN. It states (in part):

23 CCR § 490 Purpose

(b) Consistent with the legislative findings, the purpose of this model ordinance is to:

*(4) use water efficiently **WITHOUT WASTE** by setting a Maximum Applied Water Allowance as an upper limit for water use and reduce water use to the lowest practical amount.* (Emphasis added)

In the PLAN's Appendix F, *Table F-4, Land Use Type and Corresponding Water Use Factors Used to Estimate Private Well Extractions in the MGB*, Dudek uses 3.38 Acre Feet per Acre per Year for all Residential Irrigated Land Types in its calculation of water use by well extractors for the Future Water Budget. This number must accurately represent the actual current use, or all other calculations as to Basin usage would be wrong. In sharp contrast, WELO's Maximum Applied Water Allowance (MAWA) is only 2.0 Acre Foot per Acre per Year. (See Footnote 2)

Therefore, the PLAN reveals that on an aggregated basis, private well use is 69% higher (3.38 AFY vs 2.0 AFY) than the State of California's upper limit before usage becomes wasteful. I would expect a discussion of this "overage" and potential "Actions" to reduce usage in the PLAN, but the PLAN goes in exactly the opposite direction. In Chapter 4:

4.2 POSSIBLE FUTURE PROJECTS AND MANAGEMENT ACTIONS
4.2.1 Develop/Acquire Supplemental Water for Well Owners
"This project would provide an alternative and/or supplemental source of water supply to well owners to achieve a reduction in groundwater use when the existence of undesirable results are determined to be imminent, acute, or chronic."

In other words, when the well owners have so severely over used the groundwater to the point that the groundwater basin is subject to "undesirable results" (e.g. saltwater intrusion, land subsidence, etc.) , the MGSA would provide the well extractors additional water so that they can continue using the same quantity of water that caused the problem in the first place, without restriction… REALLY?

Where is the discussion of Waste? Where are the Actions to reduce/eliminate Waste? It is true that the State is currently developing specific time targets for implementing State Water Code

10609 et.seq. (based on WELO) that is addressing this very issue, but being mute on this at this time gives the well extractors a "pass" and in my opinion misinforms the community.

MONEY

This is probably the real reason private well extractors cherish their wells !

Since it is impossible to know the actual cost of extracting water from each of the private wells, I am using Montecito Water District's (MWD) well water cost found in their 2020 *Montecito Water District Water Cost of Service and Rate Study*, (PDF 49) which is $1.79 per Hundred Cubic Feet (HCF).

The PLAN states in Chapter 2 (PDF 110) (in part):

> *These estimates of irrigable area were combined with the water use factors to generate estimates of total water demand for each parcel containing a groundwater well. The estimated groundwater extraction rate at each well was calculated by computing the difference between the parcel's irrigation demand and MWD's estimated delivery to each parcel.*

For the Rate used by MWD customers, I used Residential Tier 3 rate of $12.31 per HCF from the *Water Rate Study*. (Note: this may be overstating the price somewhat, but given that Tier 2 pricing is just barely lower at $11.14 per HCF and the given that the MWD's well extraction cost is probably higher than for privately owned wells (Government cost is never cheaper than private cost (not as a criticism, but as an observation)), I felt using this cost was appropriate. Also, since there was some "non residential" use, e.g. golf courses, and given that Residential Tier 2 and 3 are the only "irrigation" focused rate, I used it for all irrigation usage.

Therefore, the cost **savings** for well water is:

$12.66 - $1.79 = $10.87 SAVINGS per HCF
AND/OR
$1.79/$12.66 = 14% of the MWD water cost.

(See Footnote 3)

The Plan goes on to state in Chapter 2 (PDF 110):

> ***Private well extractions*** *steadily increased from 1970 through 2014, averaging approximately 340 AFY in the 1970s and 900 AFY between 2000 and 2014 (Table F-5).*
> (Emphasis Added)

(See Footnote 4)

Using the 2000 to 2014 AVERAGE of 900 AFY we get:

(12.66-1.79) * (900 * 435.6) = **$4,261,475** PER YEAR

In Table F-5 (Appendix F, PDF 165) *Groundwater Extractions from wells located within the MGB,* we see that in 2014 *Estimated Extractions (Acre-Feet)* for 364 private wells was 1014 AFY, so we get a slightly higher "savings" for the well owners:

(12.66-1.79) * 1014 * 435.6 = **$4,801,262** PER YEAR

As an example, for a parcel with 1 acre of IRRIGATIBLE landscape area, the monthly cost using private groundwater is:

1 acre x 3.38 AFY x $1.79 per HCF x 435.6 HCF per AF = $2,635.47 Per Year
Or $219.62 per month

And for MWD water =

1 acre x 3.38 AFY x $12.66 x 435.6 HCF per AF = $18,639.67 Per Year
Or $1,553.31 per month

This very low water costs fully explains why it is so easy for "wasteful" use to occur. And yes, well extractors have initial drilling costs, but these are quickly amortized given the substantial cost savings.

FOR THE PUBLIC WELFARE

The same provision of the State Constitution goes on to say (in part):

> *… and that the conservation of such waters is to be exercised with a view to the reasonable and beneficial use thereof* ***IN THE INTEREST OF THE PEOPLE AND FOR THE PUBLIC WELFARE***. (Emphasis added)

In Chapter 2, Table 2-5 *Summary of Land Use in the Plan Area* (PDF pages 32/33) we find that the total number of Parcels within the boundaries of MGSA is 4,381, but when "Undeveloped and Public Service Infrastructure Parcels" are subtracted out, we end up with 4,373.

Since some wells service more than one parcel (small water companies) and some parcels have more than one well (I assume given that Table 2-8 (PDF 53) states that there are 3 golf courses within the PLAN area and other large parcels may also have more than one well), it is impossible at this "draft stage" to know exactly how many parcels benefit from well water. But assuming (on average) one well serves one parcel:

364/4373 = 8.25% of the total parcels enjoy the lower cost well water

Can anyone conclude that the exclusive use of 900 AFY of this precious resource used by just 8.25% of the total parcels is "IN THE INTEREST OF THE PEOPLE AND FOR THE PUBLIC WELFARE"?

The PLAN does not discuss this either…

And a final thought on MONEY. In the PLAN's Chapter 5, (PDF 5) we find:

> *The MBGSA's 2020 5-year fee schedule establishes the parcel fee by year and is collected semiannually on the County of Santa Barbara property tax roll* ***FOR ALL PARCELS*** *that reside over the MGB.* (Emphasis added)

In other words, 100% of us pay for the MGSA, with 8.25% as primary beneficiary…

INCREASED STORAGE

California Water Code 10720.1 also includes:

> *(g) To increase groundwater storage and remove impediments to recharge.*

In MWD's October 2022 QUARTERLY DROUGHT AND WATER SUPPLY UPDATE (PDF 3) states (in part):

> *Groundwater levels are declining due to consecutive years of below average rainfall and are approaching the historic local level reached in 2016.*

AND in the PLAN's Chapter 2 (PDF 114)

> *Throughout the 45-year historical record, the MBNM estimates that groundwater in storage declined by an average of approximately 130 AFY (Table F-2).*

And most recently, in the Montecito Water District Memorandum Section 5-C dated October 25, 2022 (PDF 58) (in part):

> *Water use above budget is occurring across most customer classes with the most significant variance occurring within the residential customer class. The reason(s) for the elevated use remains uncertain but is thought to be attributed to consecutive year of below average rainfall, a historic dry first quarter of 2022, and/or* ***PRIVATE WELL USE DECREASGING DUE TO DECLINING GROUNDWATER LEVELS****.* (Emphasis Added)

In other words, after overusing the groundwater, well extractors are retreating to the MWD at the time when it is under the greatest stress. They don't want to pay the costs delineated in Footnote 3 to maintain the system, but they want to use it as they wish when "times are toughest".

There is nothing in the PLAN that either places limits on existing usage or on drilling new wells and it is only reasonable to assume that greater use will occur, exactly in contradiction to "increase storage".

While nobody knows, one of the predictions for climate change is “wetter wets and drier dries”. In order to prepare for this possible scenario, additional storage space is needed “somewhere”. One approach is a new above ground reservoir that would cost billions, take forever to get approved and built, and is subject to significant evaporative loss. Or another approach is using the Montecito Groundwater Basin which would cost little to implement, needs no approval, and is not subject to evaporative loss.

And the PLAN does not discuss this either.

DWR requires the development of “future scenarios”. The first extends the current rain patterns into the future and the second uses DWRs prediction of rain patterns which are actually wetter than current conditions. I believe it is only prudent to assume a climate scenario that has less rainfall – perhaps a mirror image of DWR’s “wet future”, just in case... This is not considered in the PLAN either.

FUTURE ACTIONS

I believe the use of Montecito Groundwater Basin should be at an inflexion point. Do the 4,831 parcels in the GSA plan area accept/endorse the DRAFT PLAN that overwhelmingly favors 8.25% of the overlying parcels by granting them exclusive use of 900 AFY of the State’s water meant for ***THE INTEREST OF THE PEOPLE AND FOR THE PUBLIC WELFARE*** for the next 50 years, or should ALL of overlying parcels enjoy the benefits of this water?

I am sure that the 8.25% will be extremely unhappy with the following, but I see no other alternative to satisfy “IN PUBLIC INTEREST”. A community discussion is sure to ensue where perhaps a better idea emerges.

The Sustainable Groundwater Management Act (in part):

> *10726.2.*
> *A groundwater sustainability agency may do the following:*
>
> *(d) Perform any acts necessary or proper to enable the agency to purchase, transfer, deliver, or exchange water or water rights of any type with any person that may be necessary or proper to carry out any of the purposes of this part, including, but not limited to, providing surface water in exchange for a groundwater extractor’s agreement to reduce or cease groundwater extractions. The agency shall not deliver retail water supplies within the service area of a public water system without either the consent of that system or authority under the agency’s existing authorities.*

Given the benefit that would be enjoyed by ALL overlying parcels, I see no alternative other than “transferring” the water to the MWD (or MGSA to overcome the possible legal challenge who would then enter into an agreement with the MWD to manage this water) for management and distribution to all of the overlying parcels. (Yes, there is a slight difference in boundaries between the MWD and the MGWB and an accommodation would need to be found to fairly treat those parcels) This should lower the cost of water to all, except the current well extractors of

course, increase storage, strengthen our water security and ensure the water is used IN THE INTEREST OF THE PEOPLE.

Assuming these transfers occur, providing the necessary infrastructure for the 900 AFY (pipe size, pumping capacity, treatment capacity, etc.) will take a while - perhaps 5, 10 or even 15 years. But even so, the long term benefit is overwhelming.

Many may conclude my interests lie in imposing undesirable restrictions, taking away water rights, needlessly restricting personal freedom, and promoting "living small". NO! My interests lie in equitable access for an extremely valuable community resource.

In all of the State Law/Regulations I have reviewed, I only see references to surface water and groundwater, but never to Desal. I don't believe the State has any say on the use of Desal water, including the regulations of usage found in WELO. If the MWD establishes a WELO based water rate pricing structure that includes a Top Tier containing only Desal water, I believe the State would have NOTHING TO say whatsoever on this Top Tier and "living large" would be unchallengeable. Curiously, Landscape Architects inform me that WELO compliance is fairly simple to achieve for large parcels (assuming that the entire landscape is not high water using plants), but that small parcels have trouble qualifying given that WELO balances a "proportion of use" between Very Low, Low, Medium and High (e.g. grass). These smaller parcels often want enough grass for their children to play; an area often exceeding the 25% +/- of high water use (grass) found in a typical WELO calculation. To address this, I have included an EXCEL spreadsheet that can be explored to see how a suggested rate structure would allow this. See Footnote 5 and the included WELO spreadsheet.

Given the large price jump for the 8.25% (and the probable reduction in water use because of this "higher cost"), it would not surprise me if the MWD ends up with "too much" water. This "excess" water could be retained in the Basin, providing the increased storage described above.

In Summary, these "Actions":

1) Eliminates waste of "State Water", yet provides a path for those wanting more,
2) Ensures that all available water is "for the public interest", and
3) Increases storage for drought preparedness.

Water Section 10720.1 is satisfied.

CONFLICTS OF INTEREST

The Fair Political Practices Commission administers the conflict of interest provisions for government officials in California. On their website it says:

> *Under the Act, a public official has a disqualifying conflict of interest in a governmental decision if it is foreseeable that the decision will have a financial impact on his or her personal finances or other financial interests. In such cases, there is a risk of biased decision-making that could sacrifice the public's interest*

in favor of the official's private financial interests. To avoid actual bias or the appearance of possible improprieties, the public official is prohibited from participating in the decision.

I have no idea if any of the GSA Board of Directors has a water well, but given the substantial amount of money involved in any decision on groundwater, I believe this issue should be reviewed by the GSA Board and appropriate action taken.

CONCLUSION

Nick, I apologize for the length, complexity, heavy reliance on numerics, and the citing of State Law/Regulation in this missive. I hope they show this Comment Letter is not simply opinion, but a well considered, holistic and equitable consideration of the PLAN rooted in the paradigm suggested/mandated by Water Code Section 10720.1.

Thank you.

John Watson

Footnote 1:
WELO has become the "go to" standard for outdoor water use for urban water users in the State Regulations:
1) Currently, landscape projects with greater than 2,500 sq.ft. are required to apply this standard regardless of water source (i.e. water district, surface water, groundwater, or any combination) in order to get a building permit.
2) In the PLAN's Chapter 2, *Groundwater Extraction Estimates* (PDF 109-111), the entire calculation method used for calculating the current water use is based on the DWRs "irrigated" land estimates developed by Quantum Spatial, Inc.
3) Quantum Spatial, Inc. was hired by DWR to document the irrigated area of each partial in the state. Water use targets are then derived using WELO. All from State Water Code 10609.6 *Urban Water Use Objectives and Water Use Reporting*, which the MWD is currently implementing.
4) It should be noted that these Targets apply to ALL parcels using water district water AND groundwater. Given that the MWD has not had information on groundwater use until now when it has reported its usage vs its DWR target, the MWD has "looked good". Perhaps adding the 900 AFY used by private extractors should be included in the MWDs reporting to tell the whole truth about water use within its district boundary. And symmetrically, perhaps the Desal usage should be subtracted out…
5) For the un-initiated, WELO can be daunting. To assist in demystifying WELO, I have included an Excel Worksheet that does all of the calculations for the user. It still requires knowledge of a plants water usage (Very Low, Low, Medium, or High Water use), and it requires a correct area calculations for each. Generally speaking, if high water using plants (lawns most tropical plants and many ornamental flowering plans) is around 25%,

the WELO requirements for water use will be met. Please note: in the Spreadsheet, only "green" cells will accept data AND this worksheet is in a "BETA", so there may be errors, I don't think so, but maybe.
6) Most of the user input is done in Column "O" on Rows 27 through 45. The primary benefit for you is in Section F, where the price of water is revealed based on assumptions discussed above for A) well extractors, B) current MWD water users, and C) a suggestion of how a WELO based rate structure could be constructed, although the exact "break points" and pricing levels need far more investigation if this approach is adopted.

Footnote 2:
WELO's Maximum Applied Water Allowance (MAWA) per acre (using Dudek's Evapotranspiration calculation of Eto of **43.95** (chapter 2 page 59), **.55** for the "Residential Eto Adjustment Factor", **.62** for the Conversion (converting from Acre Inches to Gallons) and **43,560** (the number of sq.ft. in one acre) is:

"Eto" x "ET Adjustment Factor" x "Conversion Factor" x "Area"

43.95 x .55 x .62 x 43,560 = 652,832 GALLONS per Year, which equals 2.0 AFY.

Footnote 3:
To be fair, the costs for "irrigation only" groundwater and MWD "potable" water need to be examined:

1) Private Groundwater for irrigation includes pumping expense, and maybe (but not certainly) minor treatment.
2) MWD "potable" (i.e. drinkable) water includes:
   A) Cost of water ranging from $0.51 to $8.00 per HCF (from MWD Rate Study)
   B) Treating the water to ensure its safety for drinking
   C) Pumping the water to its destination
   D) Providing "Peeking" capacity to meet highest usage demand (hottest hour of the hottest summer day)
   E) Administrative Costs (Personnel, facilities, trucks, etc.)
3) So the "Savings" discussed here will not fully accrue to MWD customers if 100% of this water becomes available to the MWD because we must pay for Items B through E in addition to basic cost of water.
4) The MWD customers will benefit because the groundwater cost is on the lower end of the water costs available to the District AND because the Administrative Costs will be distributed across a larger number of delivered water so the per unit cost will go down and if properly distributed, the MWD rates will go down.

Footnote 4:
The PLAN indicates that in some areas of the MGB, one groundwater basin "sits on top of" another groundwater basin. The numbers I used are for extractions for BOTH basins (someone's well is deep enough that they can draw water from both basins…) So both the 900 AFY and 1014 AFY account water extracted from both basins even though the MGB is only the "top" basin.
ALSO: AFY means Acre Feet per Year and the "435.6" converts AF to HCF.

Footnote 5:
WSA annual costs after 2025 = $4,983,161 (Rate Study Table 2-2 (PDF 17))
WSA yearly purchase agreement is = 1430 AF (MWD website)
Therefore the cost per AF: $4,983,161/1,430 = $3,484.73 Per AF
And Converting AF to HCF = $3,484.73 /435.59 = $8.00 per HCF
Including the "other costs" from Table 4-9 (Rate Study PDF 52)
WSA + Base + Peaking + Treatment + Conservation = Total
$8.00 + 2.45 + $1.44 + $0.65 + $0.30 = $12.84 per HCF

Note: ONLY Desal water as a source is used in order to eliminate any claim by the State that it can control this water and its use. Also note, that by creating this separate category for Desal, ALL OTHER rate categories will probably (but not necessarily) "remove" the Desal component cost from its respective rate structure and therefore their respective rate will go down. Also, this Desal Only component does not include the State Water Project, which adds a significant cost to most other rates.

Montecito Groundwater Basin
Groundwater Sustainability Agency

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General Manager
and Board Secretary:
Nick Turner

5/9/2023

John Watson

Re: Comments on the DRAFT Groundwater Sustainability Plan

Dear Mr. Watson,

This letter is in reply to your comment letter submitted on April 5, 2023, regarding the Montecito Groundwater Basin Groundwater Sustainability Agency's (Montecito GSA) Draft Groundwater Sustainability Plan (GSP).

First, thank you for your comments and taking an active role in the development of the GSP. On behalf of the Montecito GSA and out of respect for the considerable effort you took in providing comments, we wanted to provide a written response. While an attempt has been made to address your main points, please receive this as an open dialogue. Our goal is to provide clarifying information and we recognize the discussion may be ongoing.

Water Rights

With regard to your comment that the State of California "owns" all of the surface and groundwater in the State, the State does not own all surface and groundwater but instead has the authority to determine what water of the State – surface and underground – can be converted to public use or controlled for public protection [Water Code Section 104]. This authority is consistent with Article X, Section 2 of the California Constitution which requires:

> "…that the water resources of the State be put to beneficial use to the fullest extent of which they are capable, and that the waste or unreasonable use, or unreasonable method of use, of water be prevented, and that conservation of such waters is to be exercised with a view to the reasonable and beneficial use thereof in the interest of the people and for the public welfare".

The Sustainable Groundwater Management Act (SGMA) is intended, and designed, to enhance local management of groundwater consistent with the Article X, Section 2 requirements set forth above [Water Code Section 10720.1(b)].

Use of WELO's Maximum Applied Water Allowances

The water-use factors relied upon during development of the Future Scenarios for the Montecito Groundwater Basin (MGB) exceed WELO Maximum Applied Water Allowances. The future scenarios were designed to evaluate the MGB's response to anticipated groundwater demands based on the most recent land use information for the MGB (GSP Emergency Regs,

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§354.18(c)(3)(B)). The water-use factors relied upon for future modeling are consistent with DWR and CIMIS estimates (DWR 2020; Costello and Jones 2014). Importantly, the simulation results indicate that undesirable results are not likely to occur under the simulated demand scenarios.

Use of the WELO Maximum Applied Water Allowances during development of the GSP future scenarios would underestimate near-term demands on groundwater, which would, in turn, underestimate the potential onset of undesirable results and impacts to the beneficial uses and users of groundwater. Because of this, the use of WELO's Maximum Applied Water Allowances is inappropriate for incorporation into the GSP model scenarios. However, the Montecito GSA will continue to evaluate and monitor land uses and will update water-use factors relied upon to estimate pumping in future updates to the GSP.

Possible Future Project to Develop/Acquire Supplemental Water for Well Owners

This contemplated possible future project is to replace groundwater if/when there are indications of undesirable results occurring, or likely to occur, in the groundwater basin. This possible future project is not intended as a provision to address water waste. Groundwater level and storage depletion is not necessarily a result of water use but could be a result of climate change and severe drought.

The State of California is addressing water waste through the development and implementation of urban water use objectives for public water purveyors. These objectives are required to be implemented beginning in 2024.

The Montecito GSA *could* potentially develop and implement pumping allocations based on similar objectives. This possibility is described as a possible future project in the GSP in Section 4.2.3. No implementation of this project is planned at this time based on current conditions.

GSA Parcel Fee

The Montecito GSA's Groundwater Sustainability Fees adopted in 2020 are for the purposes of funding GSA costs during the first 5 years of operations, including development of the statutorily required Groundwater Sustainability Plan which benefits stakeholders uniformly. As the Montecito GSA moves forward with any GSP implementation, it will consider an updated fee study, (within the next 1–2 years) that analyzes various approaches to recover its costs to comply with SGMA.

Future Scenario Modeling

The future climate conditions simulated in the GSP were developed based on DWR's climate change guidance (DWR 2018) and using DWR's climate change datasets. Application of this data and methodology to the MGB resulted in a climate that was generally more extreme, with a 5% increase in the frequency of dry water years and a 4% increase in the frequency of wet water years. While the resulting climate scenarios are slightly wetter than historical conditions

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(approximately 0.5 inches per year), the future climate projections are based on the best available data science.

Transferring Water Rights

Groundwater rights are fundamentally either overlying (based on property ownership above a common aquifer) or appropriative (based on physical control and use). The stated intent of SGMA is "to preserve the security of water rights in the state to the greatest extent possible consistent with the sustainable management of groundwater" [Water Code Section 10720.1(b)]. SGMA specifically states that "Nothing in this part, or in any other groundwater management plan adopted pursuant to this part, determines or alters surface water rights or groundwater rights under common law or any provision of law that determines or grants surface water rights" [Water Code Section 10720.5]. Based on the foregoing, neither the Montecito GSA, nor the Montecito Water District (MWD), have the unilateral ability to transfer water to MWD under SGMA. While Water Code Section 10726.2 does give the Montecito GSA the option to purchase, transfer, deliver or exchange water or water rights, data indicates that projects of that nature are not required at the current time, and costs attendant to any such purchase, transfer, delivery, or exchange would need to be carefully evaluated.

The Montecito GSA recognizes the importance of optimizing groundwater usage and storage in the MGB. To this effect, the Montecito GSA has led multiple investigations assessing the feasibility of utilizing the MGB for temporary storage and/or long-term storage (Dudek 2015, GSI Water Solutions, Inc. 2020). These investigations have evaluated historical/current groundwater conditions, aquifer properties, and structural characteristics of the MGB. These studies have found that utilizing the MGB for temporary or long-term storage is not feasible for the following reasons:

1) The MGB tends to lose water to the Pacific Ocean.
2) The MGB groundwater levels tend to be shallow following normal to high rainfall years, which limits available storage, and may create potential risks associated with liquefaction or increased surface flooding associated with recharge projects.
3) The MGB's high-density of private wells, and low transmissivities, make it difficult to identify potential recharge locations that could comply with State regulations regarding subsurface residence times for recharged water.

Desalinated Water Supplies

The State's urban water use objectives, which are required to be implemented beginning in 2024 by all urban water purveyors, do not differentiate between sources of supply. Therefore, the State is incorporating desalination into these regulations and presumably WELO as well.

Conflict of Interest

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Under The Political Reform Act of 1974, multiple factors must be evaluated to determine if a conflict of interest exists. The existence of a financial interest is only one factor in determining whether a disqualifying conflict of interest exists. Another factor is whether the effect of a governmental decision on the public official's economic interests is distinguishable from its effect on the general public [Government Code Section 87103]. The GSP, and any management actions related thereto, will impact Montecito GSA Directors in precisely the same fashion as other impacted individuals, and therefore no conflict of interest exists under FPPC requirements.

Again, the Montecito GSA thanks you for your comments and participation in this process.

Sincerely,

Nick Turner
General Manager

CC:
Brian Goebel, Montecito GSA President
Nicholas Kunstek, Groundwater Specialist

References:

Costello, L. R., and K. S. Jones. 2014. Water Use Classification of Landscape Species: WUCOLS IV 2014. January 2014.

California Department of Water Resources (DWR). 2018. Guidance for Climate Change Data Use During Sustainability Development. August 2018.

California Department of Water Resources (DWR). 2020. Land & Water Use 2011-2014. Land & Water Use 2011-2015 - Datasets - California Natural Resources Agency Open Data. Accessed July 2021.

Dudek. 2015. Montecito Groundwater Basin Recharge Feasibility Study. Prepared for Heal the Ocean, Montecito Water District, and Montecito Sanitary District. September 2015.

GSI Water Solutions, Inc. (GSI). 2020. Groundwater Augmentation Feasibility Analysis for the Montecito Groundwater Basin. Prepared for the Montecito Water District. January 2020.

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Received by MB GSA from Glyn Davies via email on 5/15/2023

RECEIVED
MAY 15 2023

Summary: The following analysis of the United Nations Water Development Report of 2022 and the 'Urban Water Crisis' published in the journal *Nature Sustainability* on April 10, 2023, is intended to provide to the GSP board and staff relevant facts to enhance the discussion of the draft GSP.

Recommendation for the board to consider are located and the end of the analysis. As I have in the past, I commend and appreciate the hard work the board and staff have invested in the production of the draft GSP. It is however a draft, and I would hope that additional relevant studies and public comment will result in a limited revision of the way forward.

GSP Draft Analysis:

Following are quotes from the *Nature Sustainability* study that are relevant to Montecito:

1. 'Over the past two decades, more than 80 metropolitan cities across the world have faced sever water shortages due to droughts and unsustainable water use.'
2. 'The sustainable management of urban water supply constitutes one of the key challenges of our time.'
3. '…social power and heterogeneity in society shape both the way urban water crises unfold and who is vulnerable to them.'
4. '…conditions of water scarcity and limited access to water result from the prevailing politics and power dynamics that govern the city.' **Montecito must not fall victim to this same issue.**
5. 'The analysis…. focuses away from averages of urban water consumption and simulates consumption levels across different social groups. This approach allows an exploration of the role that elite and higher-income classes play in the water balance of a city, while also assessing their ability to respond to drought-related water crises relative to other social groups.'
6. 'We first describe the model's estimates of different water consumption levels across an unequal urban space. The results highlight the disproportionate water uses of privileged social groups relative to the rest of the city.' **Glyn Davies-the currently constituted GSP does not permit such an analysis of the Montecito Basin due to the inability to measure (as opposed to projections based on limited and unreliable historic data) well use in the basin.**
7. '…future drought resilience strategy should be more proactive and be able to recognize the long-term socioenvironmental patterns that engender urban water crisis.'

8. 'Daily household water uses are as follows by classification:
   a. Elite-43 units
   b. Upper middle income-19 units
   c. Lower middle income-5 units'

   Glyn Davies-Montecito has no ability, under the proposed GSP to conduct such an analysis due to unmetered wells.

9. 'Analysis shows that most of the water consumed by privileged social groups (elite and upper-middle income) is used for non-basic water needs (amenities) such as the irrigation of residential gardens, swimming pools and additional fixtures, both indoor and outdoor.'
10. 'Specifically, privileged water consumption is unsustainable because in the short term, it disproportionally uses the water available for the entire urban population. In the long term, privileged consumption constitutes an environmental threat to the status of local .... groundwater sources.'
11. 'Low-income residents are significantly more vulnerable to the demand-measures enforced by the city than are more-affluent inhabitants, who can afford tariff increase and can access and develop alternative water sources.' **Glyn Davies-In Montecito the more affluent may develop and then use the limited water resources at no water cost to themselves. Then when the property is marketed for sale the fact that it has a well or several wells on the property is prominently advertised.**
12. '...the elite and upper-middle-income groups tend to enhance their water security after a drought while low-income groups become more water insecure.' **Glyn Davies...my wife was recently getting a hair cut in Montecito and overheard a female Montecito resident say, 'I am putting in a well, I am not giving up my green lawn'. She can do that and use all the water she wishes and not pay a penny for the water consumed under current and future plans according to the presently presented GSP!!!**

I have been urged to study specific sections of the GSP to further my education as to the analysis and conclusions reached in the GSP. I have done so. My study has made me appreciate just how much work has occurred to get the community to this point. It has also revealed how much better the GSP can be with some further observations and recommendations.

Specifically:

1. It is clear to anyone reading the report that the hard work and analysis is based on incomplete data, as old records are not complete and no accurate

measurement of the extraction of water from the basin exists. The analysis is based on educated guesses and projections using this limited data. I now refer back to my first observations provided to the board that is a management and certainly an engineering fact **that if you cannot measure you cannot effectively manage.**

2. The GSP, as currently constituted, basis the sustainability of our water supply on a number of future projections:

'Future baseline GW extraction due to wells is not anticipated to increase during the model period to 2069.' Without the GSP going on record of opposing future well drilling, I believe that this projection will not be accurate. It is quite apparent to long term residents that the financial demographics of newer residents are those of a much wealthier population. The ability to obtain free, unlimited water, is a temptation that will not be satisfied without a well.

   a. 'An increase in precipitation is anticipated due to climate change.' While I recognize that this statement is based on the projections of qualified experts it will not necessarily, as the GSP implies, be beneficial to our local water supply. In fact, an argument could be made that the infrequent 'atmospheric river' surrounded on both sides by drought years might actually decrease our usable supply of basin water. Much of the 'atmospheric river' precipitation ends up in the ocean not the basin.
   b. As I stated earlier, the current projections are based on unreliable, inconsistent historical records back to the early 1970's. Even last year's records are inadequate due to inability to accurately measure usage. The draft GSP states 'MWD's diverse water supply portfolio, which include local surface water, imported water, desalinated water, and local groundwater, is anticipated to satisfy demand in normal and **single dry-year conditions.** Does anyone who has lived in the area believe that dry years occur as **single year events**. In fact, climate change might exacerbate the likelihood of multiple dry year events.

3. The GSP does not address the fact that well owners benefit from free, unlimited water. They also benefit from increased sales price of their properties due to the water subsidy provided by the community owned basin. The free, unlimited water is most inappropriate during drought conditions, when well usage is almost certainly at a maximum. The general public, during these drought conditions, is subject to financial rationing of their water usage due the cost of the high cost of all but the basic tiers of water usage.

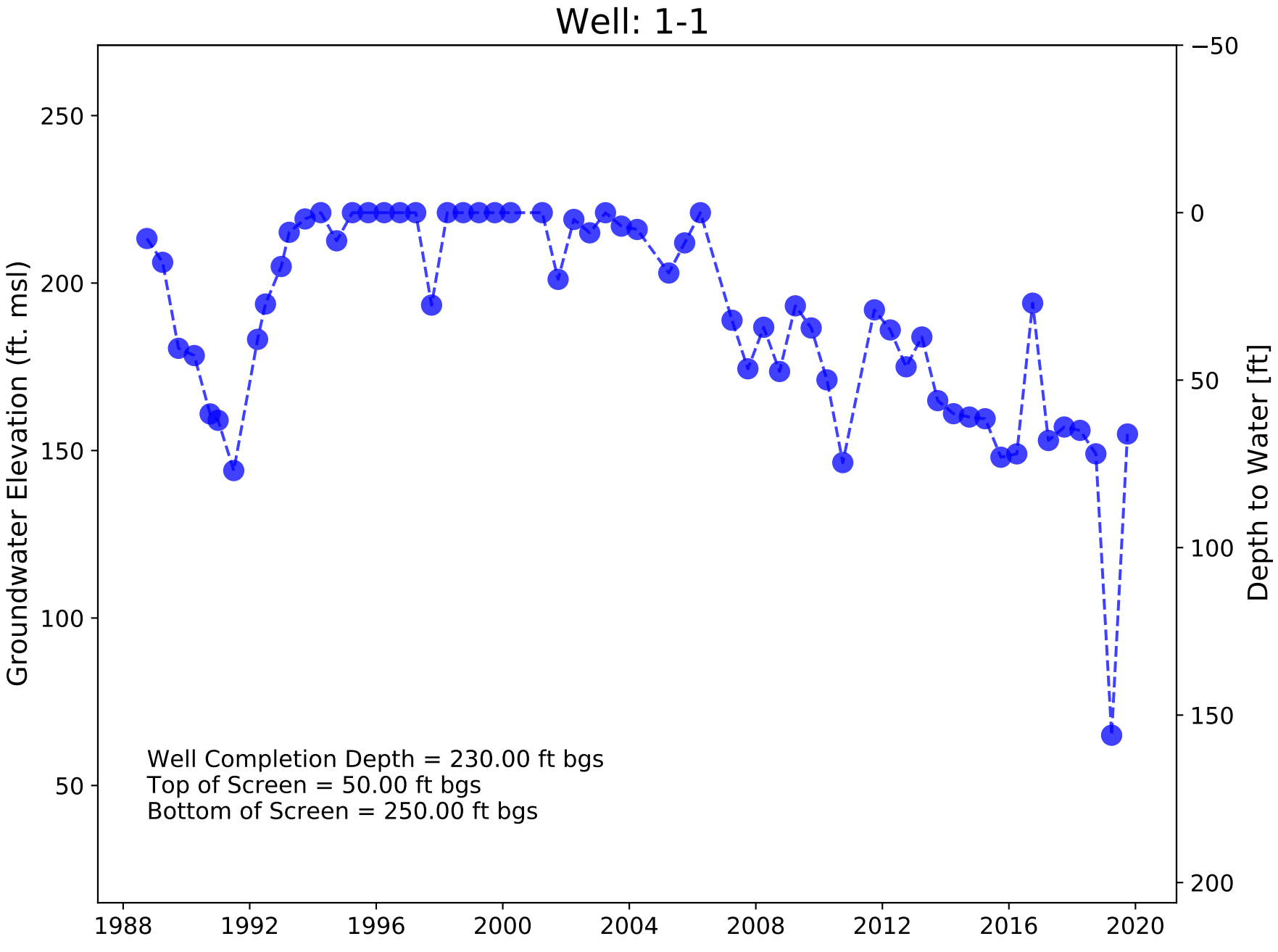
Recommendations:

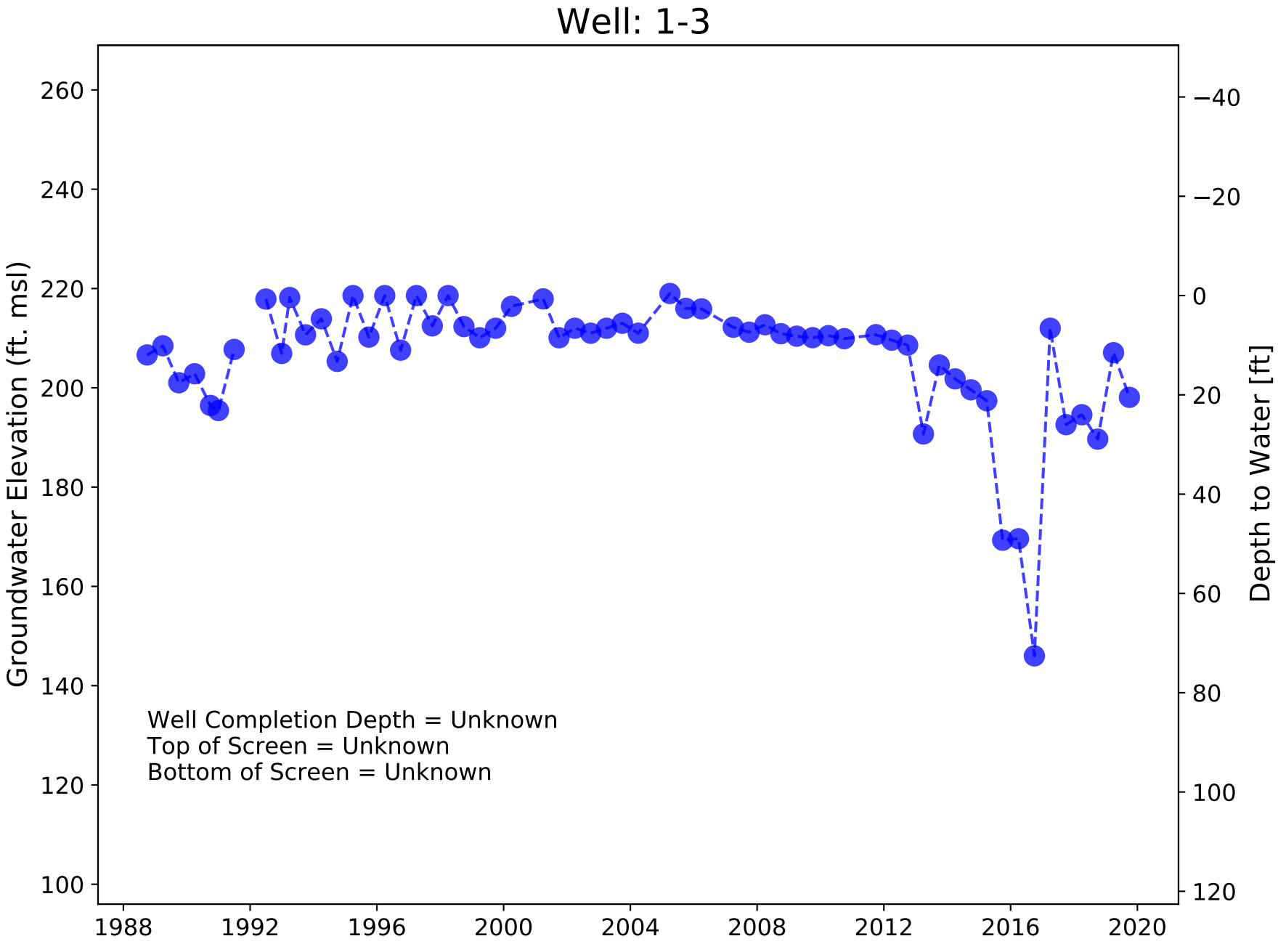
1. **The GSP be amended to require all private wells be metered within 18 months.**
2. **That the GSB, while recognizing that the County of Santa Barbara is the governing body, go on record of opposing future well drilling in the district.**
3. **The GSP be amended to recognize that at some time in the future that water extraction from wells will no longer be free.**
4. **To avoid any conflict of interest any board member that has a well, or resides in a community utilizing unmetered free water, recuse themselves from voting on the GSP draft.**

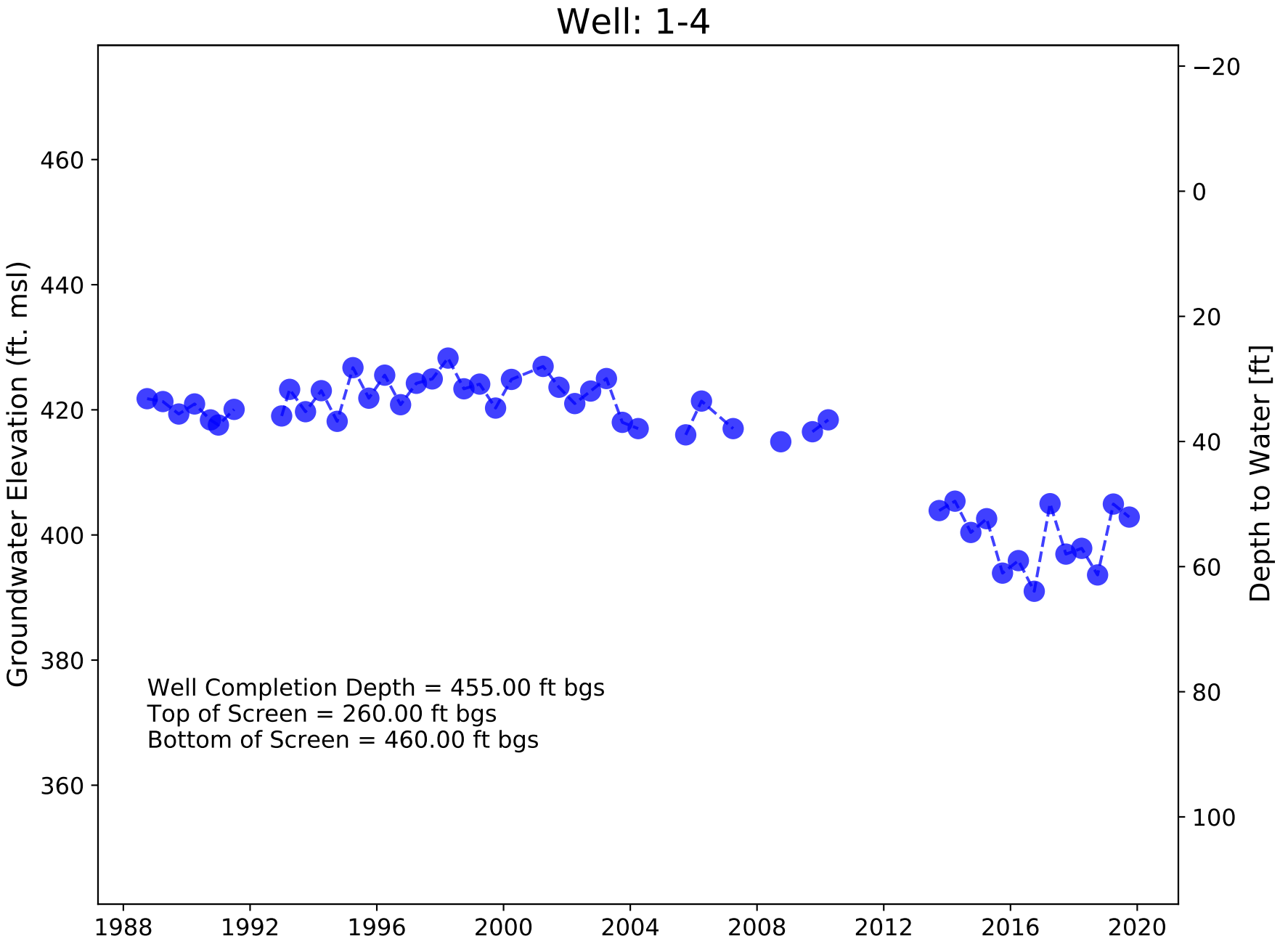
Appendix E
Groundwater Elevation Hydrographs

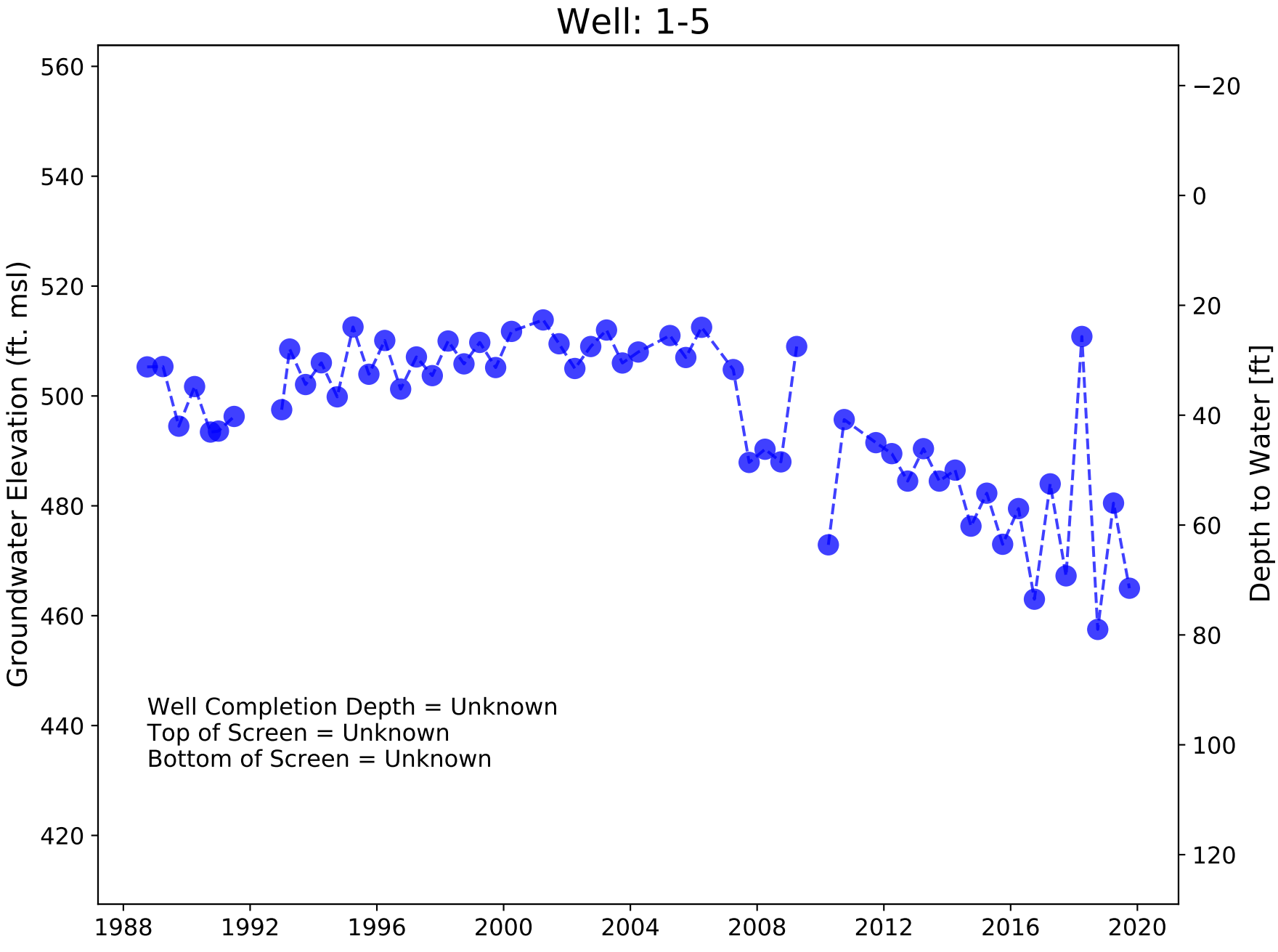
This appendix contains a compilation of groundwater hydrographs from monitoring wells in the Montecito Groundwater Basin (MGB). Specifically, this data was used in the development of the Basin Numerical Model, and to characterize the historical and current groundwater conditions in the MGB, as they relate to potential undesirable results, such as chronic lowering of groundwater levels, reduction of groundwater in storage, seawater intrusion, depletion of interconnected surface water, degradation of water quality, and land subsidence. For a discussion of the health of the MGB and whether it is experiencing any undesirable results, please see Section 3.2 of this GSP.

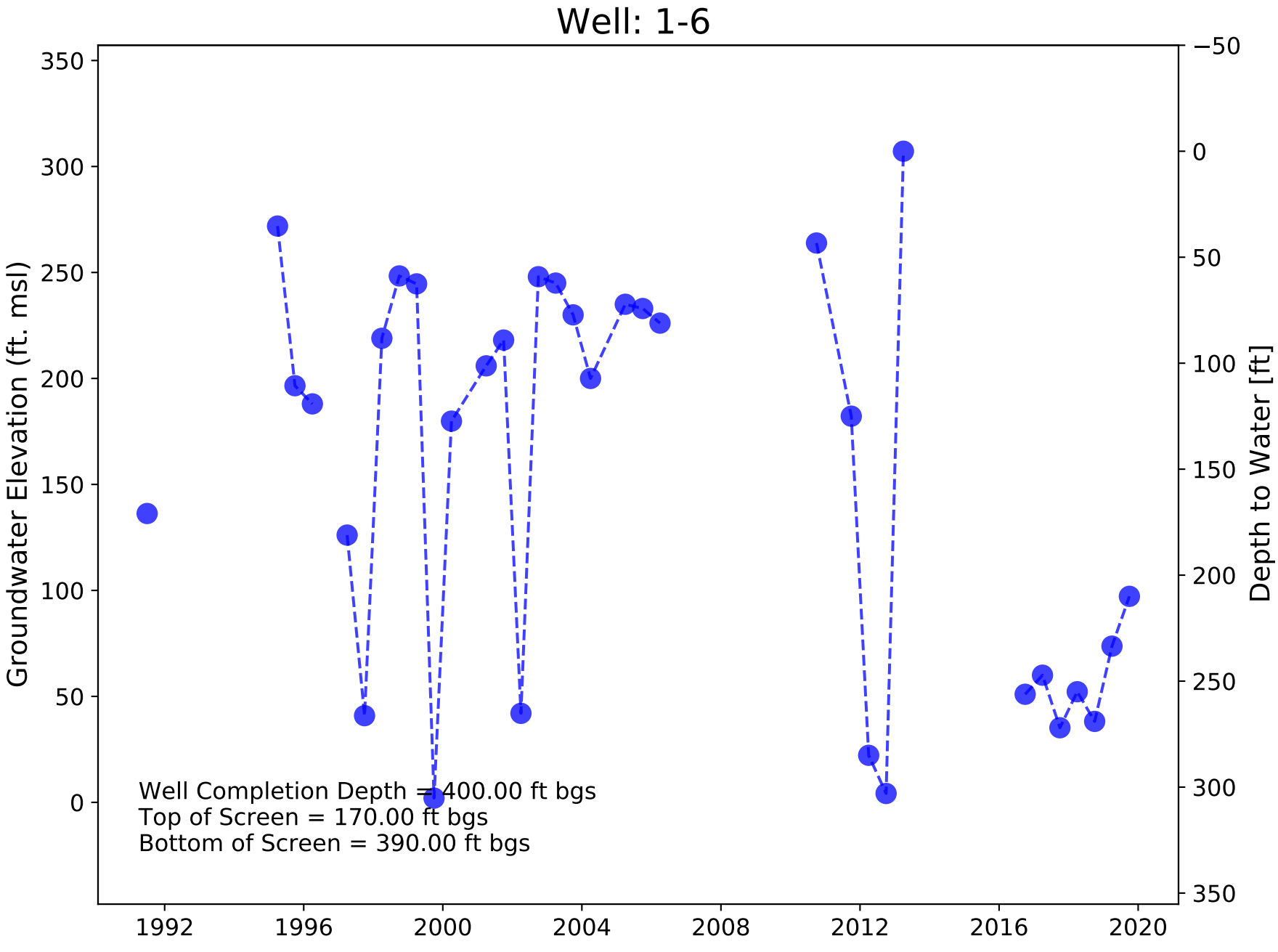
(This appendix is referenced in Sections 2.2, 2.3, and 3.1 of this GSP.)

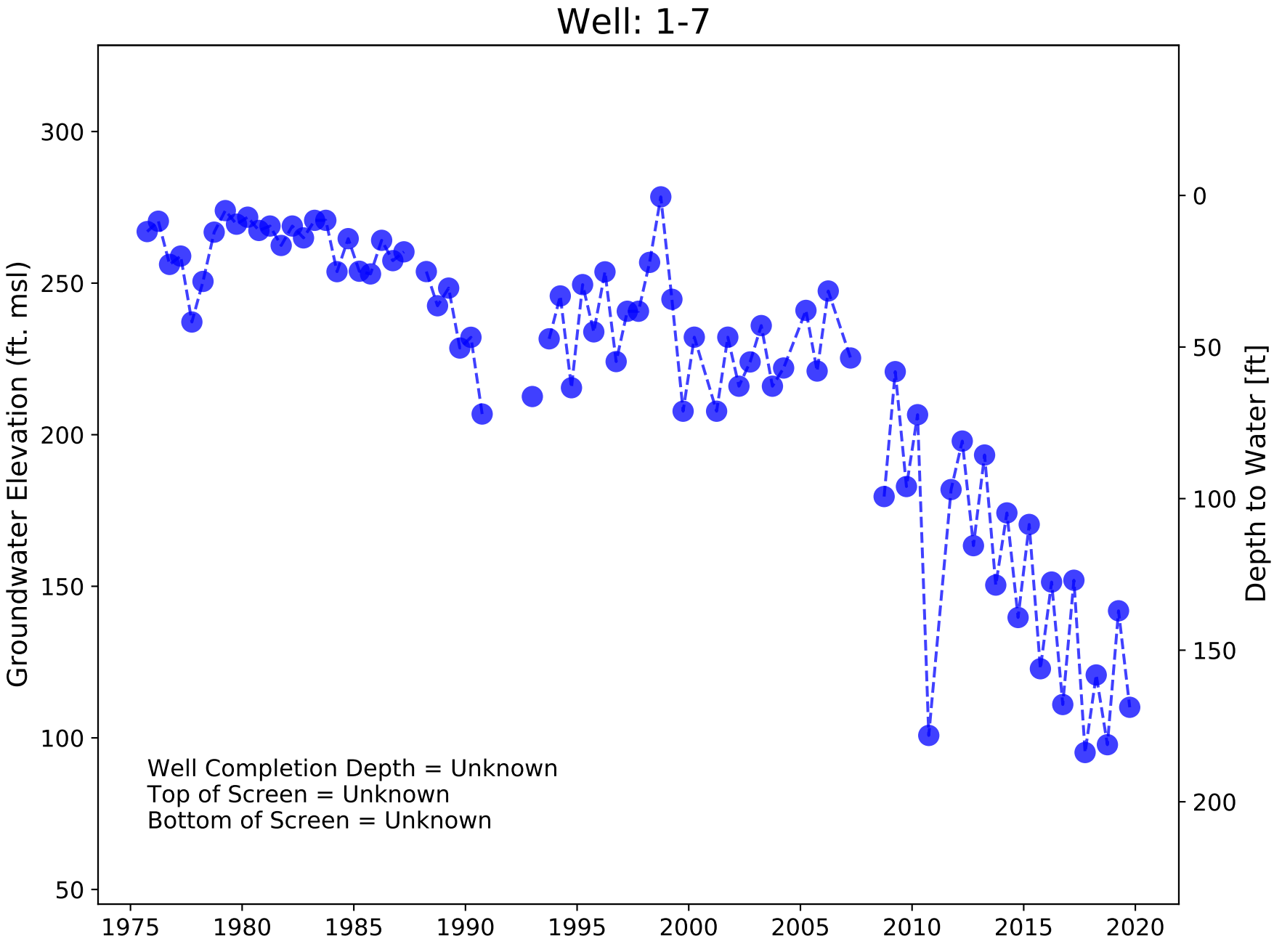

Well: 1-1
Groundwater Elevation (ft. msl)
Depth to Water [ft]
250
200
150
100
50
−50
0
50
100
150
200
1988
1992
1996
2000
2004
2008
2012
2016
2020
Well Completion Depth = 230.00 ft bgs
Top of Screen = 50.00 ft bgs
Bottom of Screen = 250.00 ft bgs

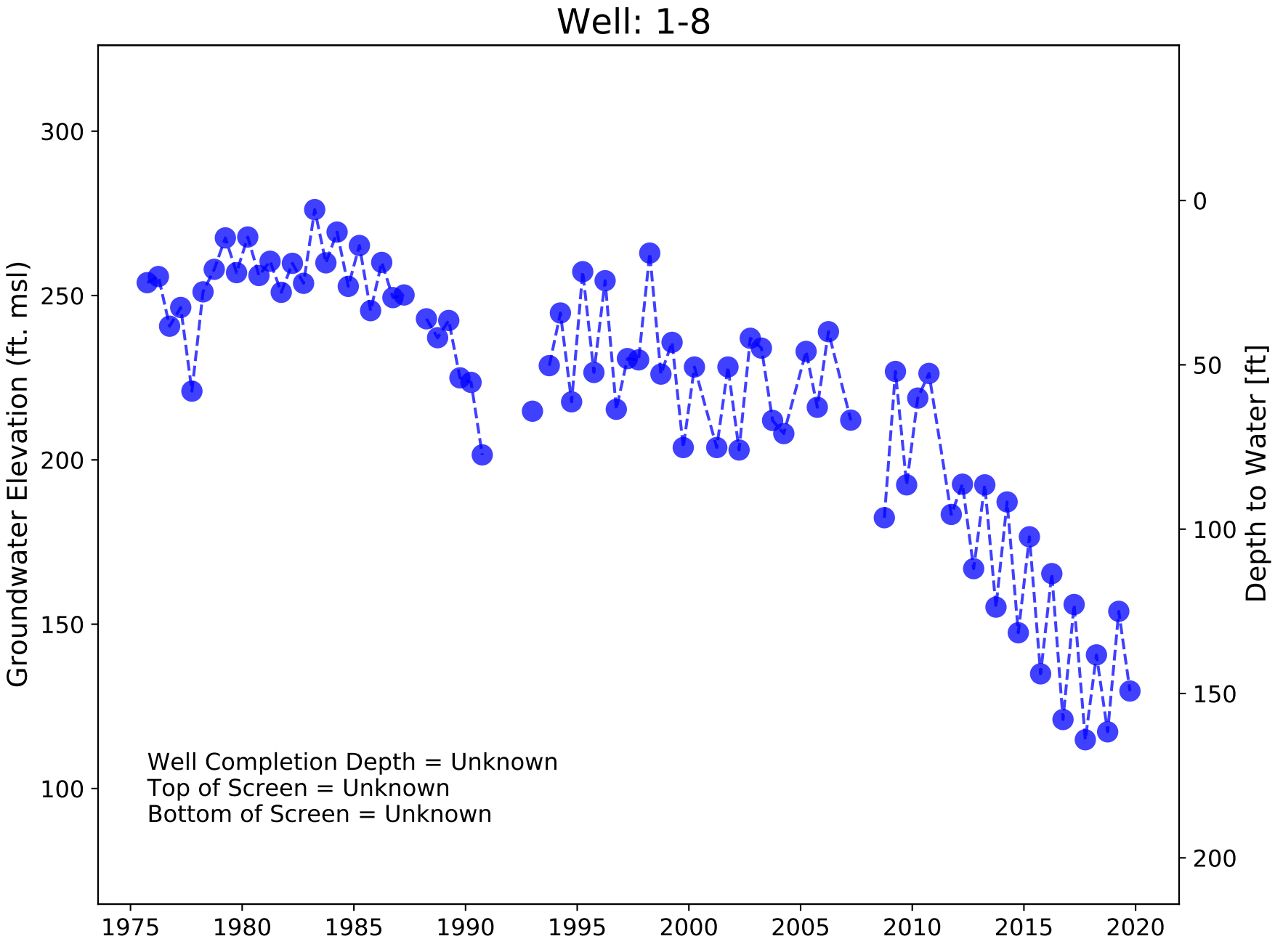

Well: 1-3
Groundwater Elevation (ft. msl)
Depth to Water [ft]
260
240
220
200
180
160
140
120
100
−40
−20
0
20
40
60
80
100
120
1988
1992
1996
2000
2004
2008
2012
2016
2020
Well Completion Depth = Unknown
Top of Screen = Unknown
Bottom of Screen = Unknown

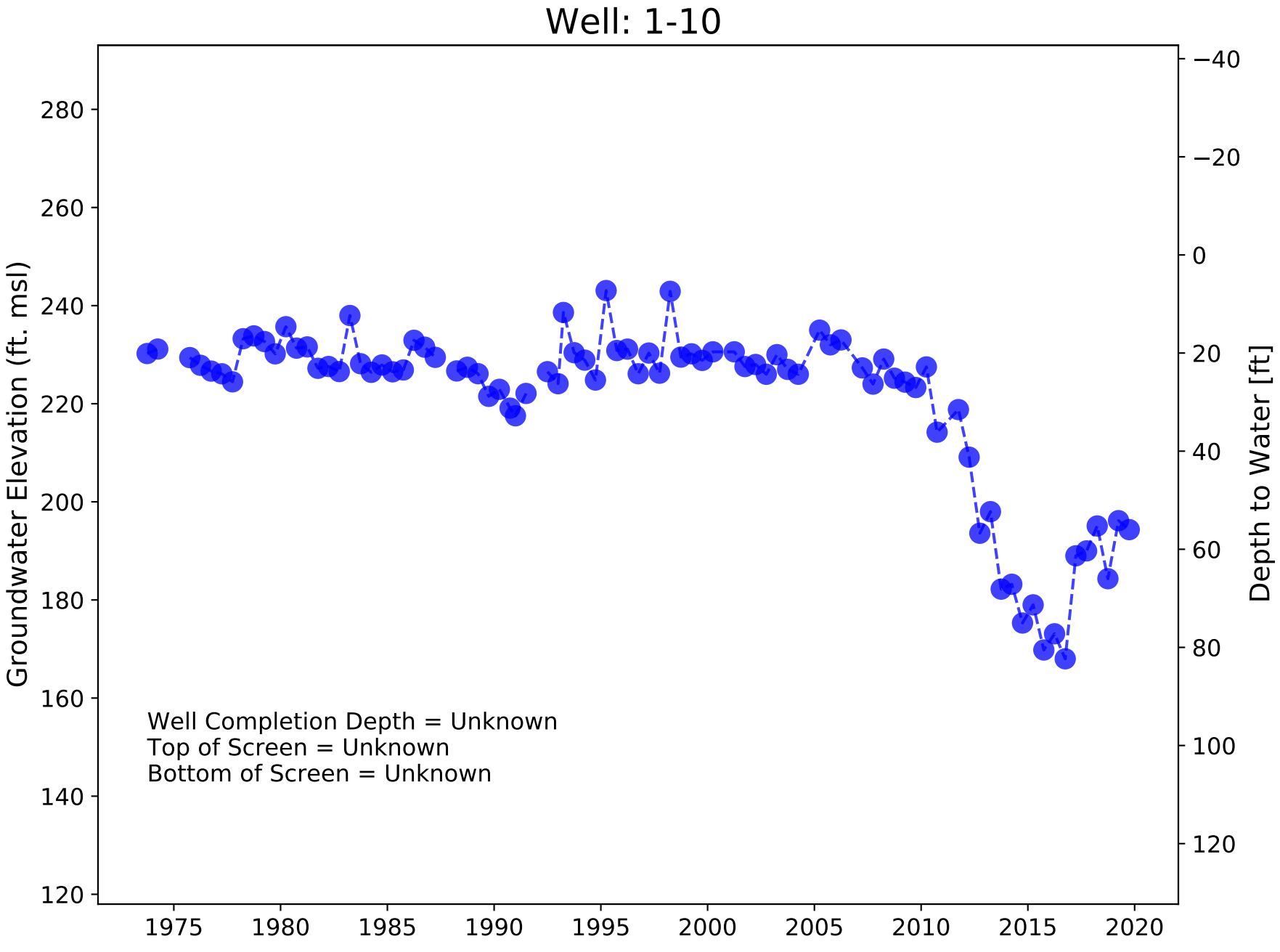

Well: 1-4
Groundwater Elevation (ft. msl)
Depth to Water [ft]
460
440
420
400
380
360
−20
0
20
40
60
80
100
1988
1992
1996
2000
2004
2008
2012
2016
2020
Well Completion Depth = 455.00 ft bgs
Top of Screen = 260.00 ft bgs
Bottom of Screen = 460.00 ft bgs

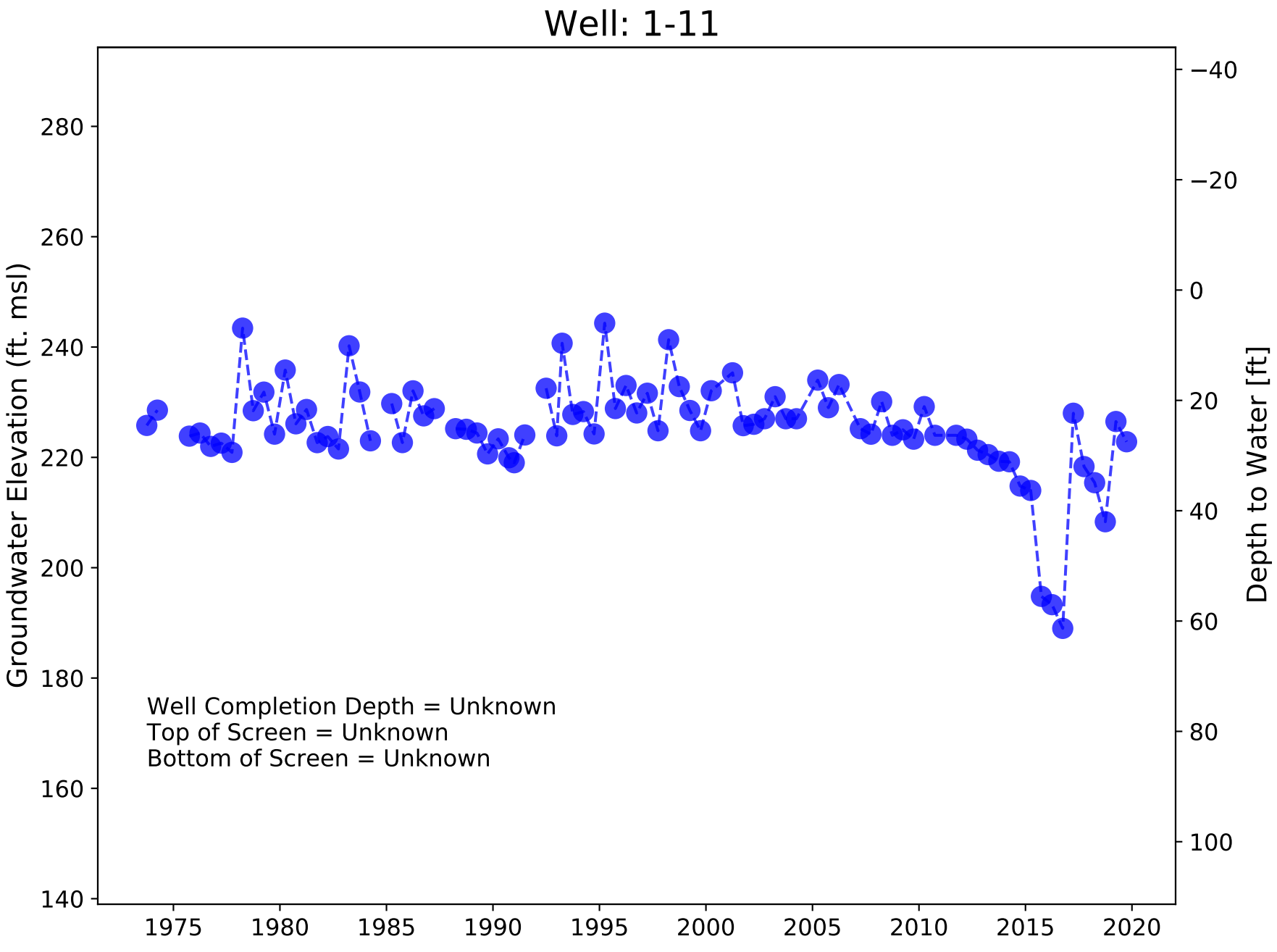

Well: 1-5
Groundwater Elevation (ft. msl)
Depth to Water [ft]
560
540
520
500
480
460
440
420
−20
0
20
40
60
80
100
120
1988
1992
1996
2000
2004
2008
2012
2016
2020
Well Completion Depth = Unknown
Top of Screen = Unknown
Bottom of Screen = Unknown

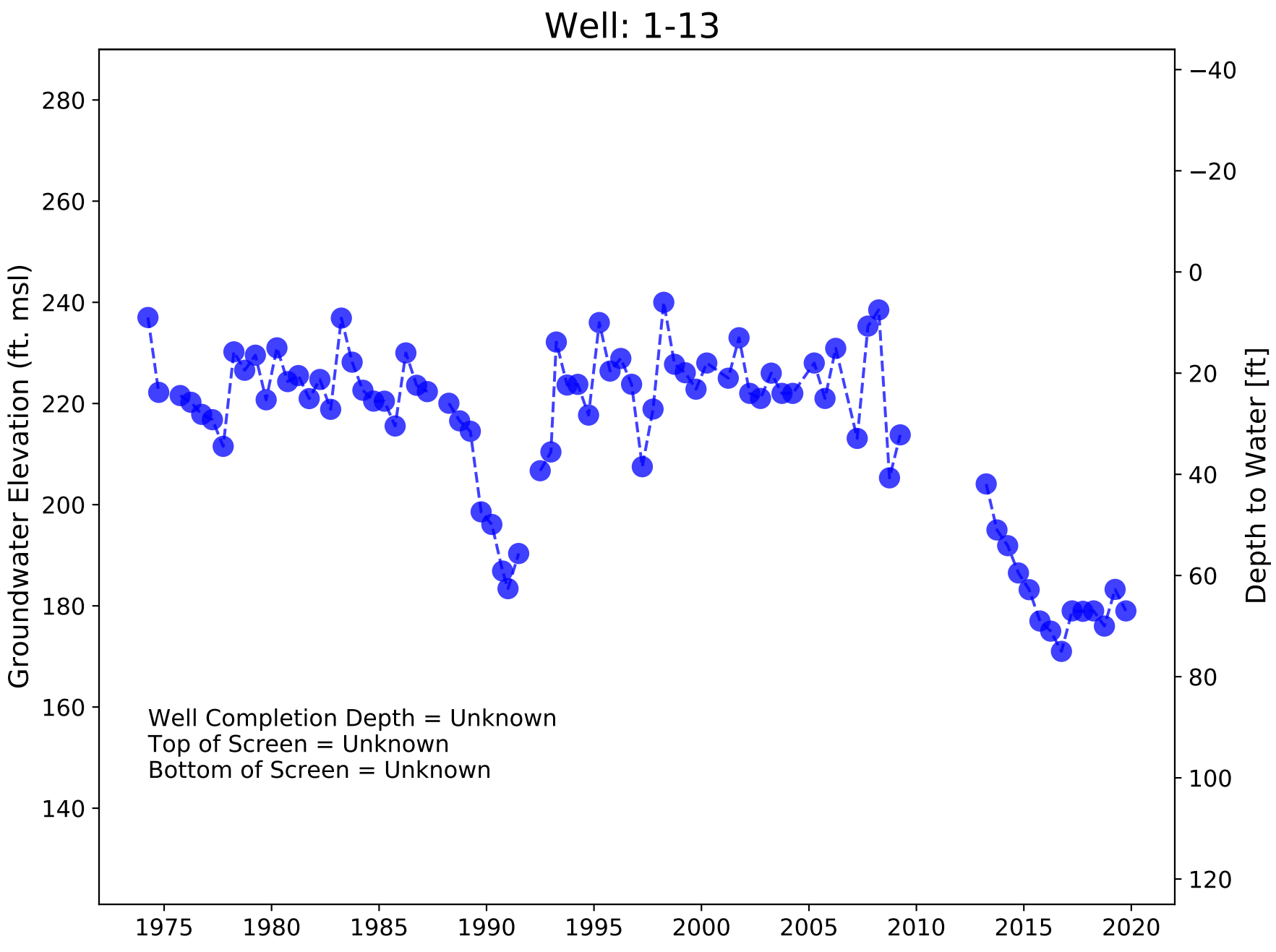

Well: 1-6
Groundwater Elevation (ft. msl)
Depth to Water [ft]
350
300
250
200
150
100
50
0
−50
0
50
100
150
200
250
300
350
1992
1996
2000
2004
2008
2012
2016
2020
Well Completion Depth = 400.00 ft bgs
Top of Screen = 170.00 ft bgs
Bottom of Screen = 390.00 ft bgs

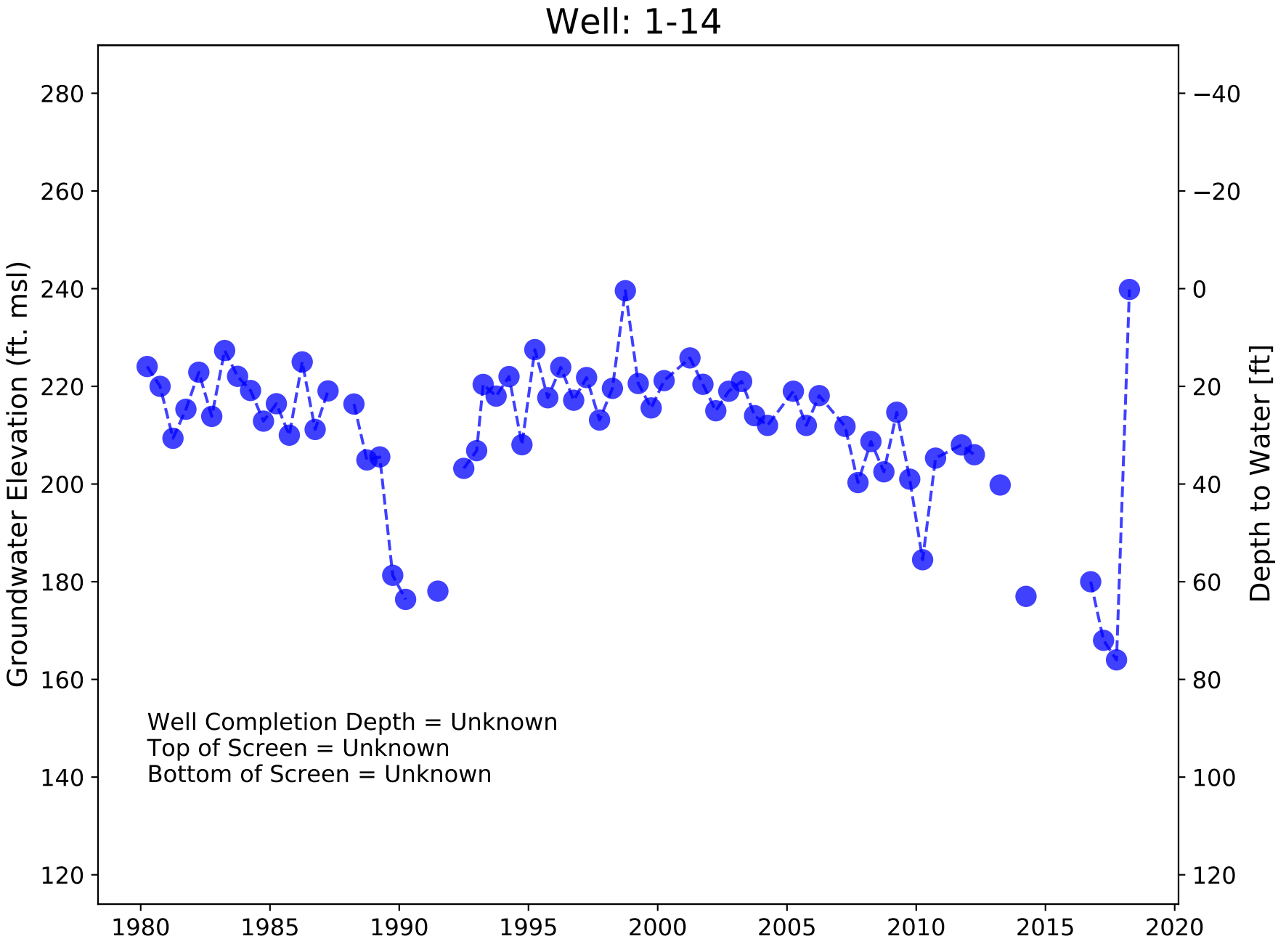

Well: 1-7
Groundwater Elevation (ft. msl)
Depth to Water [ft]
300
250
200
150
100
50
0
50
100
150
200
1975
1980
1985
1990
1995
2000
2005
2010
2015
2020
Well Completion Depth = Unknown
Top of Screen = Unknown
Bottom of Screen = Unknown

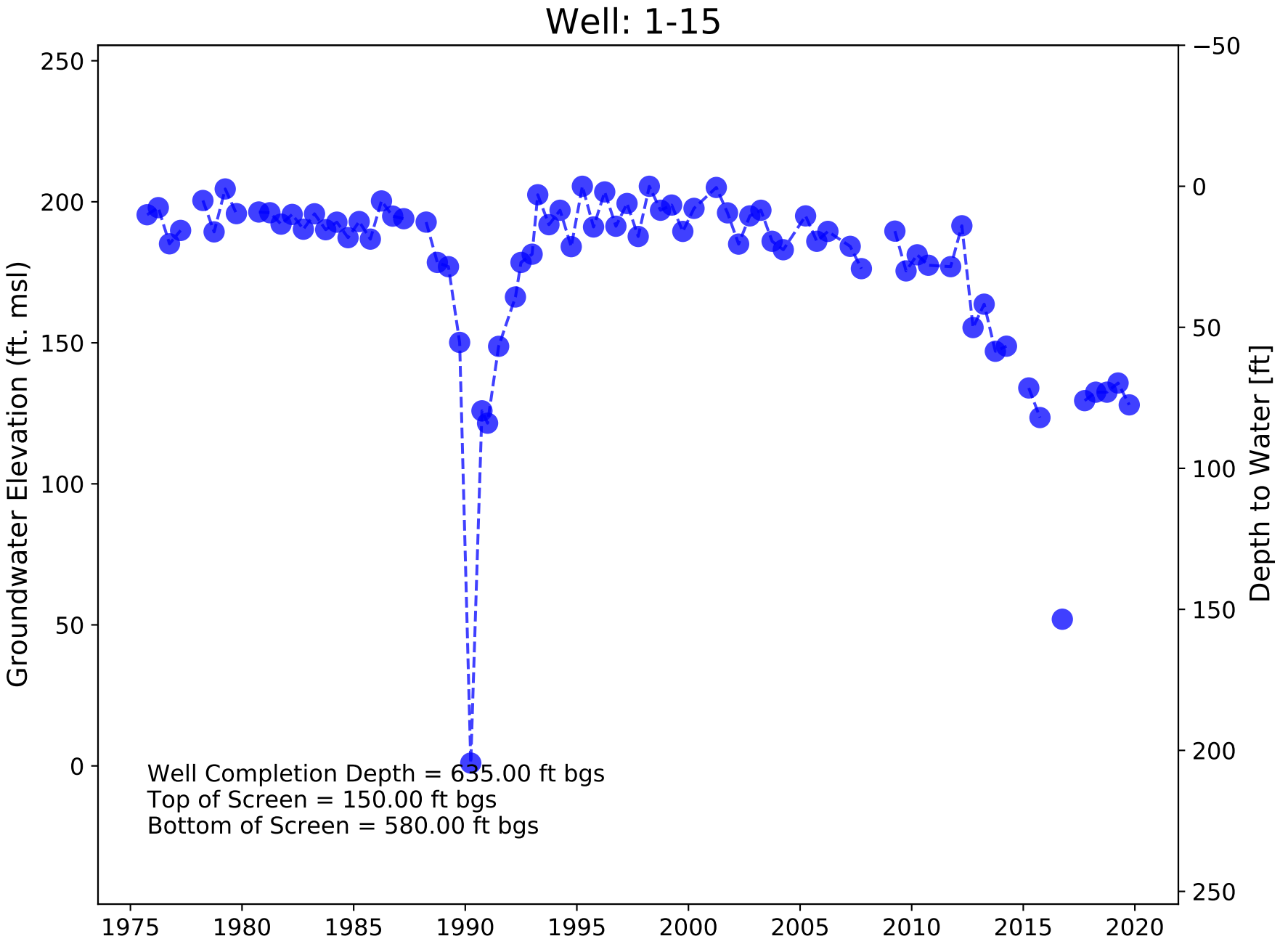

Well: 1-8
Groundwater Elevation (ft. msl)
Depth to Water [ft]
300
250
200
150
100
0
50
100
150
200
1975
1980
1985
1990
1995
2000
2005
2010
2015
2020
Well Completion Depth = Unknown
Top of Screen = Unknown
Bottom of Screen = Unknown

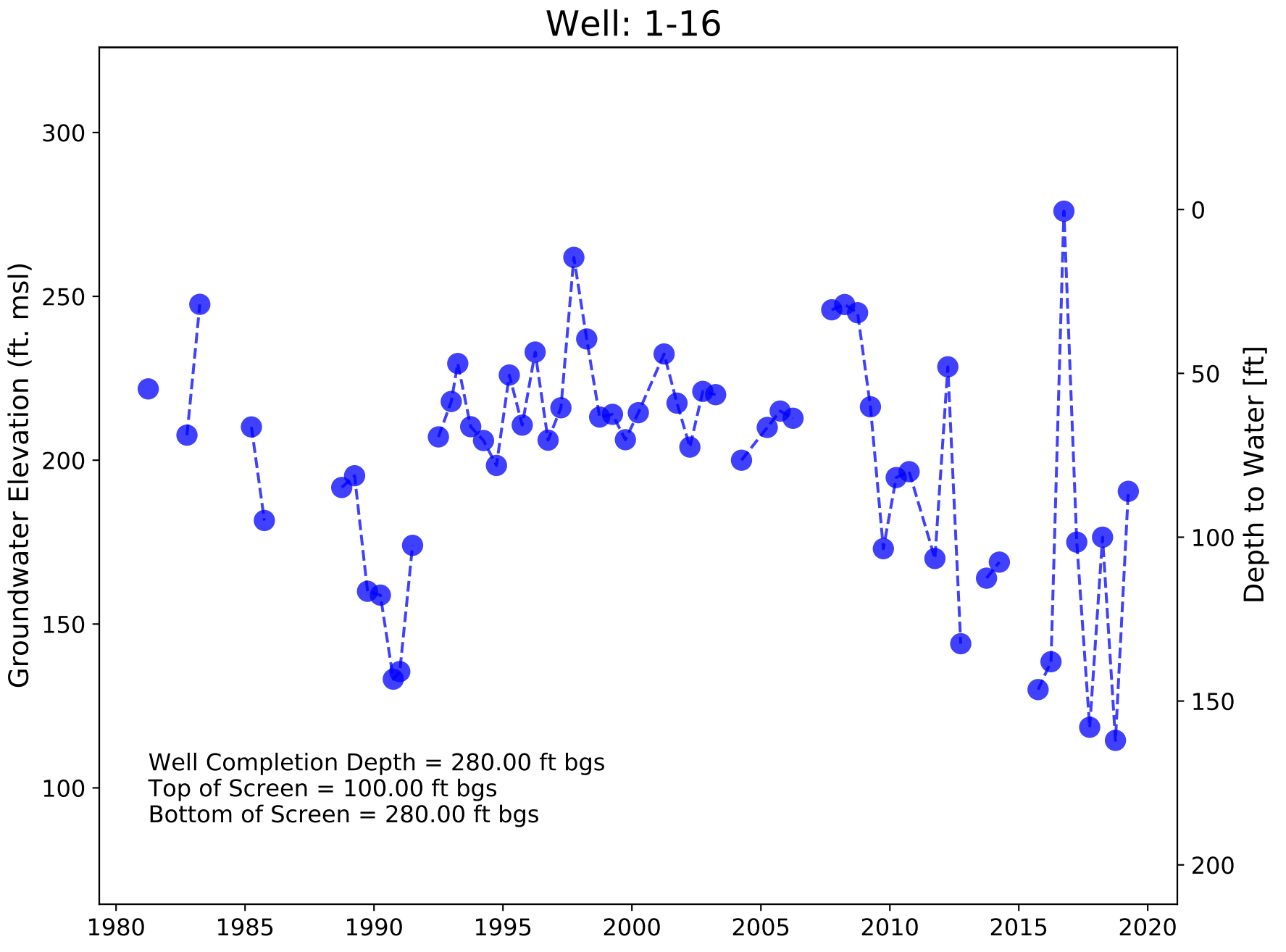

Well: 1-10
Groundwater Elevation (ft. msl)
Depth to Water [ft]
280
260
240
220
200
180
160
140
120
−40
−20
0
20
40
60
80
100
120
1975
1980
1985
1990
1995
2000
2005
2010
2015
2020
Well Completion Depth = Unknown
Top of Screen = Unknown
Bottom of Screen = Unknown

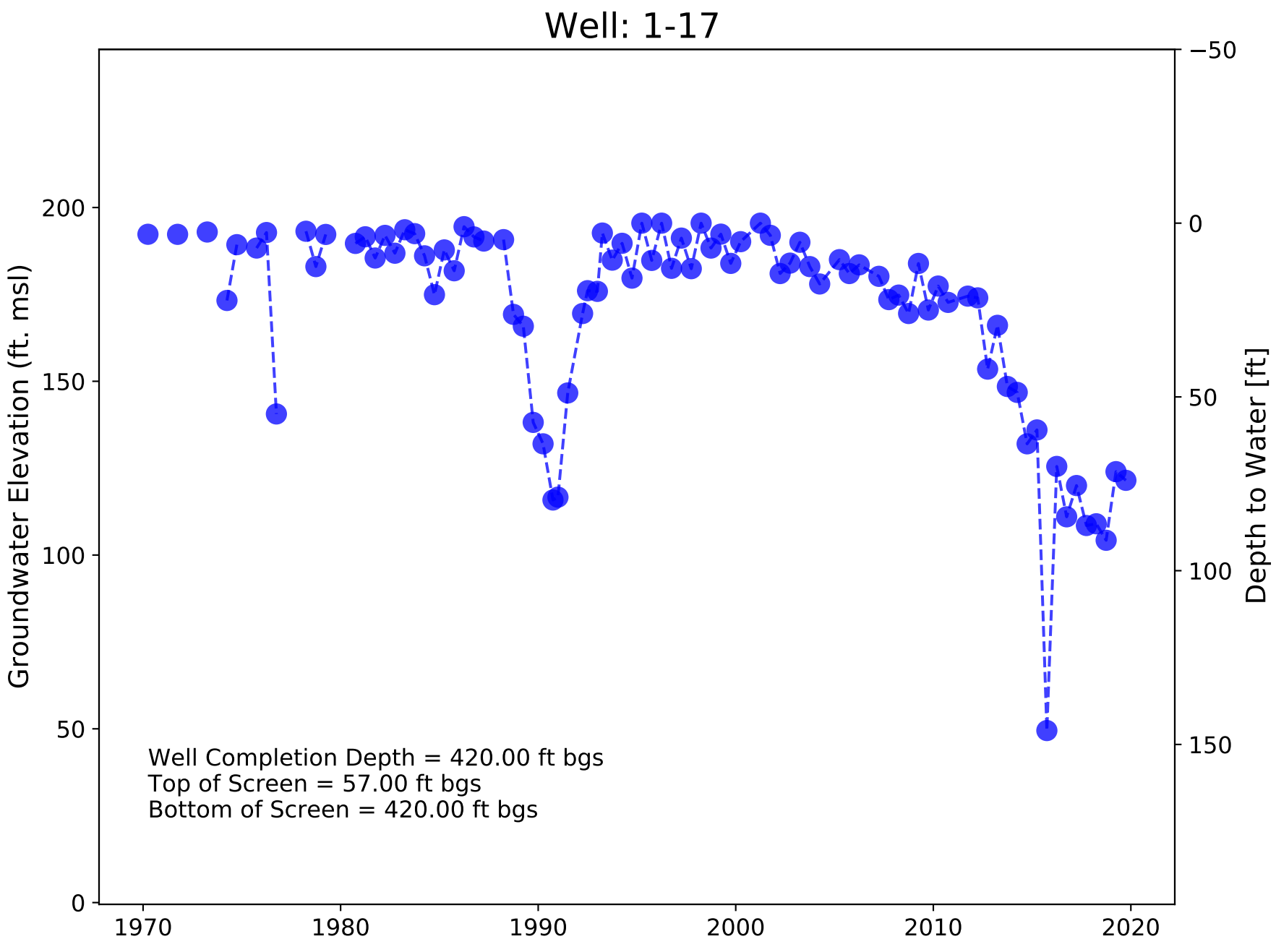

Well: 1-11
Groundwater Elevation (ft. msl)
Depth to Water [ft]
280
260
240
220
200
180
160
140
−40
−20
0
20
40
60
80
100
1975
1980
1985
1990
1995
2000
2005
2010
2015
2020
Well Completion Depth = Unknown
Top of Screen = Unknown
Bottom of Screen = Unknown

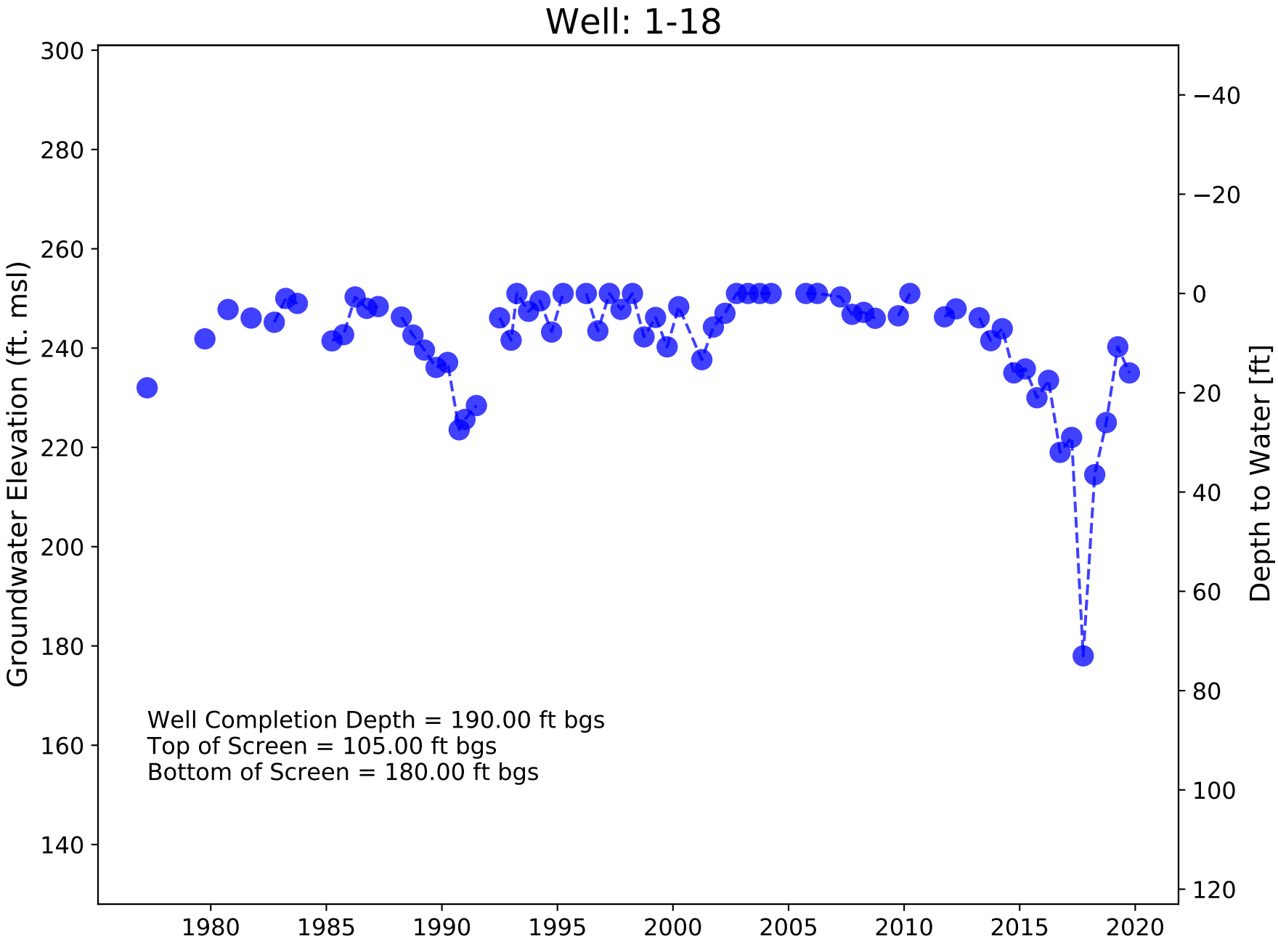

Well: 1-13
Groundwater Elevation (ft. msl)
Depth to Water [ft]
280
260
240
220
200
180
160
140
−40
−20
0
20
40
60
80
100
120
1975
1980
1985
1990
1995
2000
2005
2010
2015
2020
Well Completion Depth = Unknown
Top of Screen = Unknown
Bottom of Screen = Unknown

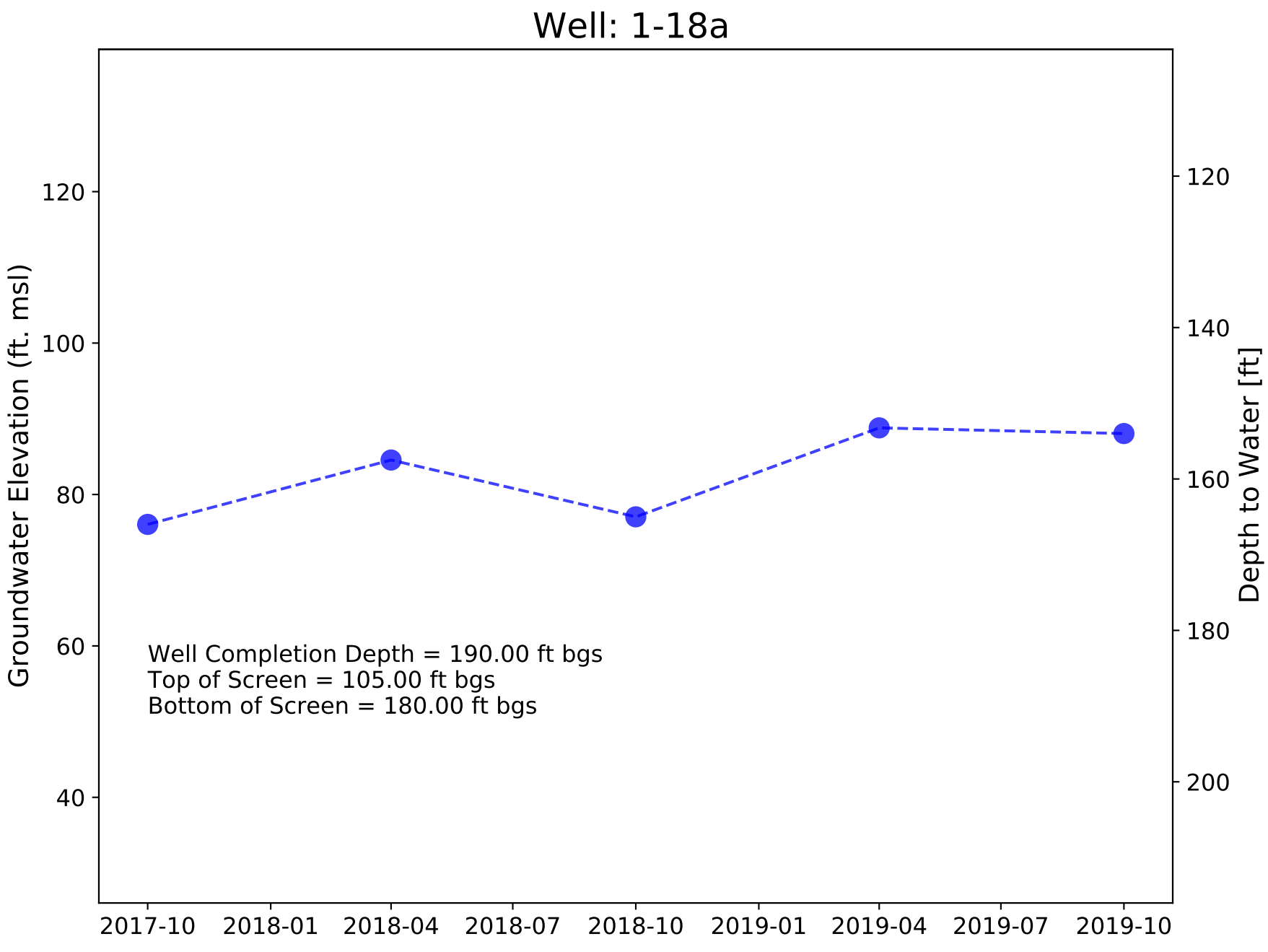

Well: 1-14
Groundwater Elevation (ft. msl)
Depth to Water [ft]
280
260
240
220
200
180
160
140
120
−40
−20
0
20
40
60
80
100
120
1980
1985
1990
1995
2000
2005
2010
2015
2020
Well Completion Depth = Unknown
Top of Screen = Unknown
Bottom of Screen = Unknown

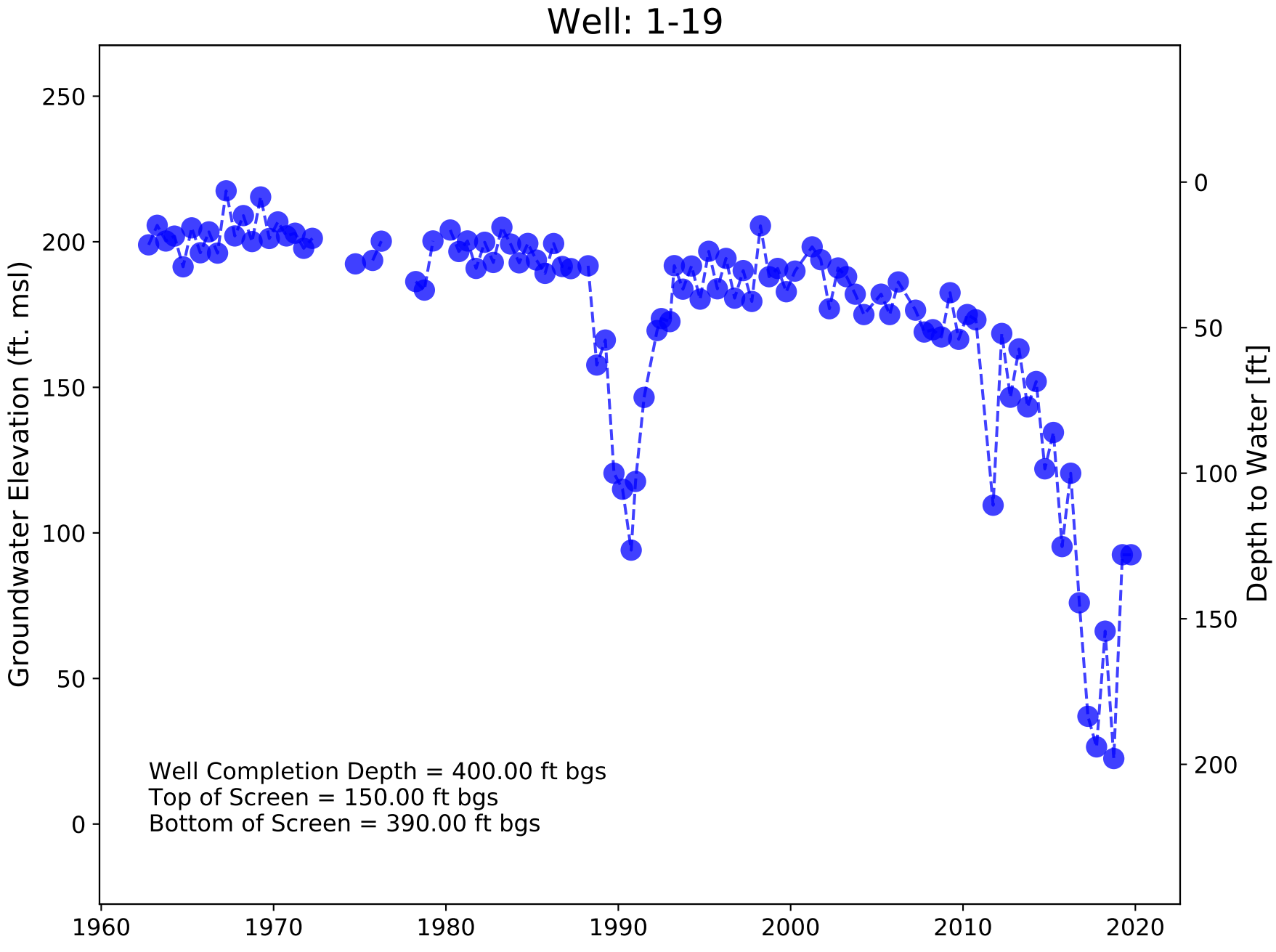

Well: 1-15
Groundwater Elevation (ft. msl)
Depth to Water [ft]
250
200
150
100
50
0
−50
0
50
100
150
200
250
1975
1980
1985
1990
1995
2000
2005
2010
2015
2020
Well Completion Depth = 635.00 ft bgs
Top of Screen = 150.00 ft bgs
Bottom of Screen = 580.00 ft bgs

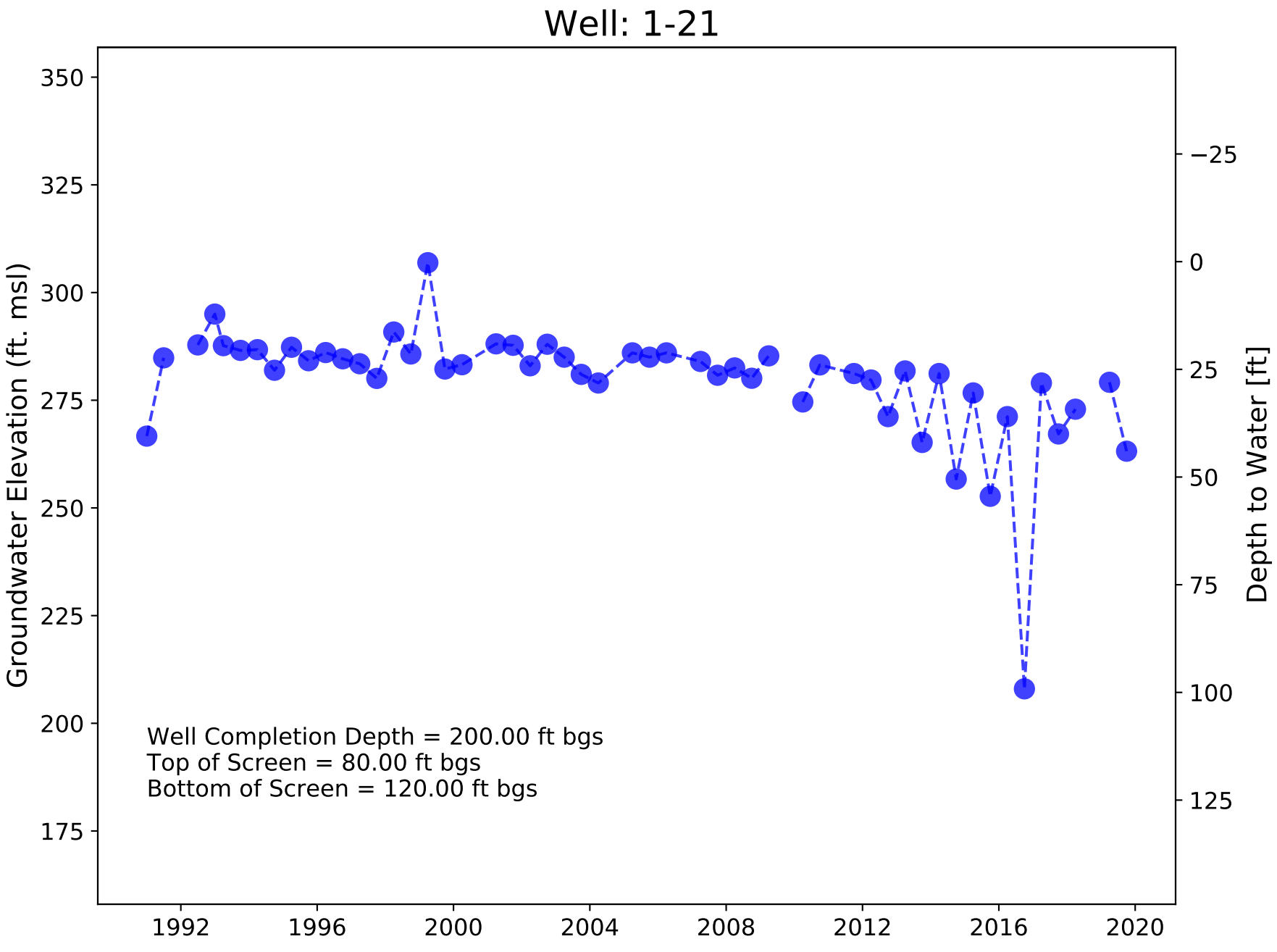

Well: 1-16
Groundwater Elevation (ft. msl)
Depth to Water [ft]
300
250
200
150
100
0
50
100
150
200
1980
1985
1990
1995
2000
2005
2010
2015
2020
Well Completion Depth = 280.00 ft bgs
Top of Screen = 100.00 ft bgs
Bottom of Screen = 280.00 ft bgs

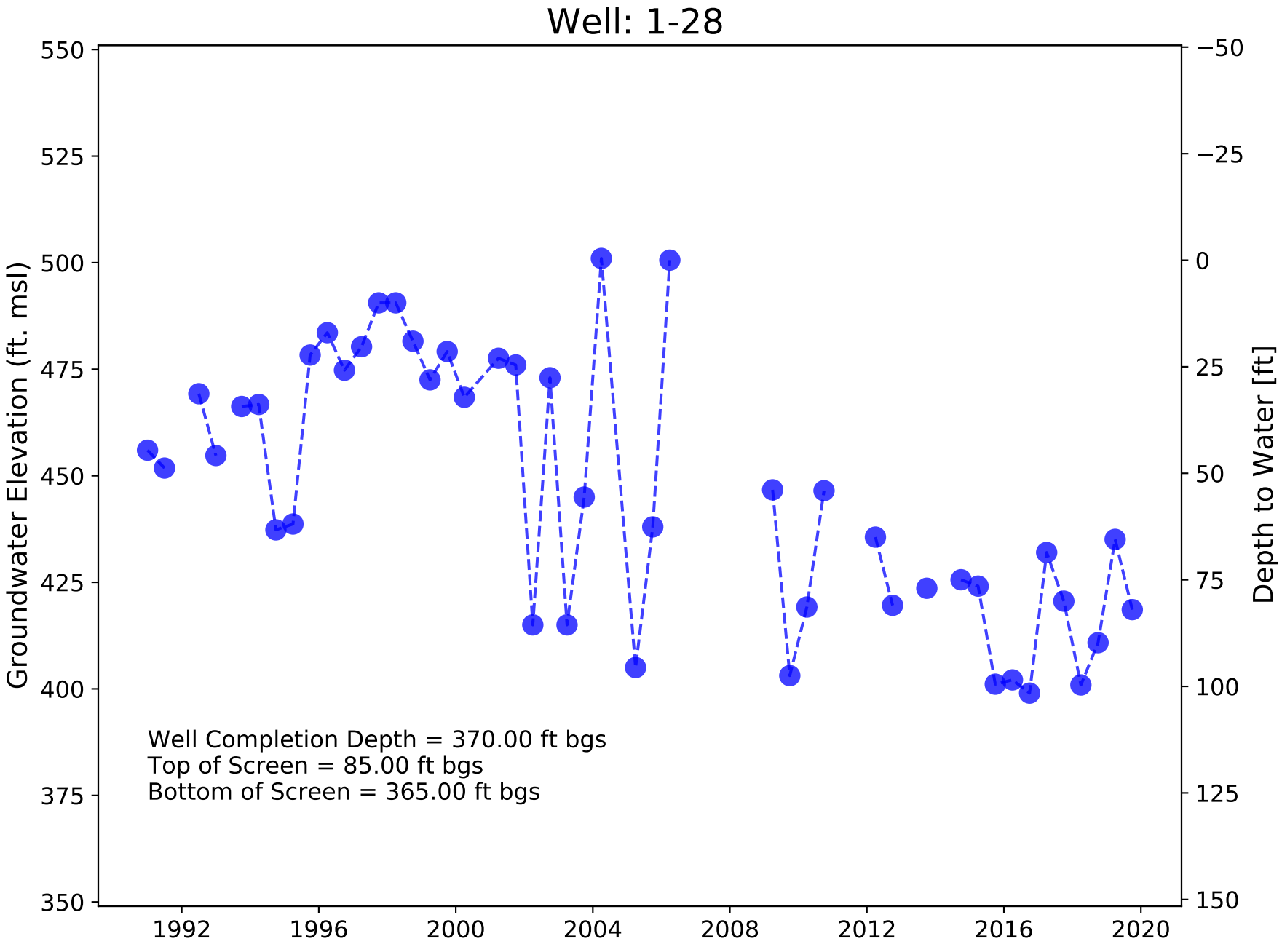

Well: 1-17
Groundwater Elevation (ft. msl)
Depth to Water [ft]
200
150
100
50
0
−50
0
50
100
150
1970
1980
1990
2000
2010
2020
Well Completion Depth = 420.00 ft bgs
Top of Screen = 57.00 ft bgs
Bottom of Screen = 420.00 ft bgs

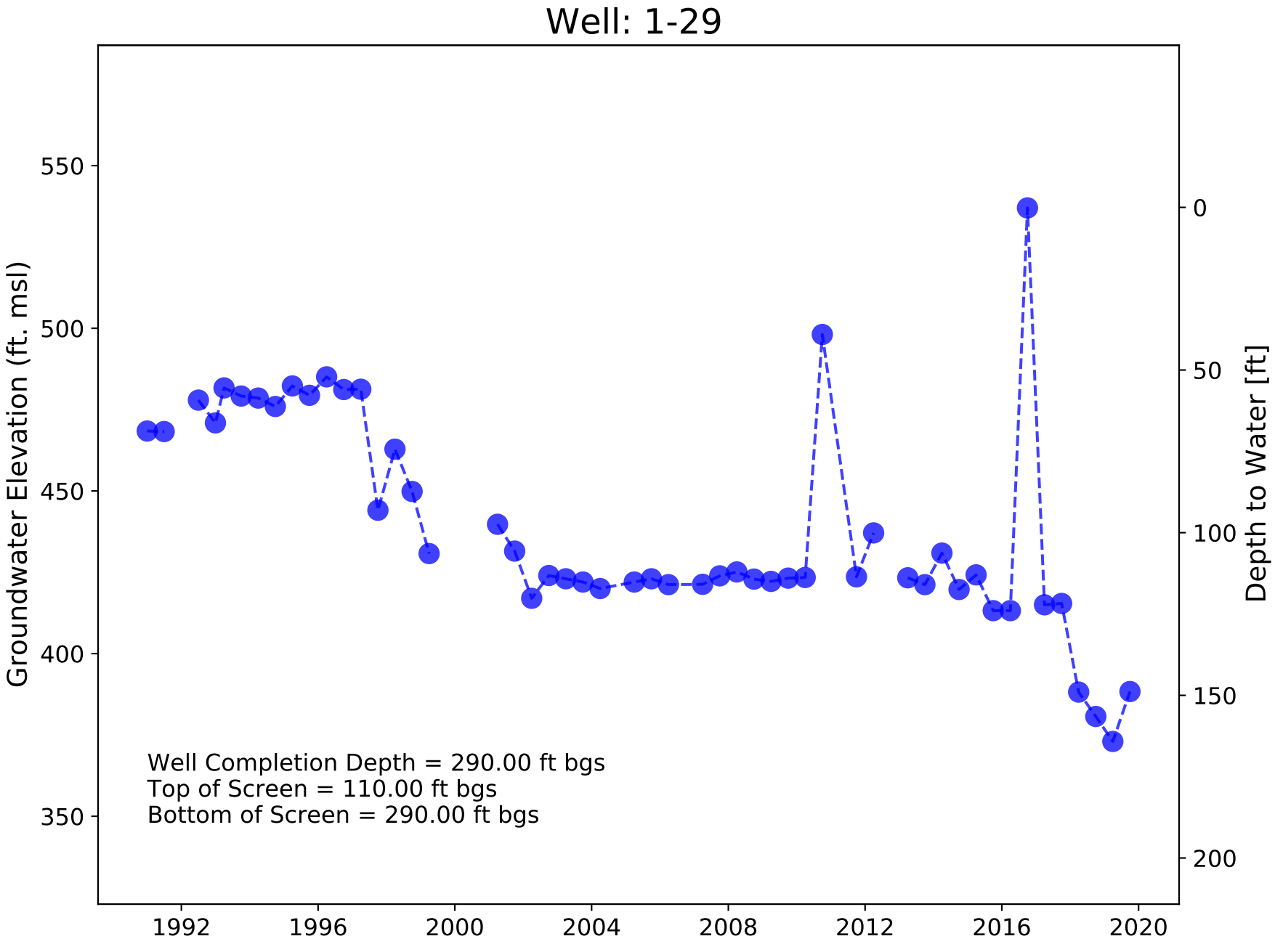

Well: 1-18
Groundwater Elevation (ft. msl)
Depth to Water [ft]
300
280
260
240
220
200
180
160
140
−40
−20
0
20
40
60
80
100
120
1980
1985
1990
1995
2000
2005
2010
2015
2020
Well Completion Depth = 190.00 ft bgs
Top of Screen = 105.00 ft bgs
Bottom of Screen = 180.00 ft bgs

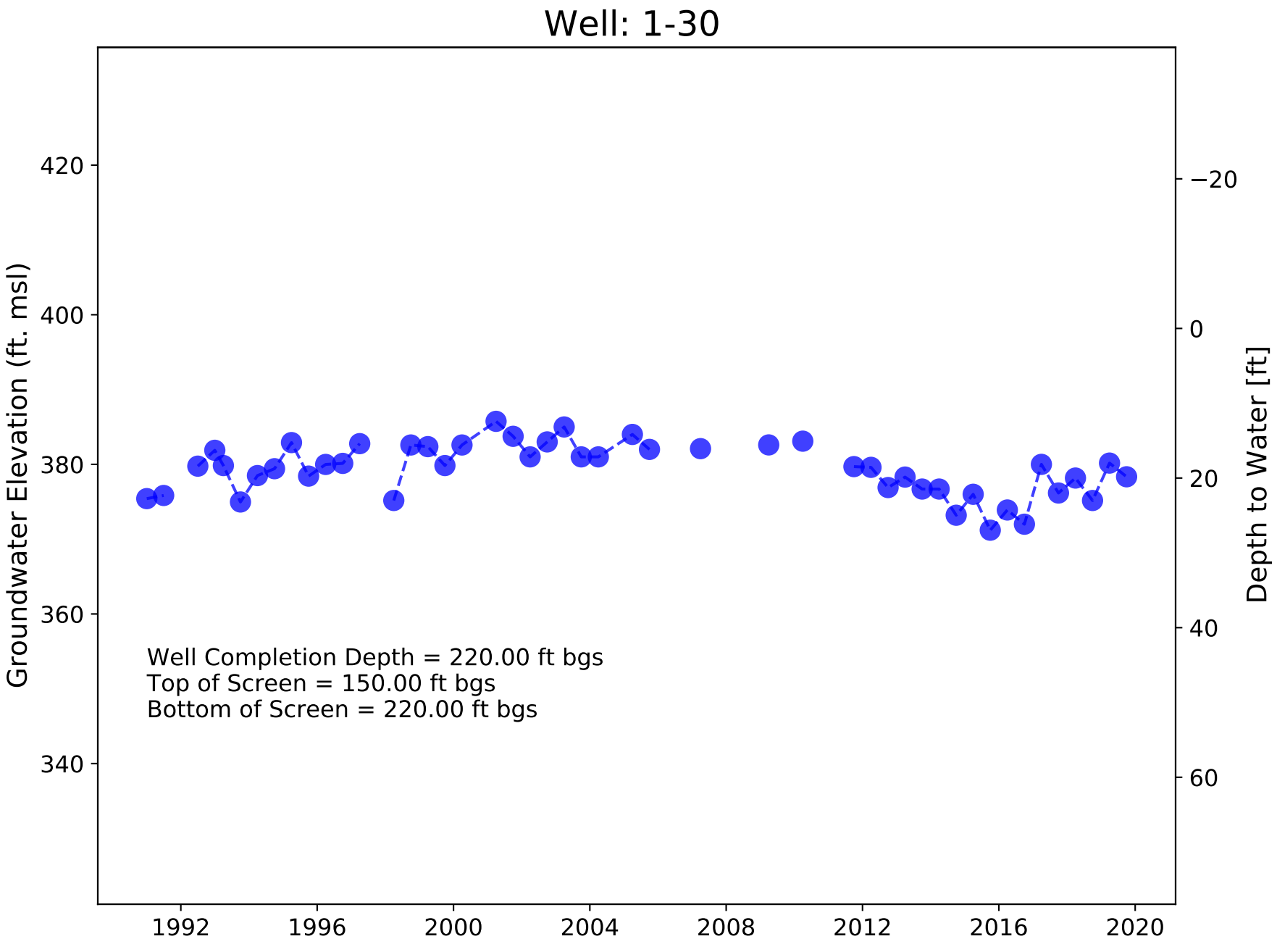

Well: 1-18a
Groundwater Elevation (ft. msl)
Depth to Water [ft]
120
100
80
60
40
120
140
160
180
200
2017-10
2018-01
2018-04
2018-07
2018-10
2019-01
2019-04
2019-07
2019-10
Well Completion Depth = 190.00 ft bgs
Top of Screen = 105.00 ft bgs
Bottom of Screen = 180.00 ft bgs

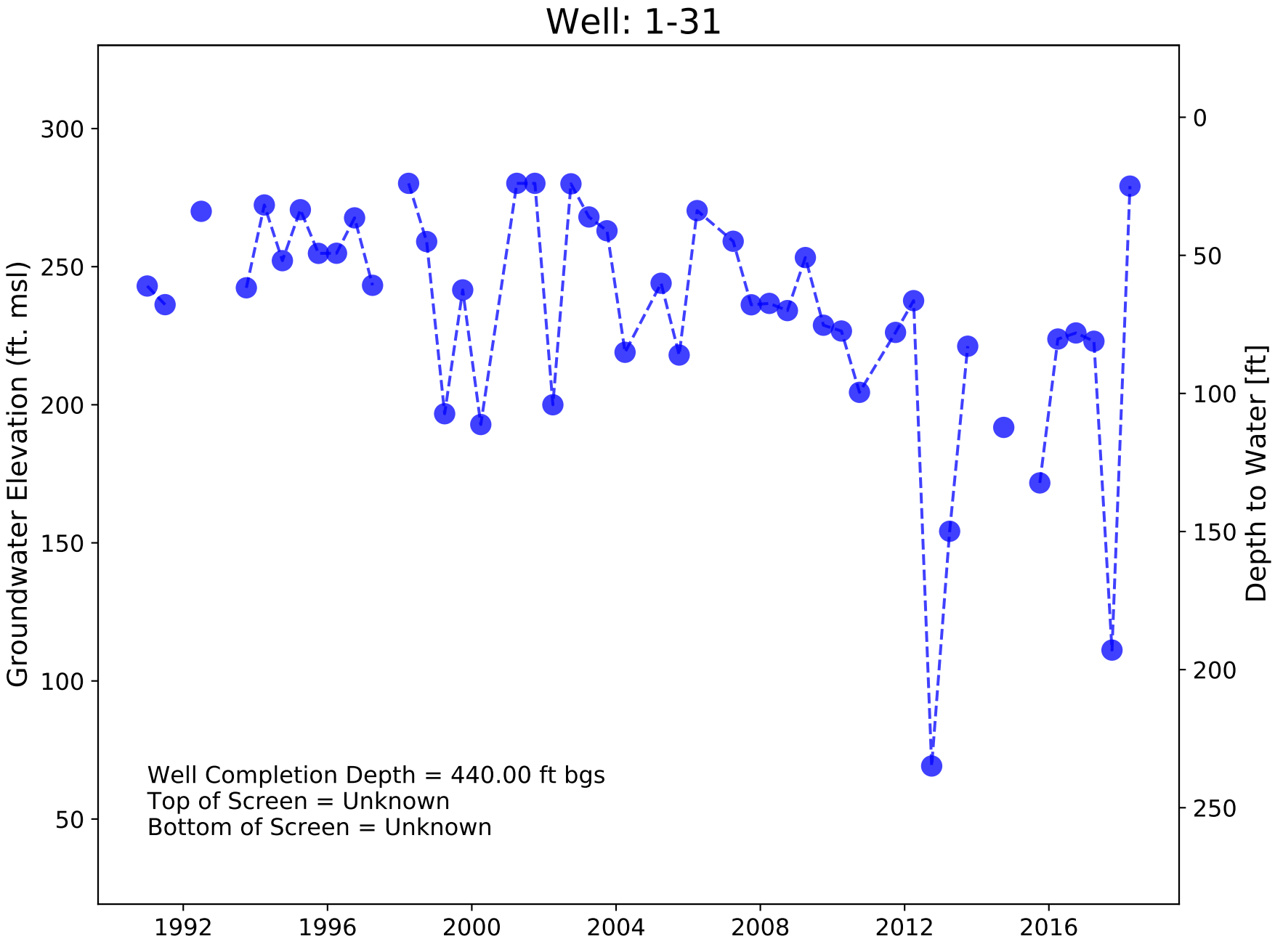

Well: 1-19
Groundwater Elevation (ft. msl)
Depth to Water [ft]
250
200
150
100
50
0
0
50
100
150
200
1960
1970
1980
1990
2000
2010
2020
Well Completion Depth = 400.00 ft bgs
Top of Screen = 150.00 ft bgs
Bottom of Screen = 390.00 ft bgs

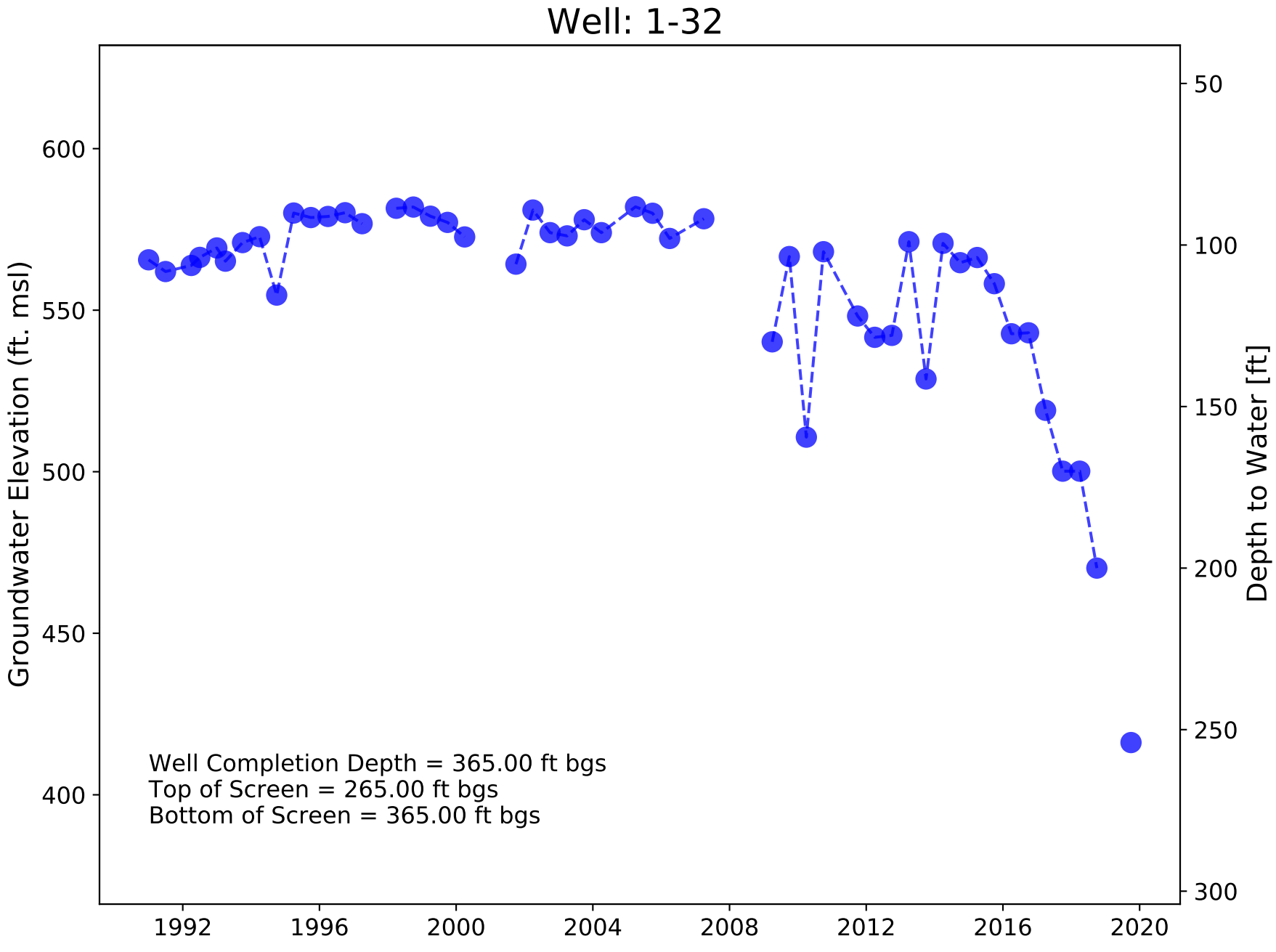

Well: 1-21
Groundwater Elevation (ft. msl)
Depth to Water [ft]
350
325
300
275
250
225
200
175
−25
0
25
50
75
100
125
1992
1996
2000
2004
2008
2012
2016
2020
Well Completion Depth = 200.00 ft bgs
Top of Screen = 80.00 ft bgs
Bottom of Screen = 120.00 ft bgs

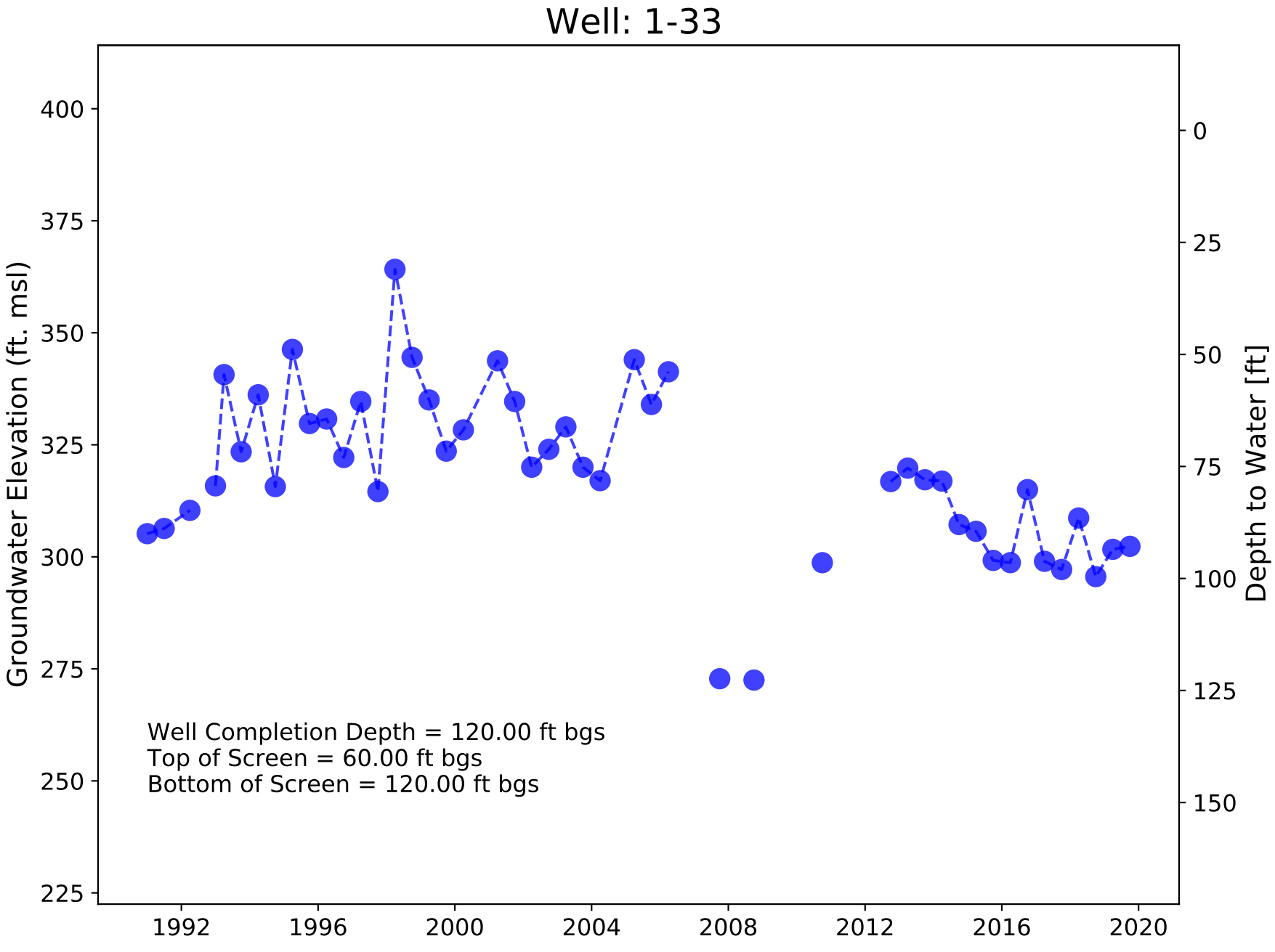

Well: 1-28
Groundwater Elevation (ft. msl)
Depth to Water [ft]
550
525
500
475
450
425
400
375
350
−50
−25
0
25
50
75
100
125
150
1992
1996
2000
2004
2008
2012
2016
2020
Well Completion Depth = 370.00 ft bgs
Top of Screen = 85.00 ft bgs
Bottom of Screen = 365.00 ft bgs

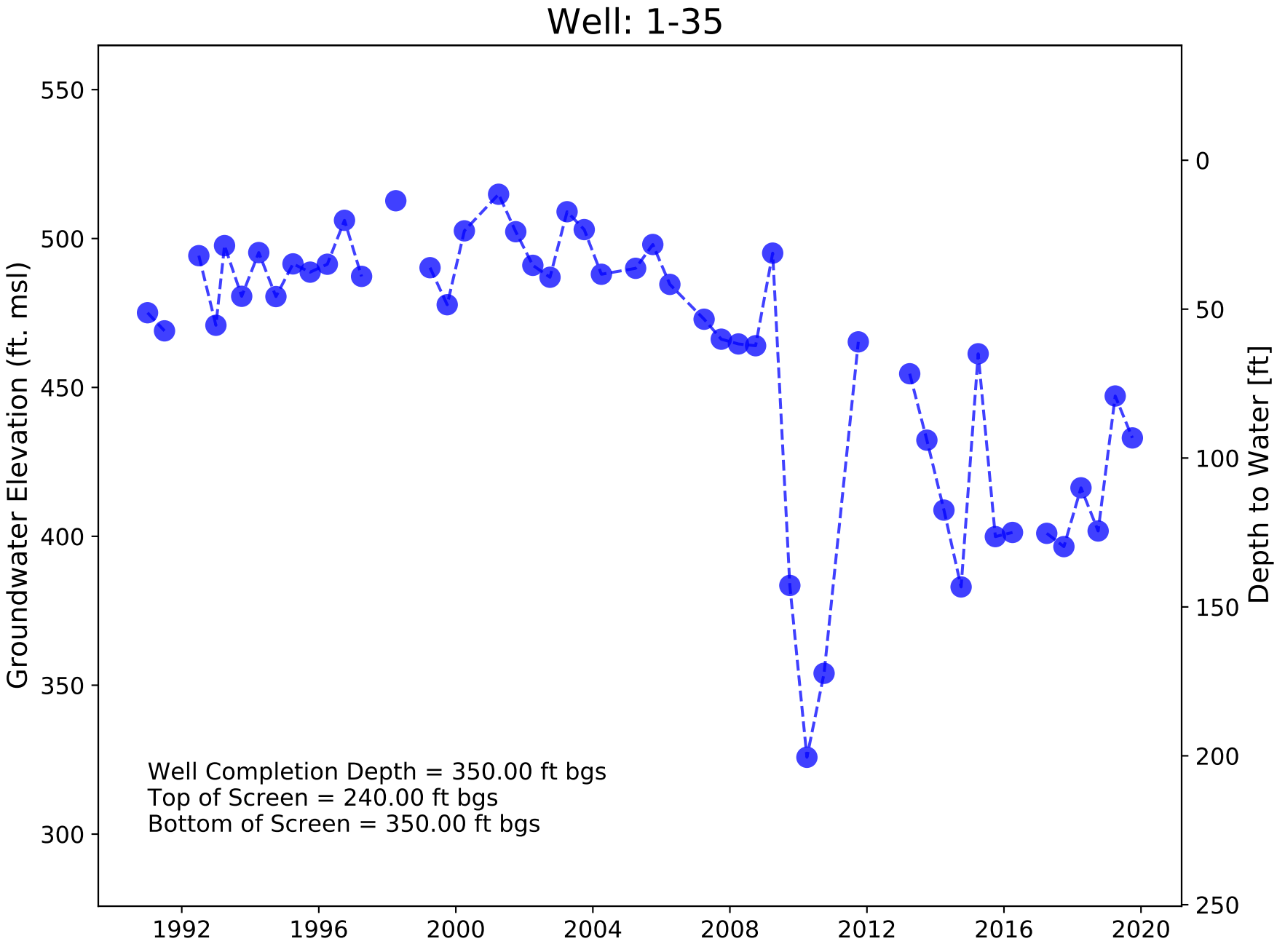

Well: 1-29
Groundwater Elevation (ft. msl)
Depth to Water [ft]
550
500
450
400
350
0
50
100
150
200
1992
1996
2000
2004
2008
2012
2016
2020
Well Completion Depth = 290.00 ft bgs
Top of Screen = 110.00 ft bgs
Bottom of Screen = 290.00 ft bgs

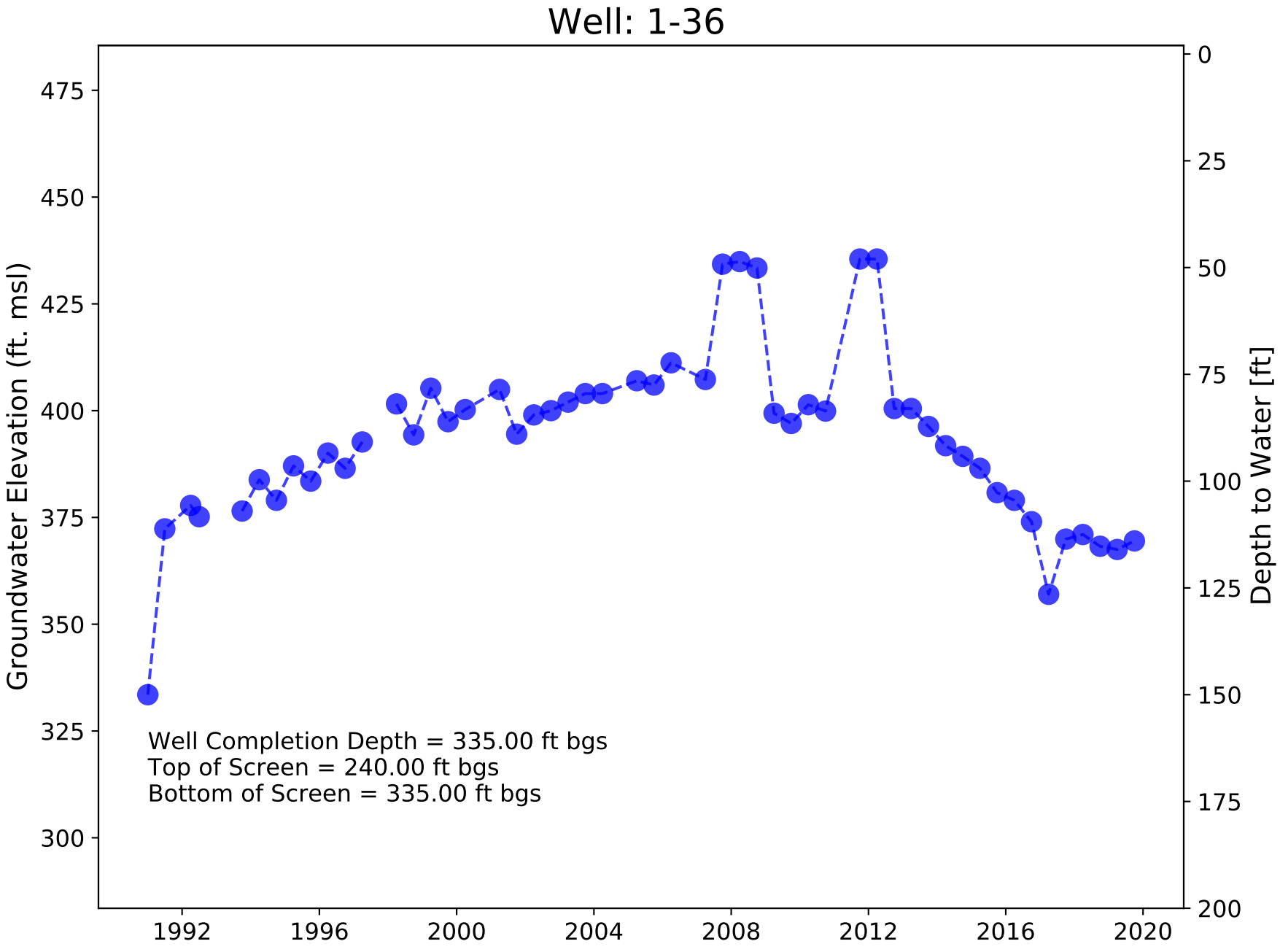

Well: 1-30
Groundwater Elevation (ft. msl)
Depth to Water [ft]
420
400
380
360
340
−20
0
20
40
60
1992
1996
2000
2004
2008
2012
2016
2020
Well Completion Depth = 220.00 ft bgs
Top of Screen = 150.00 ft bgs
Bottom of Screen = 220.00 ft bgs

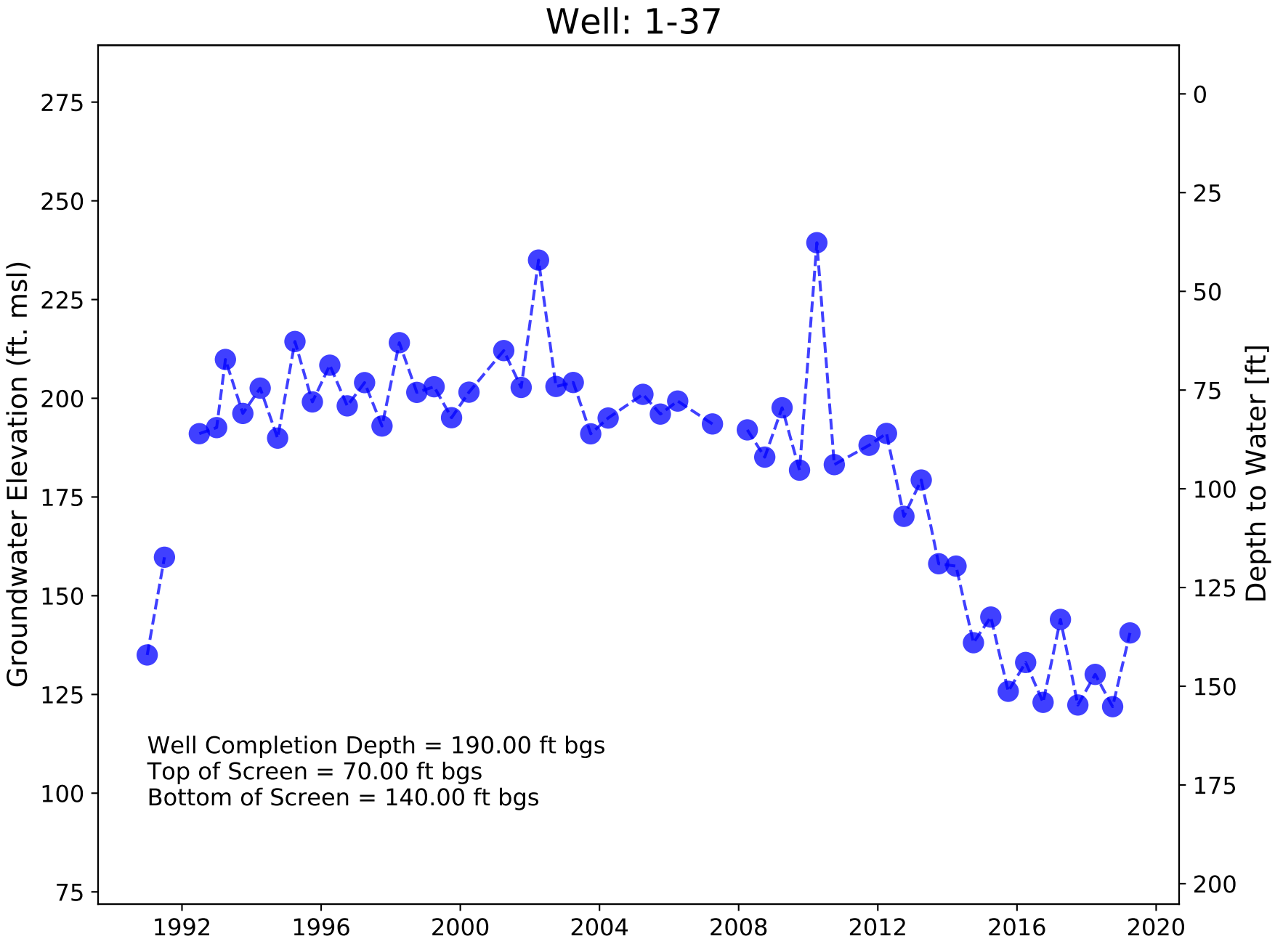

Well: 1-31
Groundwater Elevation (ft. msl)
Depth to Water [ft]
300
250
200
150
100
50
0
50
100
150
200
250
1992
1996
2000
2004
2008
2012
2016
Well Completion Depth = 440.00 ft bgs
Top of Screen = Unknown
Bottom of Screen = Unknown

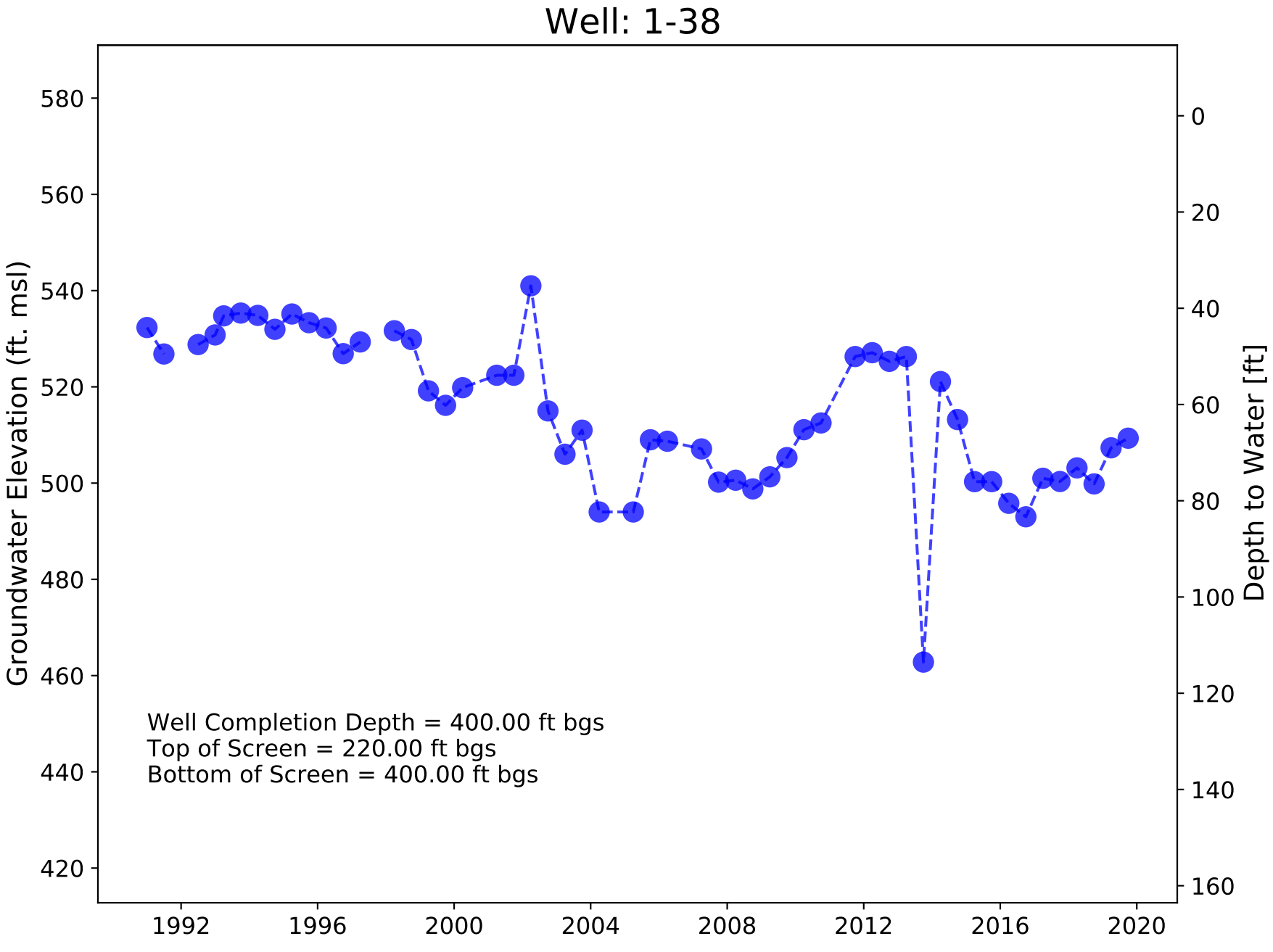

Well: 1-32
Groundwater Elevation (ft. msl)
Depth to Water [ft]
600
550
500
450
400
50
100
150
200
250
300
1992
1996
2000
2004
2008
2012
2016
2020
Well Completion Depth = 365.00 ft bgs
Top of Screen = 265.00 ft bgs
Bottom of Screen = 365.00 ft bgs

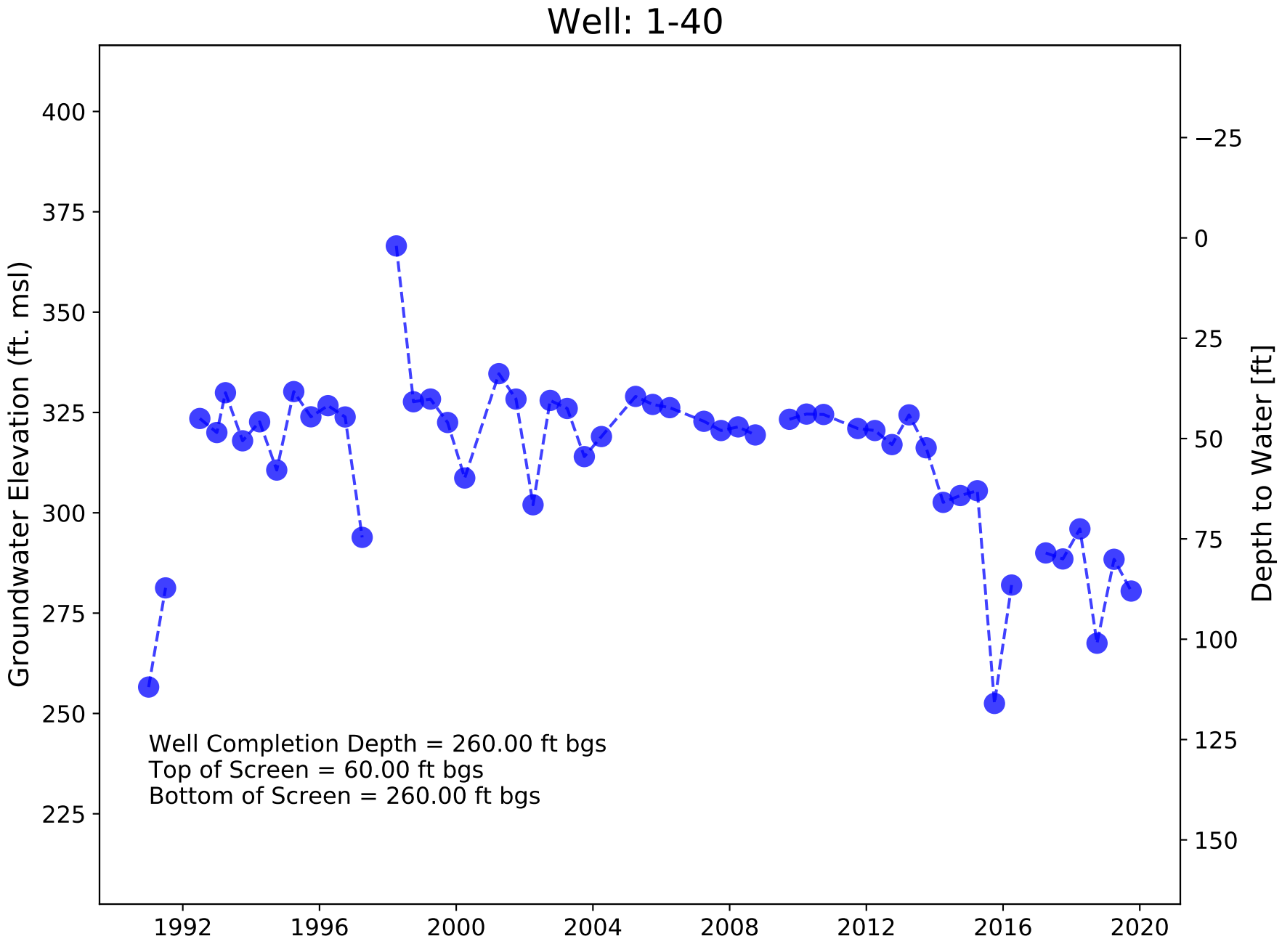

Well: 1-33
Groundwater Elevation (ft. msl)
Depth to Water [ft]
400
375
350
325
300
275
250
225
0
25
50
75
100
125
150
1992
1996
2000
2004
2008
2012
2016
2020
Well Completion Depth = 120.00 ft bgs
Top of Screen = 60.00 ft bgs
Bottom of Screen = 120.00 ft bgs

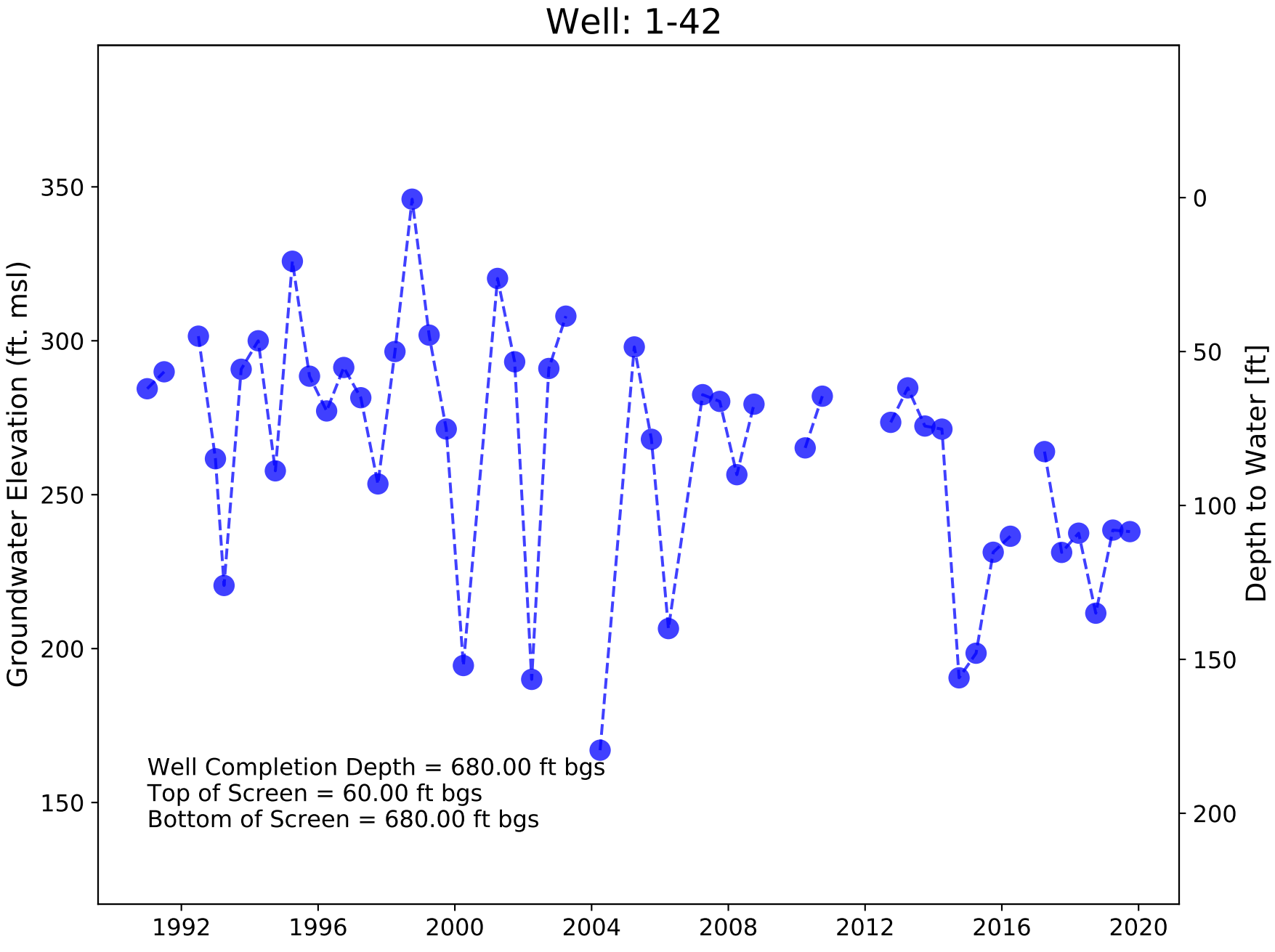

Well: 1-35
Groundwater Elevation (ft. msl)
Depth to Water [ft]
550
500
450
400
350
300
0
50
100
150
200
250
1992
1996
2000
2004
2008
2012
2016
2020
Well Completion Depth = 350.00 ft bgs
Top of Screen = 240.00 ft bgs
Bottom of Screen = 350.00 ft bgs

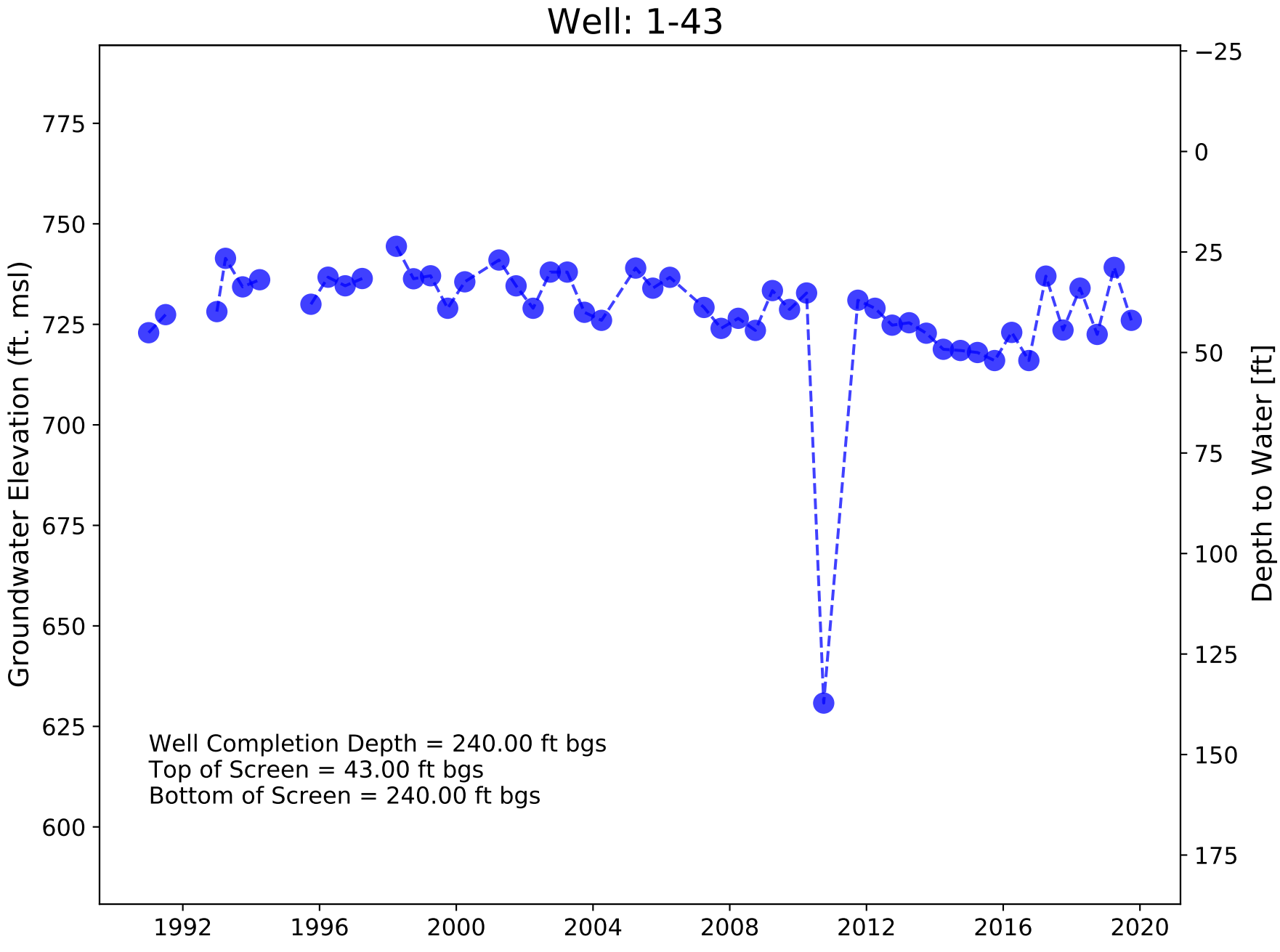

Well: 1-36
Groundwater Elevation (ft. msl)
Depth to Water [ft]
475
450
425
400
375
350
325
300
0
25
50
75
100
125
150
175
200
1992
1996
2000
2004
2008
2012
2016
2020
Well Completion Depth = 335.00 ft bgs
Top of Screen = 240.00 ft bgs
Bottom of Screen = 335.00 ft bgs

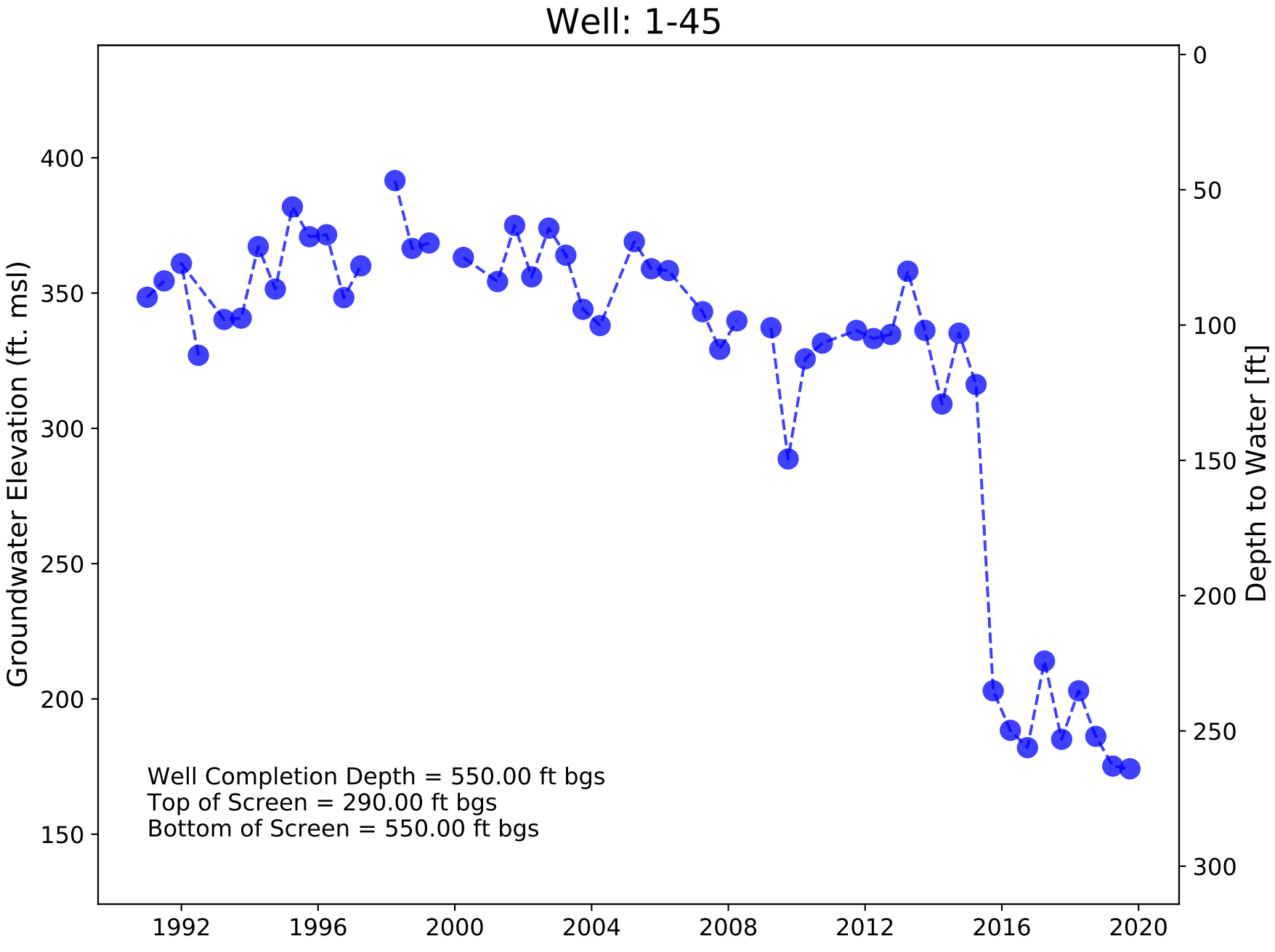

Well: 1-37
Groundwater Elevation (ft. msl)
Depth to Water [ft]
275
250
225
200
175
150
125
100
75
0
25
50
75
100
125
150
175
200
1992
1996
2000
2004
2008
2012
2016
2020
Well Completion Depth = 190.00 ft bgs
Top of Screen = 70.00 ft bgs
Bottom of Screen = 140.00 ft bgs

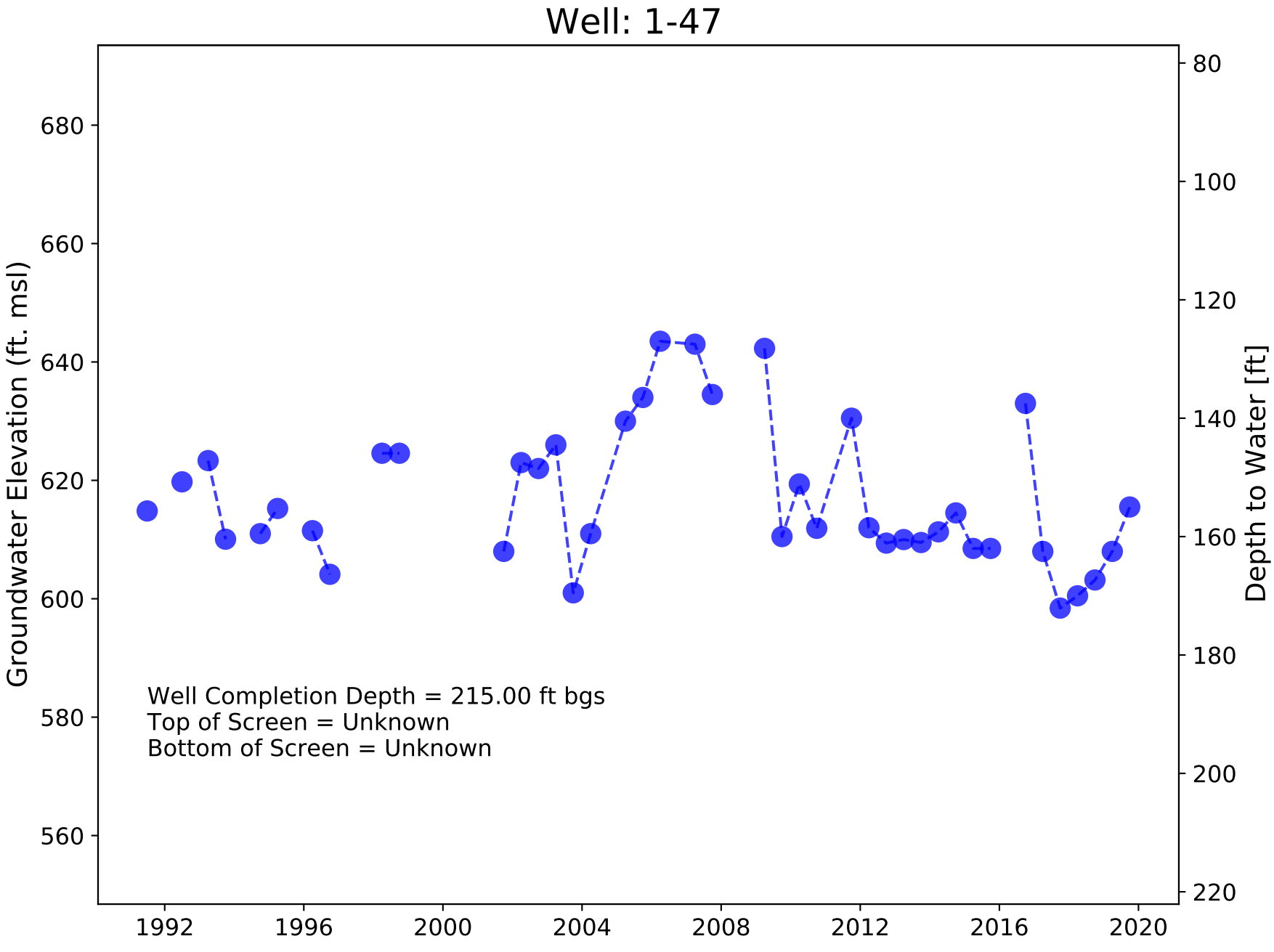

Well: 1-38
Groundwater Elevation (ft. msl)
Depth to Water [ft]
580
560
540
520
500
480
460
440
420
0
20
40
60
80
100
120
140
160
1992
1996
2000
2004
2008
2012
2016
2020
Well Completion Depth = 400.00 ft bgs
Top of Screen = 220.00 ft bgs
Bottom of Screen = 400.00 ft bgs

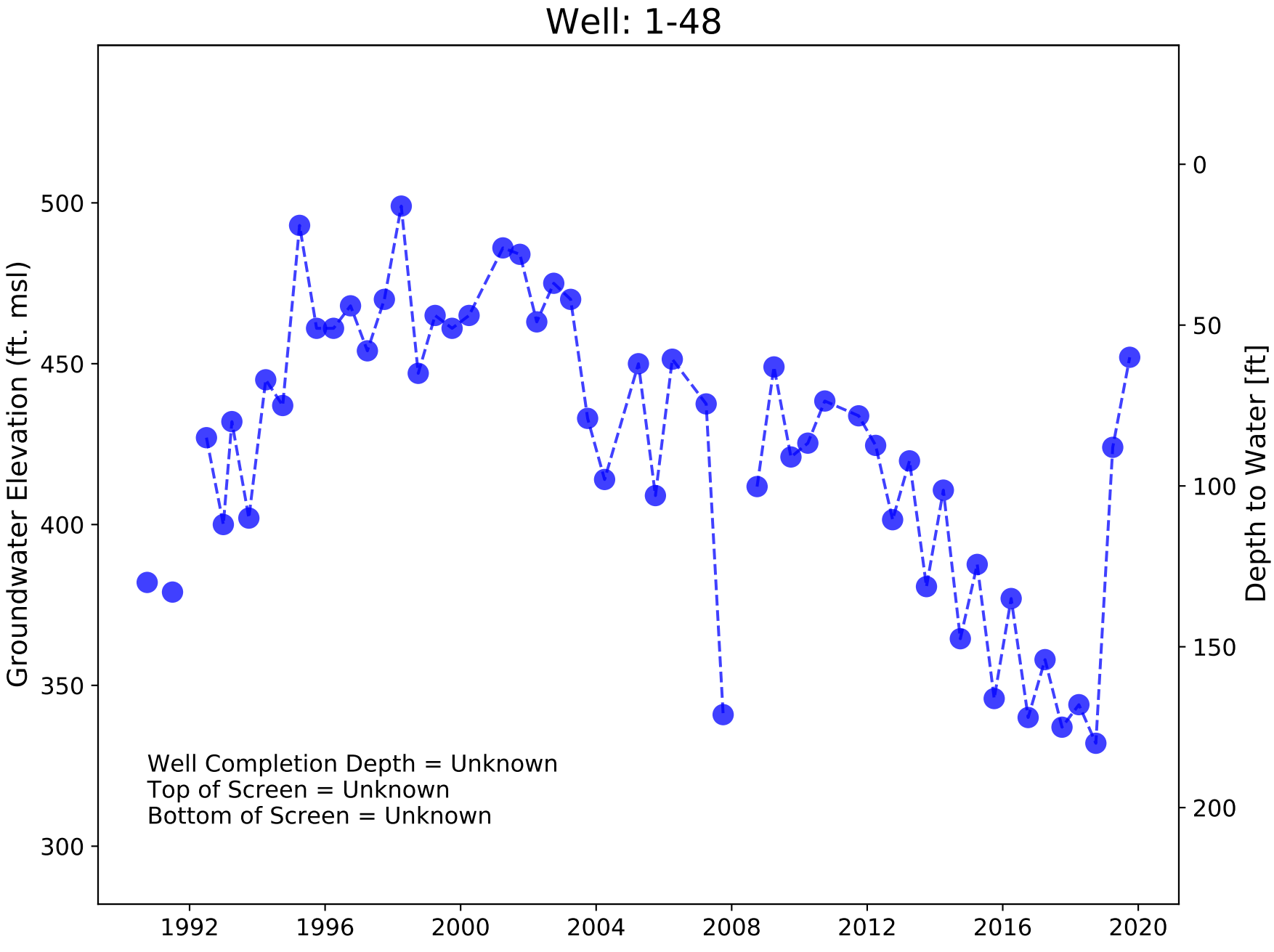

Well: 1-40
Groundwater Elevation (ft. msl)
Depth to Water [ft]
400
375
350
325
300
275
250
225
−25
0
25
50
75
100
125
150
1992
1996
2000
2004
2008
2012
2016
2020
Well Completion Depth = 260.00 ft bgs
Top of Screen = 60.00 ft bgs
Bottom of Screen = 260.00 ft bgs

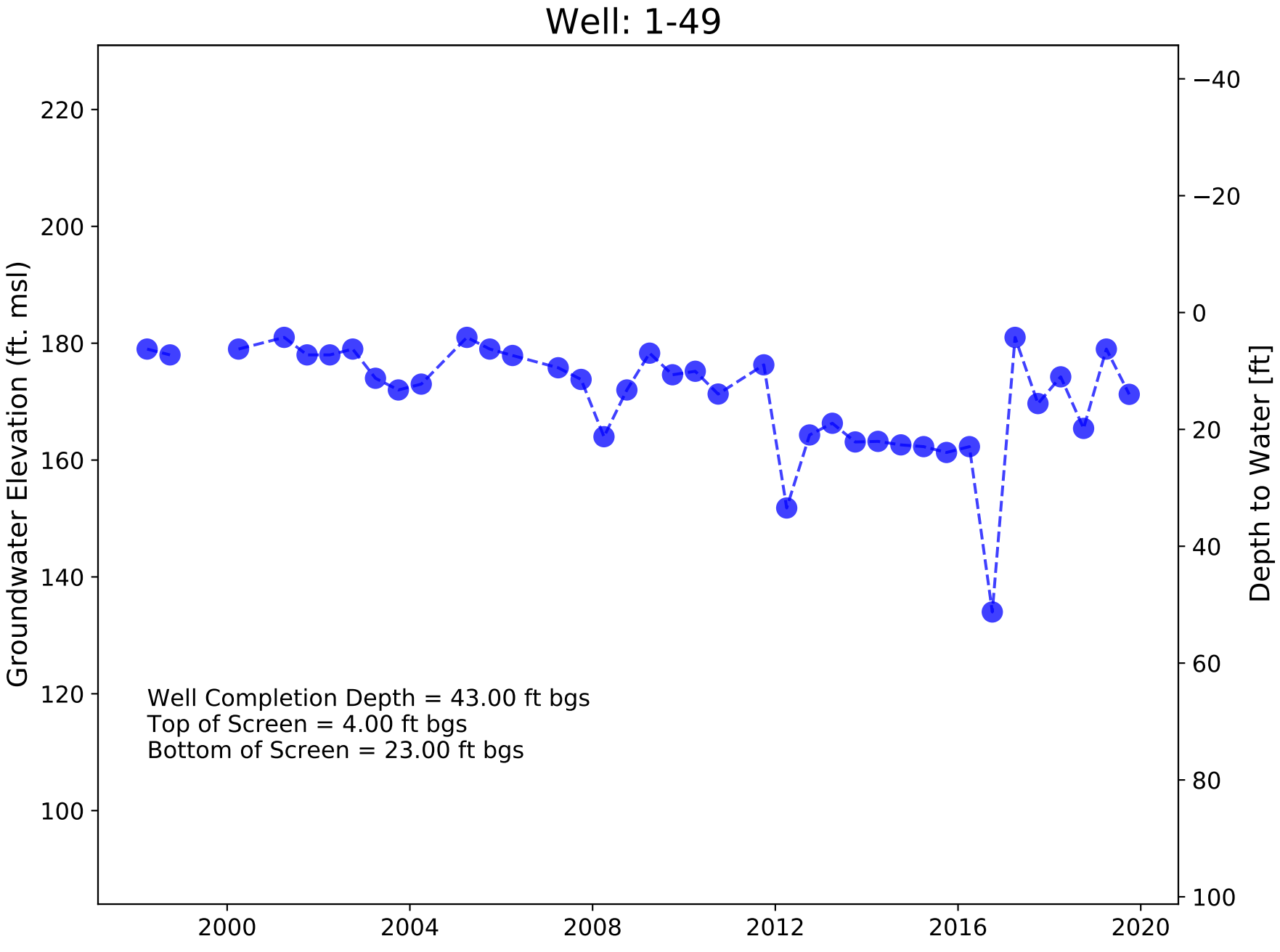

Well: 1-42
Groundwater Elevation (ft. msl)
Depth to Water [ft]
350
300
250
200
150
0
50
100
150
200
1992
1996
2000
2004
2008
2012
2016
2020
Well Completion Depth = 680.00 ft bgs
Top of Screen = 60.00 ft bgs
Bottom of Screen = 680.00 ft bgs

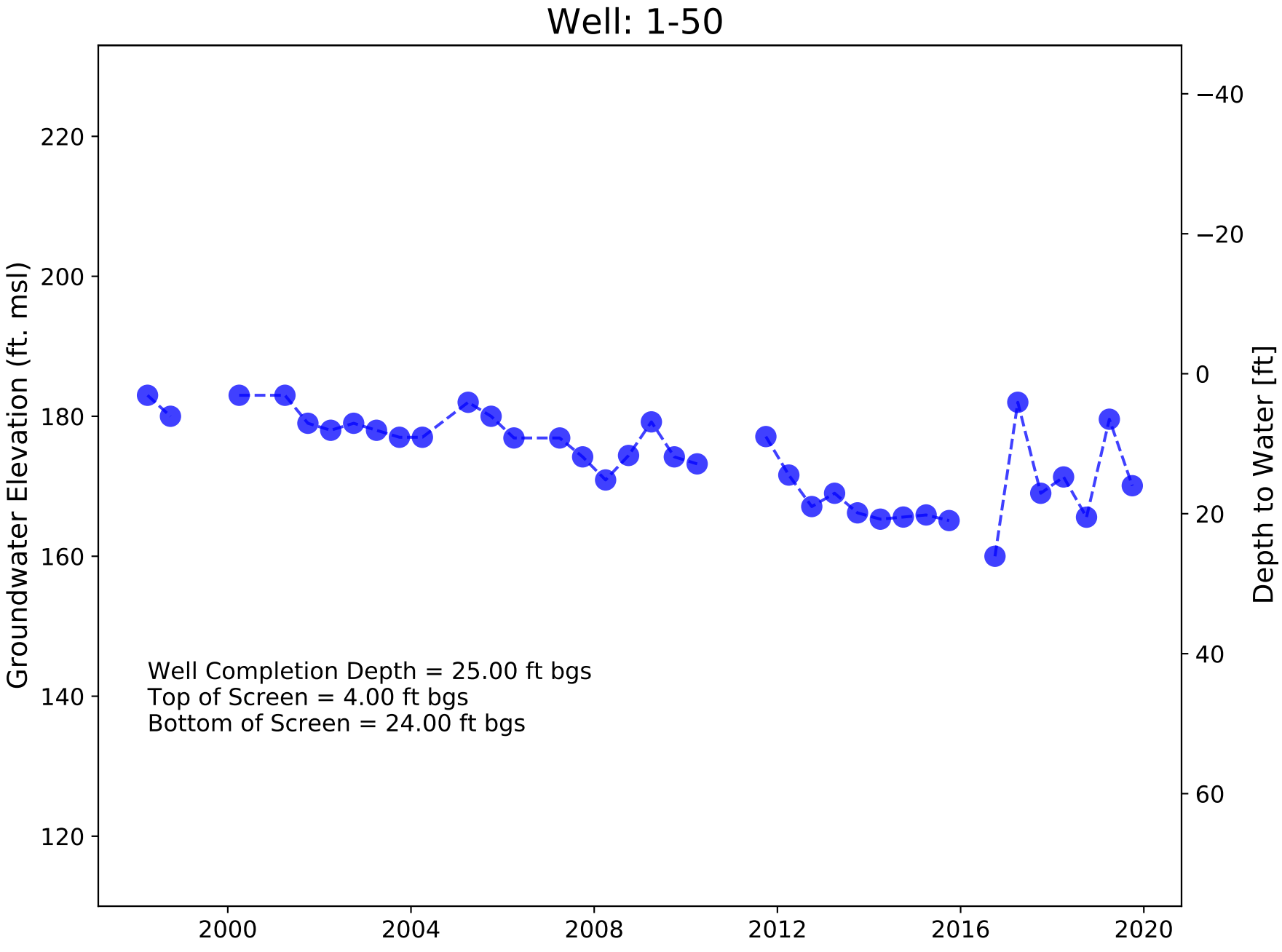

Well: 1-43
Groundwater Elevation (ft. msl)
Depth to Water [ft]
775
750
725
700
675
650
625
600
−25
0
25
50
75
100
125
150
175
1992
1996
2000
2004
2008
2012
2016
2020
Well Completion Depth = 240.00 ft bgs
Top of Screen = 43.00 ft bgs
Bottom of Screen = 240.00 ft bgs

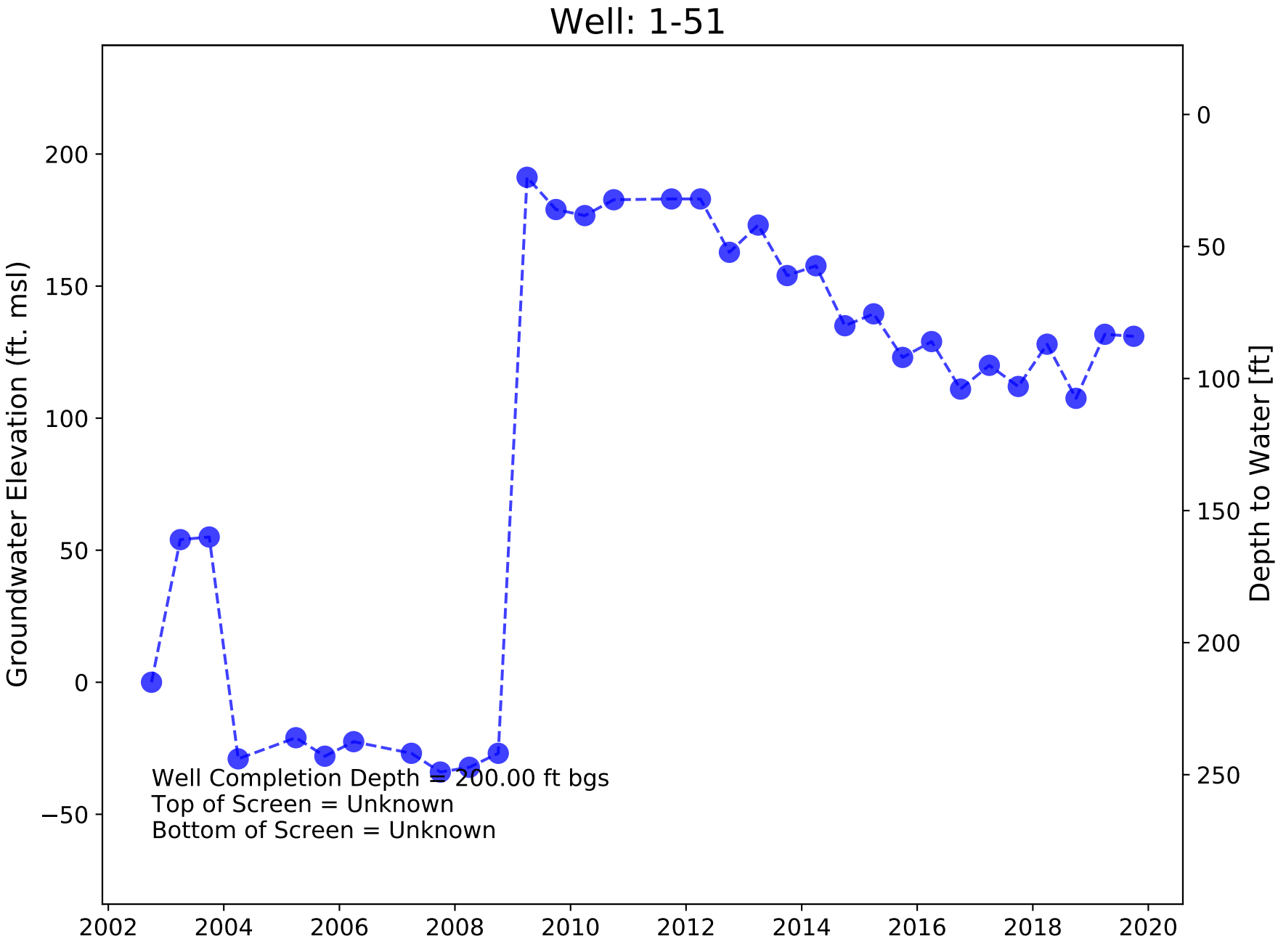

Well: 1-45
Groundwater Elevation (ft. msl)
Depth to Water [ft]
400
350
300
250
200
150
0
50
100
150
200
250
300
1992
1996
2000
2004
2008
2012
2016
2020
Well Completion Depth = 550.00 ft bgs
Top of Screen = 290.00 ft bgs
Bottom of Screen = 550.00 ft bgs

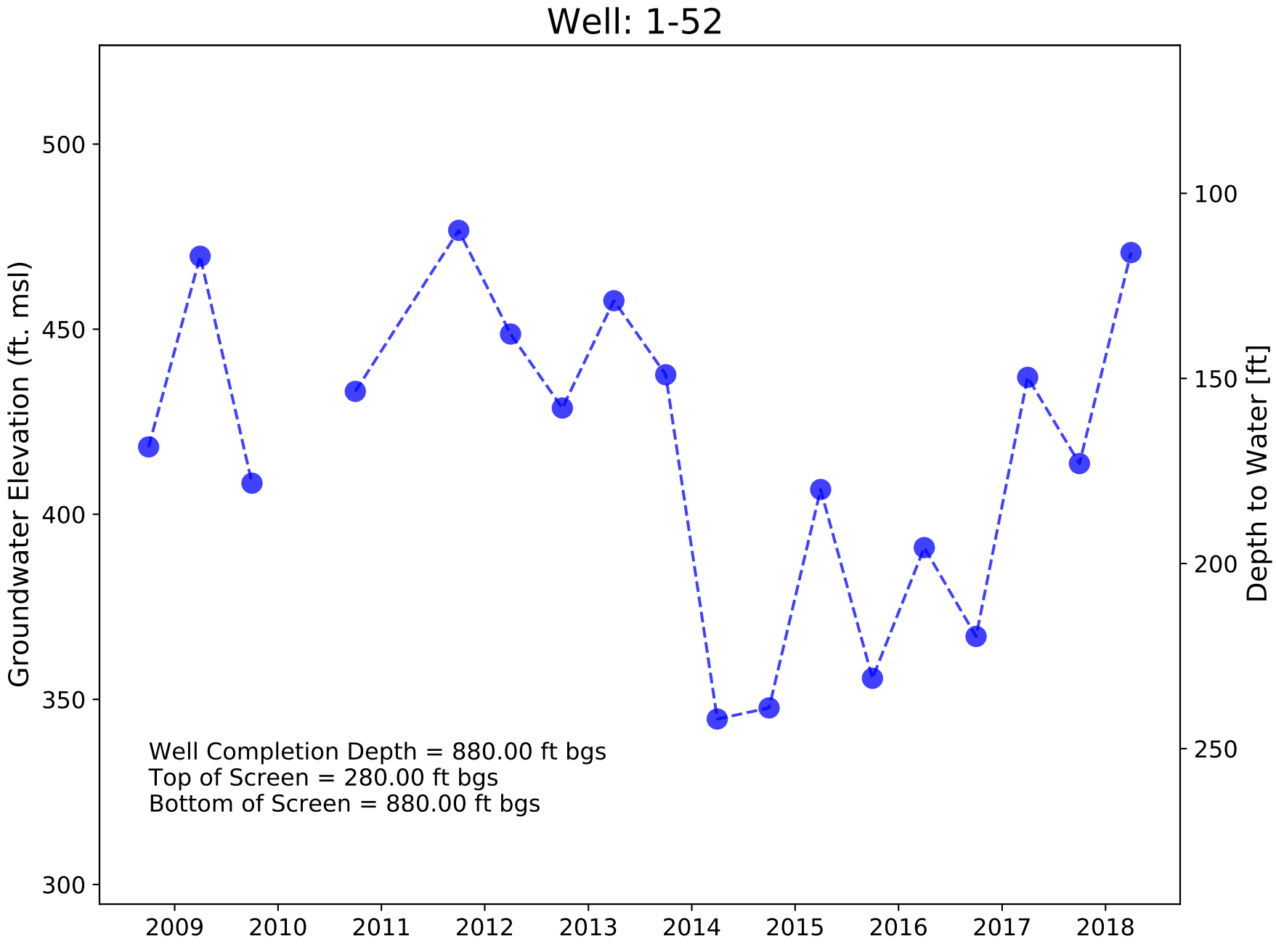

Well: 1-47
Groundwater Elevation (ft. msl)
Depth to Water [ft]
680
660
640
620
600
580
560
80
100
120
140
160
180
200
220
1992
1996
2000
2004
2008
2012
2016
2020
Well Completion Depth = 215.00 ft bgs
Top of Screen = Unknown
Bottom of Screen = Unknown

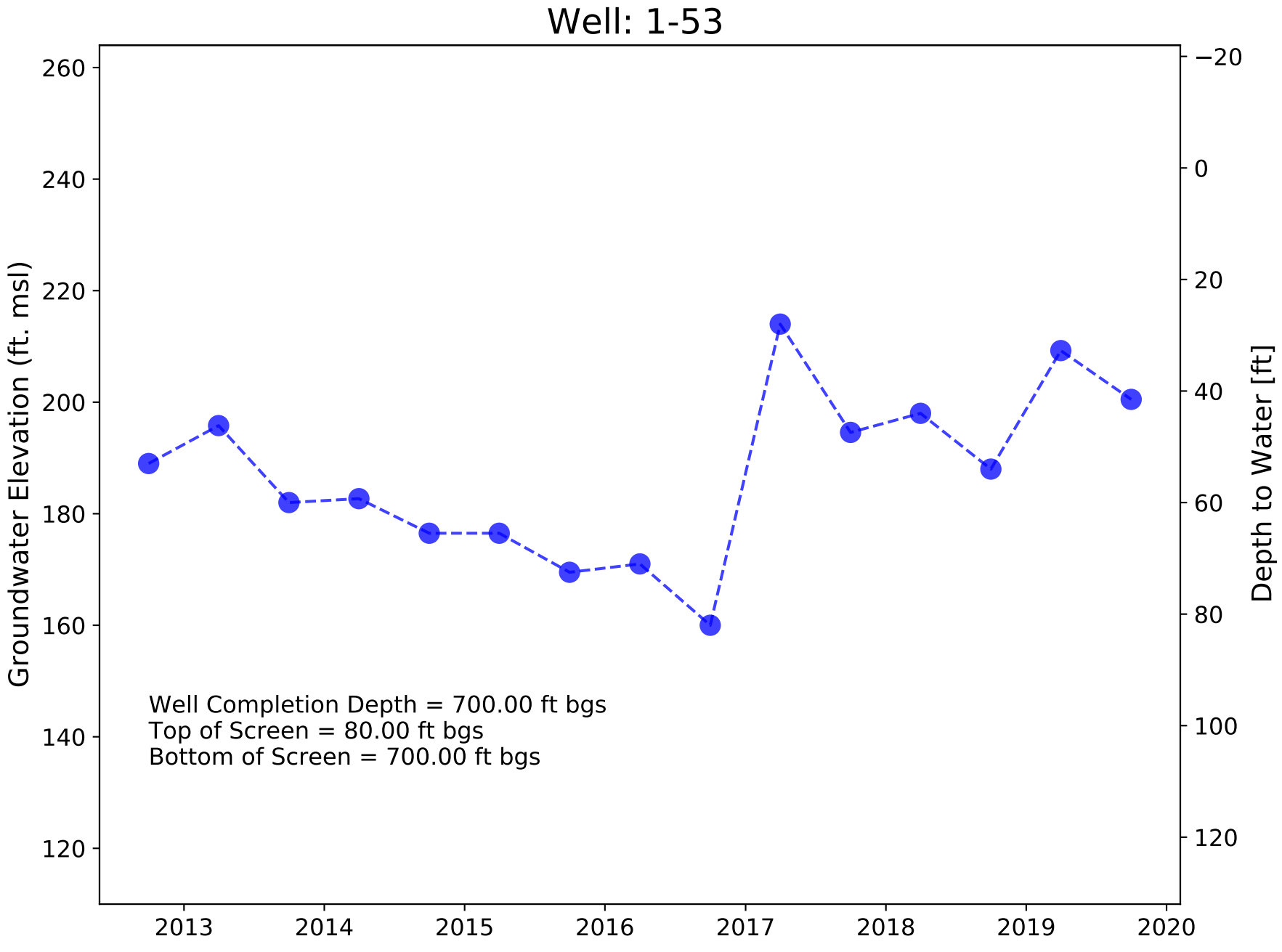

Well: 1-48
Groundwater Elevation (ft. msl)
Depth to Water [ft]
500
450
400
350
300
0
50
100
150
200
1992
1996
2000
2004
2008
2012
2016
2020
Well Completion Depth = Unknown
Top of Screen = Unknown
Bottom of Screen = Unknown

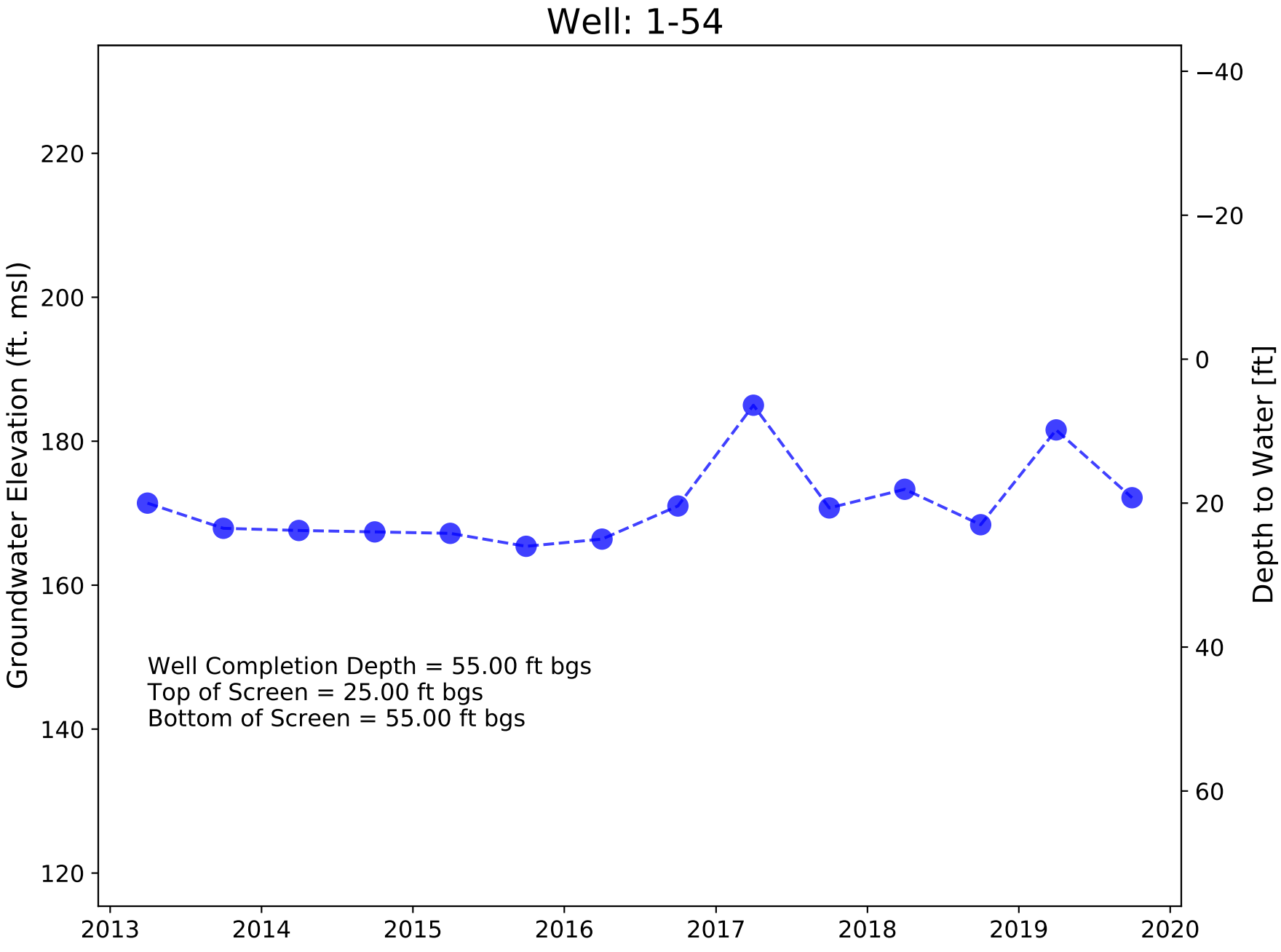

Well: 1-49
Groundwater Elevation (ft. msl)
Depth to Water [ft]
220
200
180
160
140
120
100
−40
−20
0
20
40
60
80
100
2000
2004
2008
2012
2016
2020
Well Completion Depth = 43.00 ft bgs
Top of Screen = 4.00 ft bgs
Bottom of Screen = 23.00 ft bgs

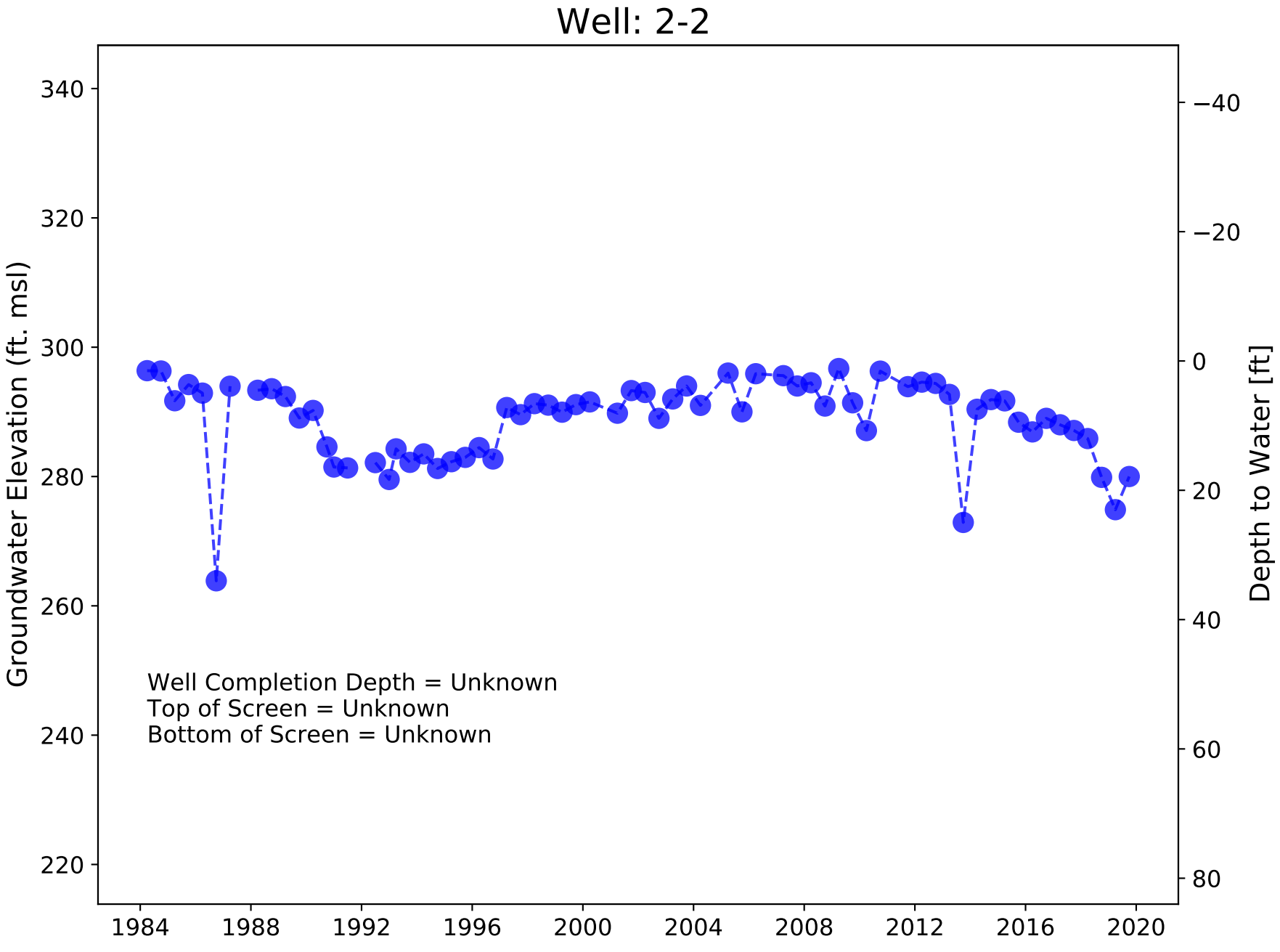

Well: 1-50
Groundwater Elevation (ft. msl)
Depth to Water [ft]
220
200
180
160
140
120
−40
−20
0
20
40
60
2000
2004
2008
2012
2016
2020
Well Completion Depth = 25.00 ft bgs
Top of Screen = 4.00 ft bgs
Bottom of Screen = 24.00 ft bgs

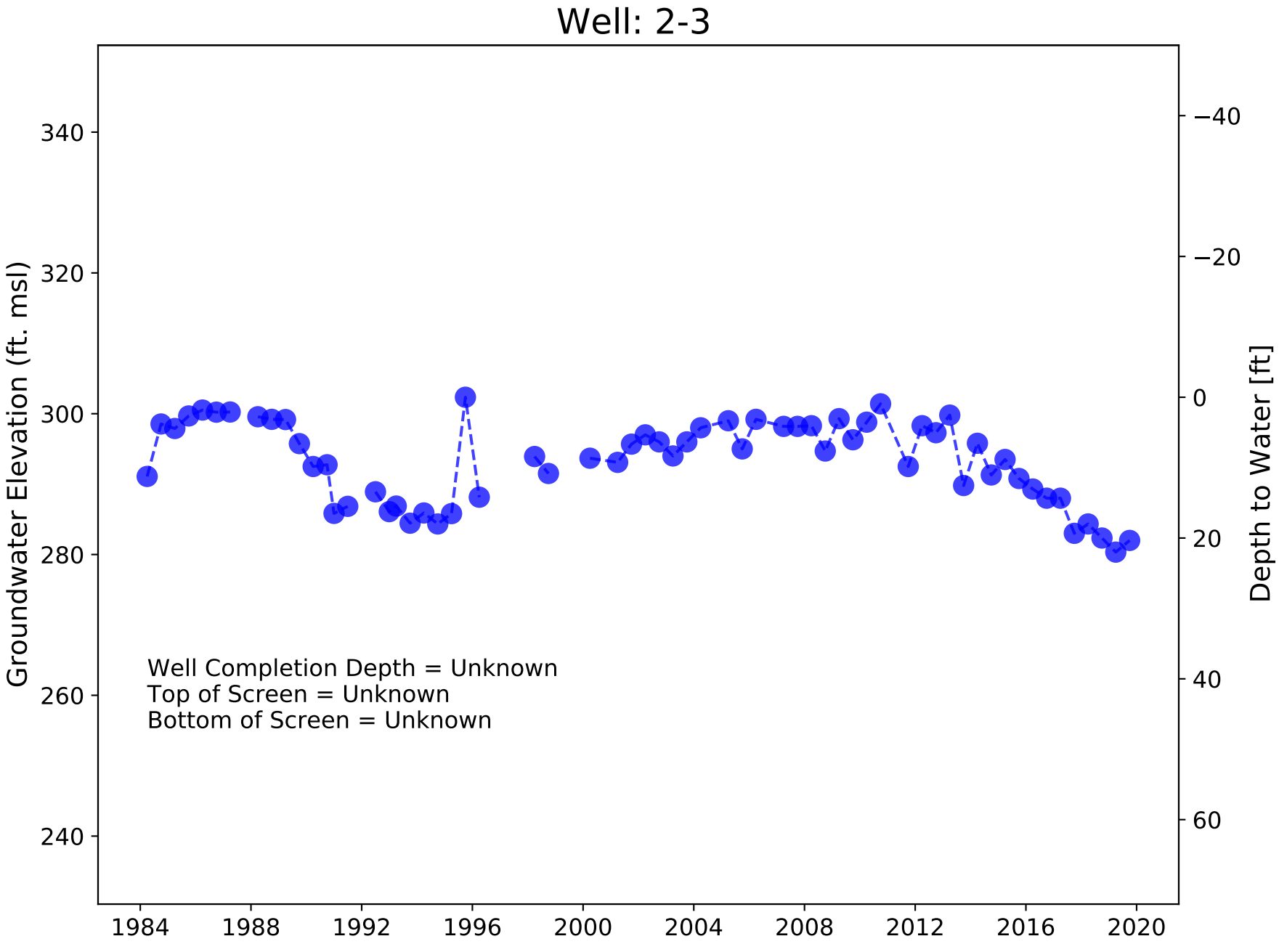

Well: 1-51
Groundwater Elevation (ft. msl)
Depth to Water [ft]
200
150
100
50
0
−50
0
50
100
150
200
250
2002
2004
2006
2008
2010
2012
2014
2016
2018
2020
Well Completion Depth = 200.00 ft bgs
Top of Screen = Unknown
Bottom of Screen = Unknown

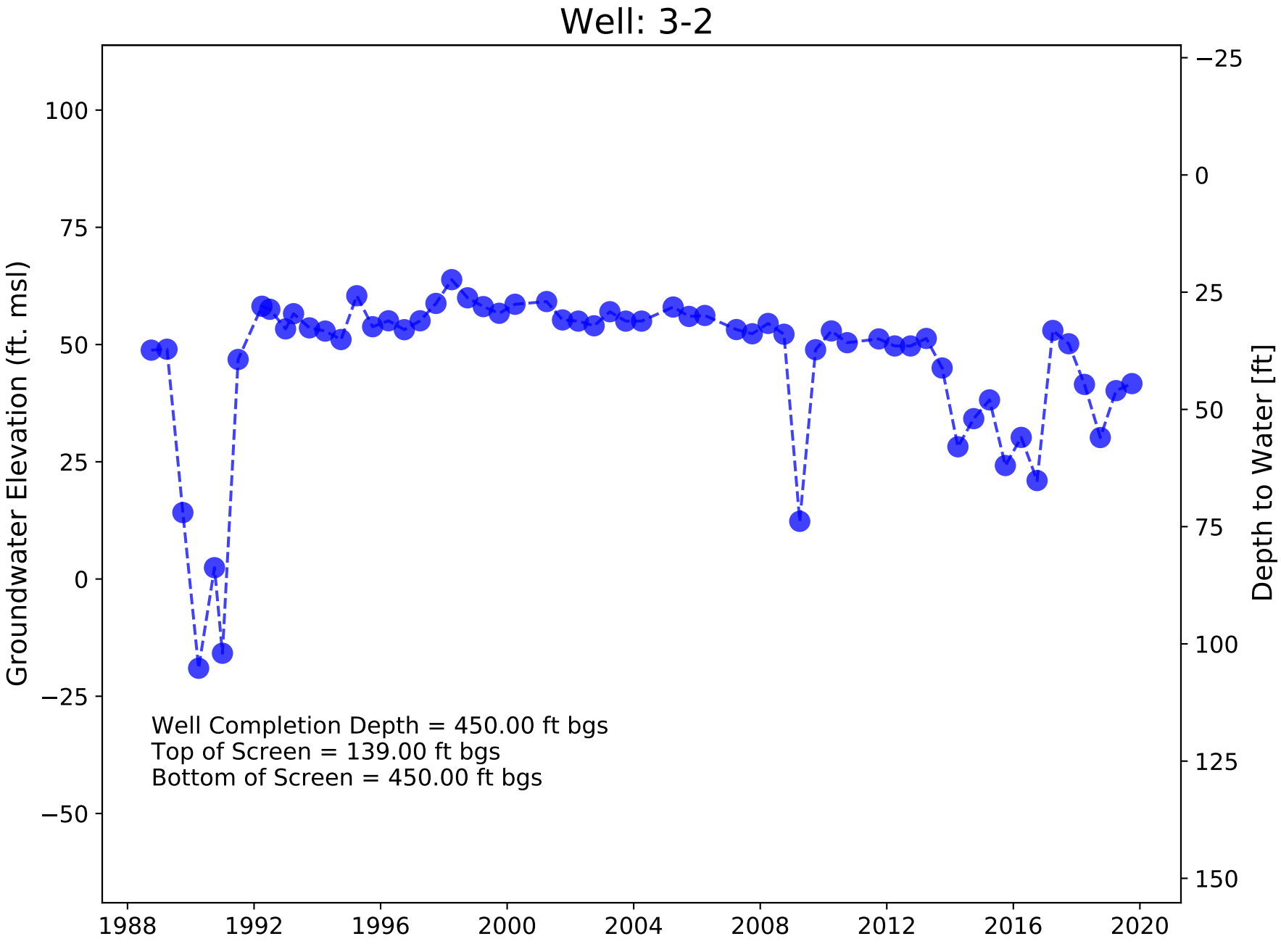

Well: 1-52
Groundwater Elevation (ft. msl)
Depth to Water [ft]
500
450
400
350
300
100
150
200
250
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
Well Completion Depth = 880.00 ft bgs
Top of Screen = 280.00 ft bgs
Bottom of Screen = 880.00 ft bgs

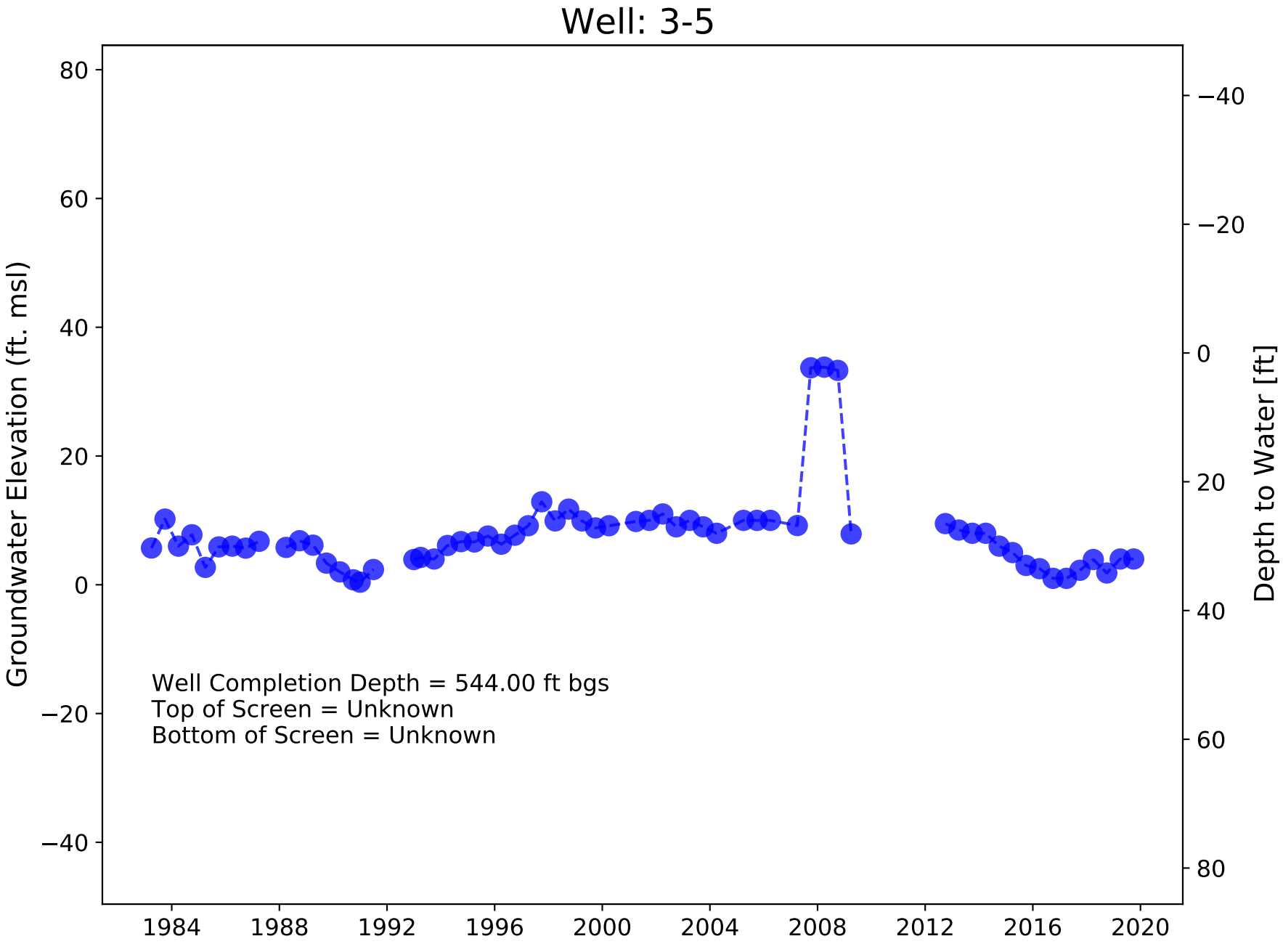

Well: 1-53
Groundwater Elevation (ft. msl)
Depth to Water [ft]
260
240
220
200
180
160
140
120
−20
0
20
40
60
80
100
120
2013
2014
2015
2016
2017
2018
2019
2020
Well Completion Depth = 700.00 ft bgs
Top of Screen = 80.00 ft bgs
Bottom of Screen = 700.00 ft bgs

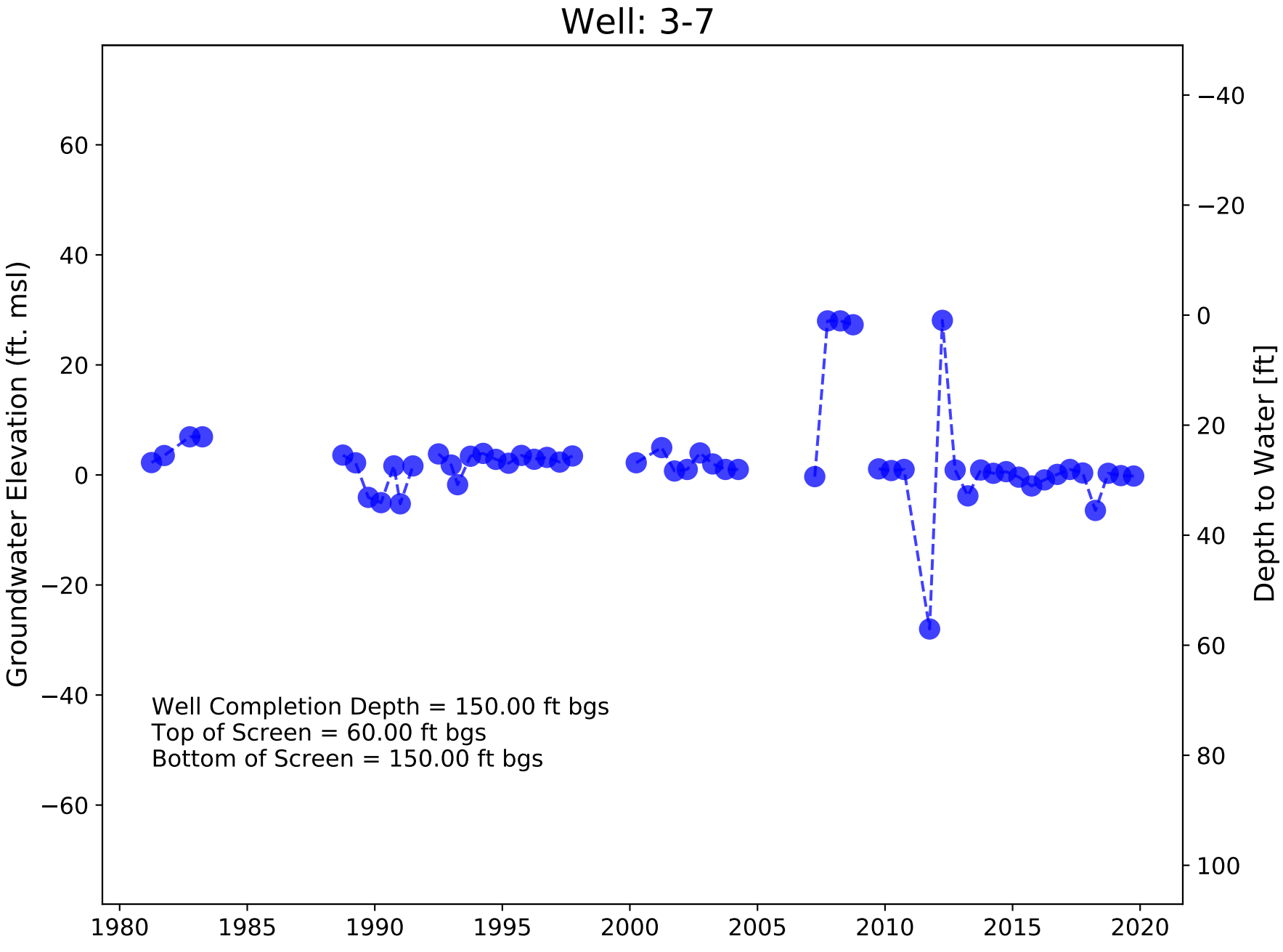

Well: 1-54
Groundwater Elevation (ft. msl)
Depth to Water [ft]
220
200
180
160
140
120
−40
−20
0
20
40
60
2013
2014
2015
2016
2017
2018
2019
2020
Well Completion Depth = 55.00 ft bgs
Top of Screen = 25.00 ft bgs
Bottom of Screen = 55.00 ft bgs

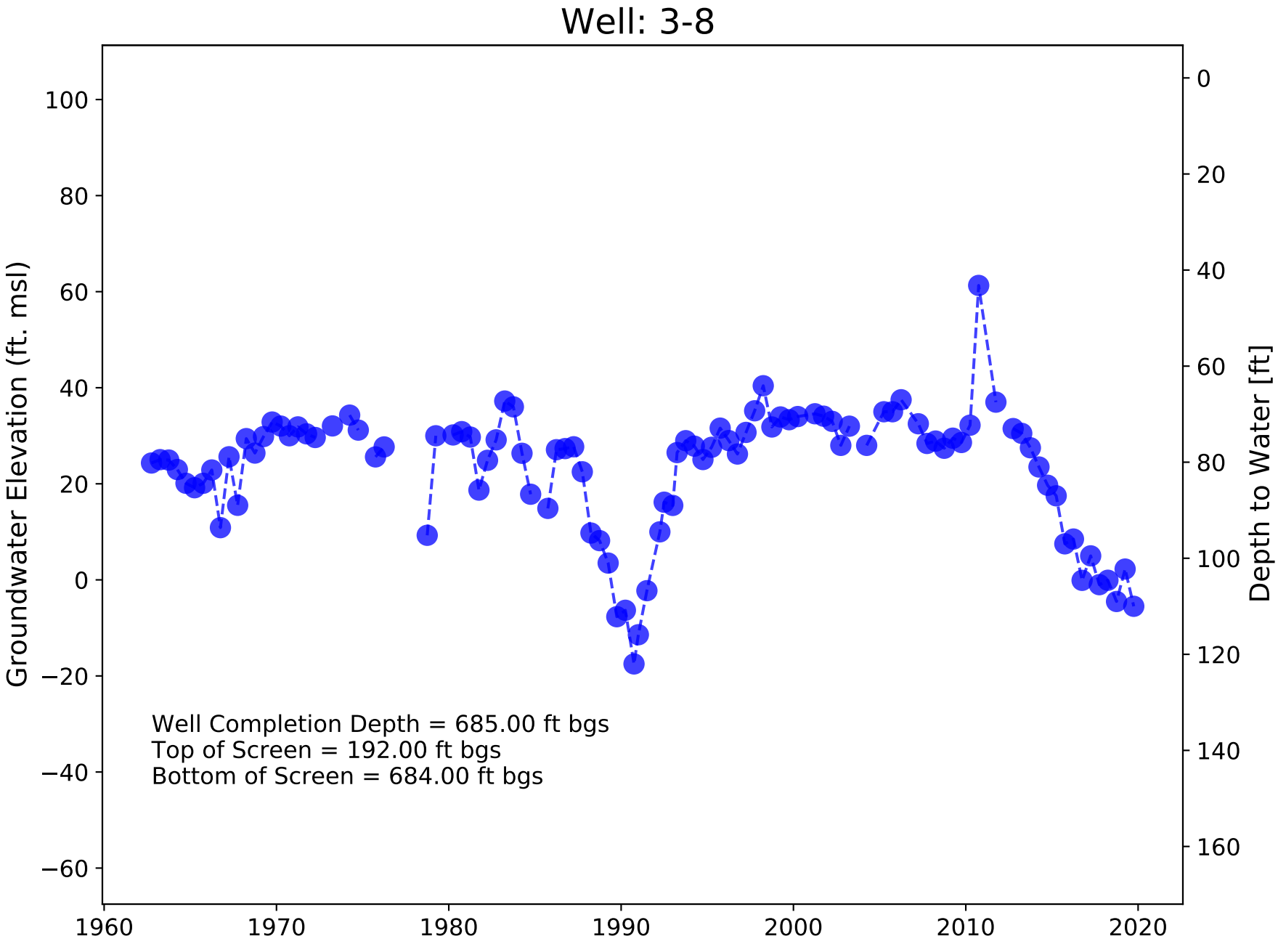

Well: 2-2
Groundwater Elevation (ft. msl)
Depth to Water [ft]
340
320
300
280
260
240
220
−40
−20
0
20
40
60
80
1984
1988
1992
1996
2000
2004
2008
2012
2016
2020
Well Completion Depth = Unknown
Top of Screen = Unknown
Bottom of Screen = Unknown

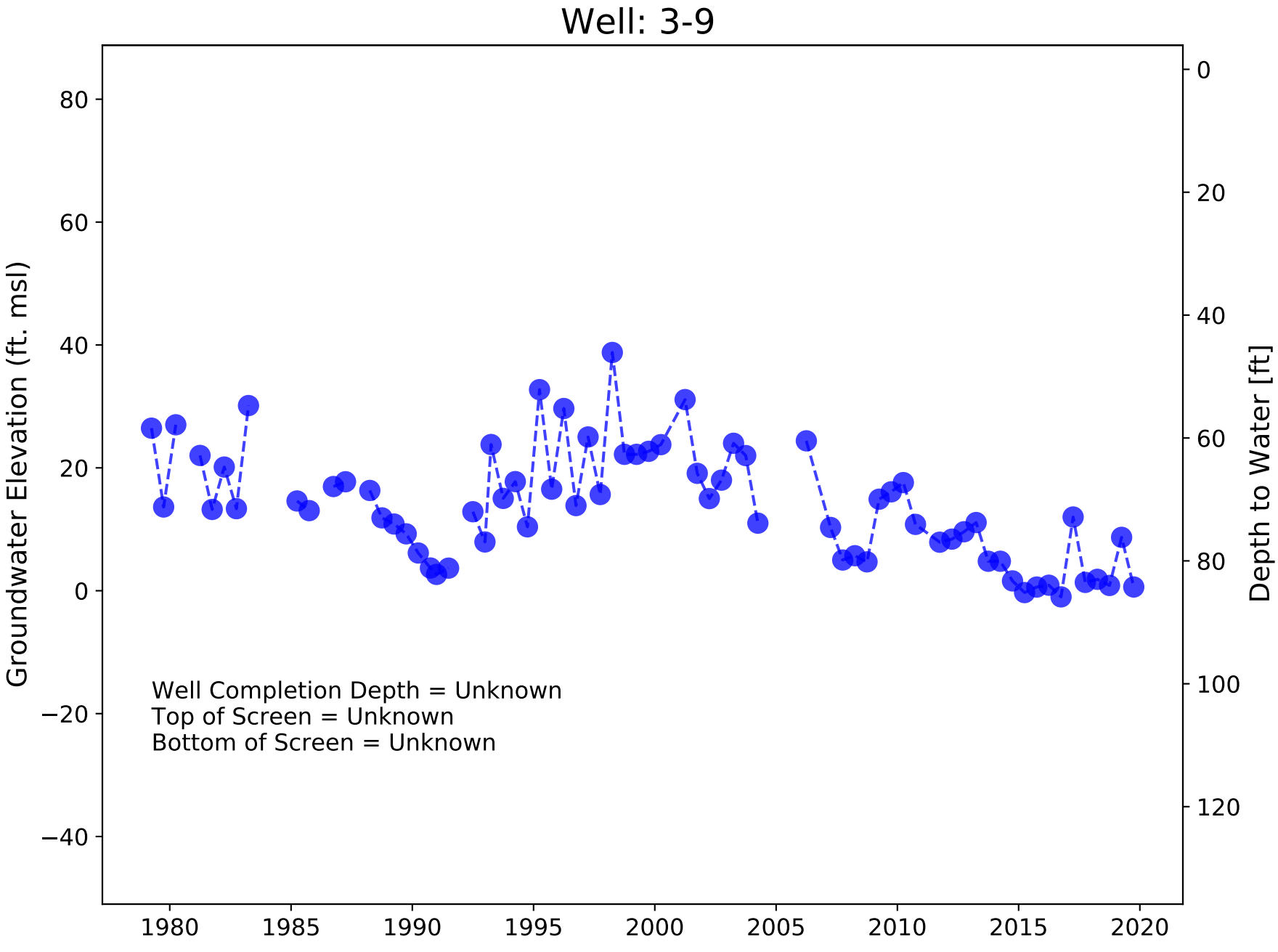

Well: 2-3
Groundwater Elevation (ft. msl)
Depth to Water [ft]
340
320
300
280
260
240
−40
−20
0
20
40
60
1984
1988
1992
1996
2000
2004
2008
2012
2016
2020
Well Completion Depth = Unknown
Top of Screen = Unknown
Bottom of Screen = Unknown

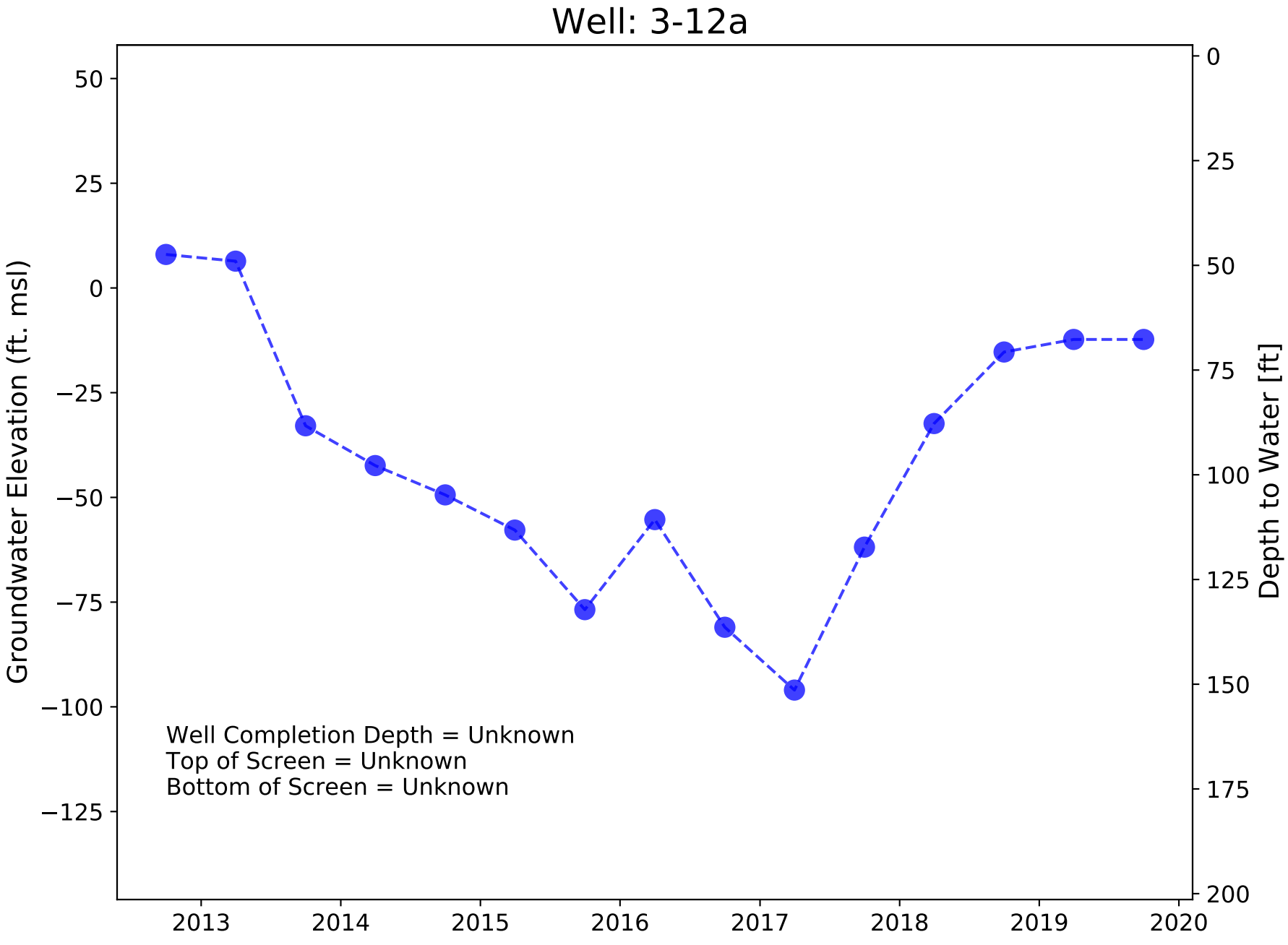

Well: 3-2
Groundwater Elevation (ft. msl)
Depth to Water [ft]
100
75
50
25
0
−25
−50
−25
0
25
50
75
100
125
150
1988
1992
1996
2000
2004
2008
2012
2016
2020
Well Completion Depth = 450.00 ft bgs
Top of Screen = 139.00 ft bgs
Bottom of Screen = 450.00 ft bgs

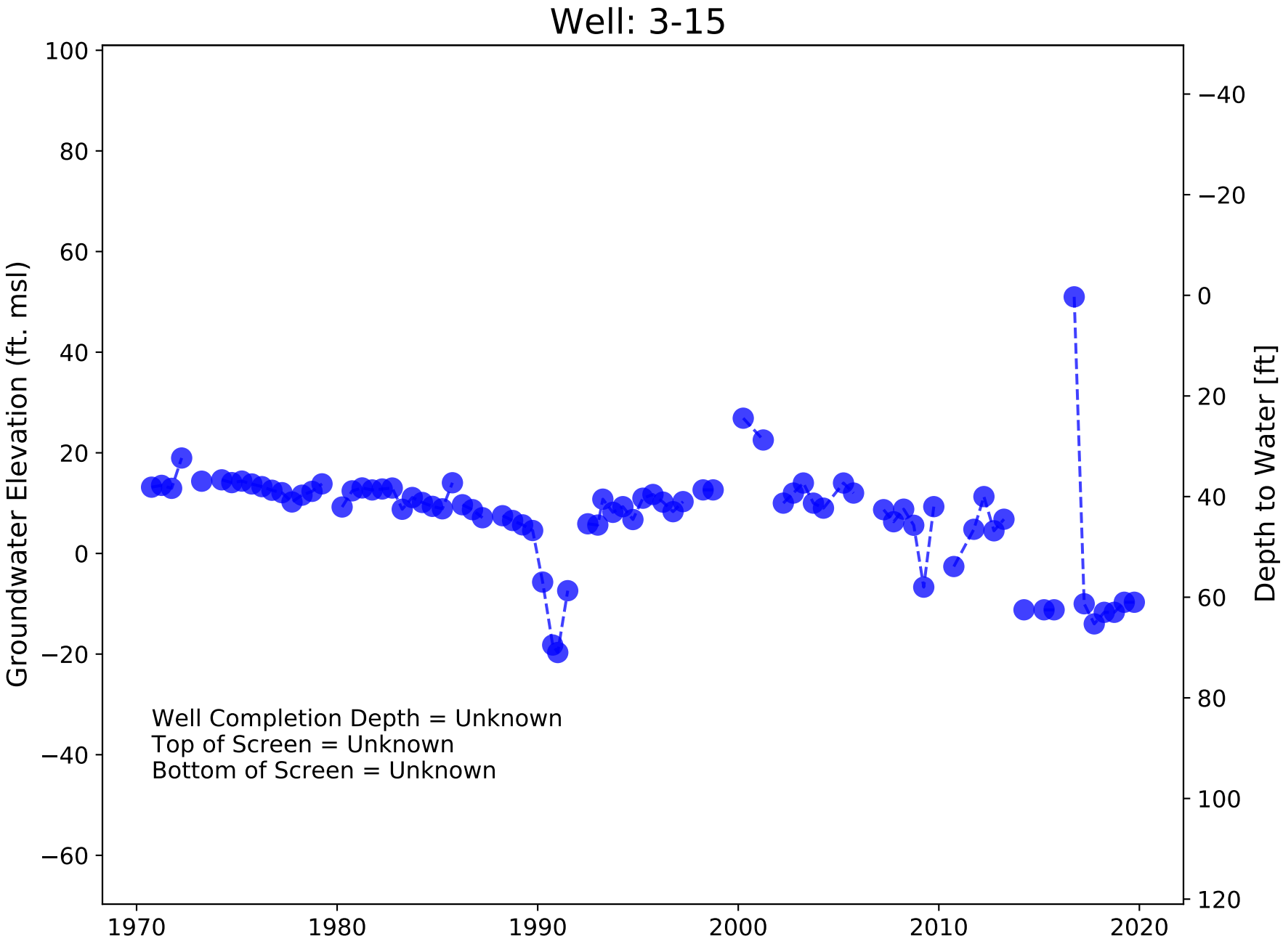

Well: 3-5
Groundwater Elevation (ft. msl)
Depth to Water [ft]
80
60
40
20
0
−20
−40
−40
−20
0
20
40
60
80
1984
1988
1992
1996
2000
2004
2008
2012
2016
2020
Well Completion Depth = 544.00 ft bgs
Top of Screen = Unknown
Bottom of Screen = Unknown

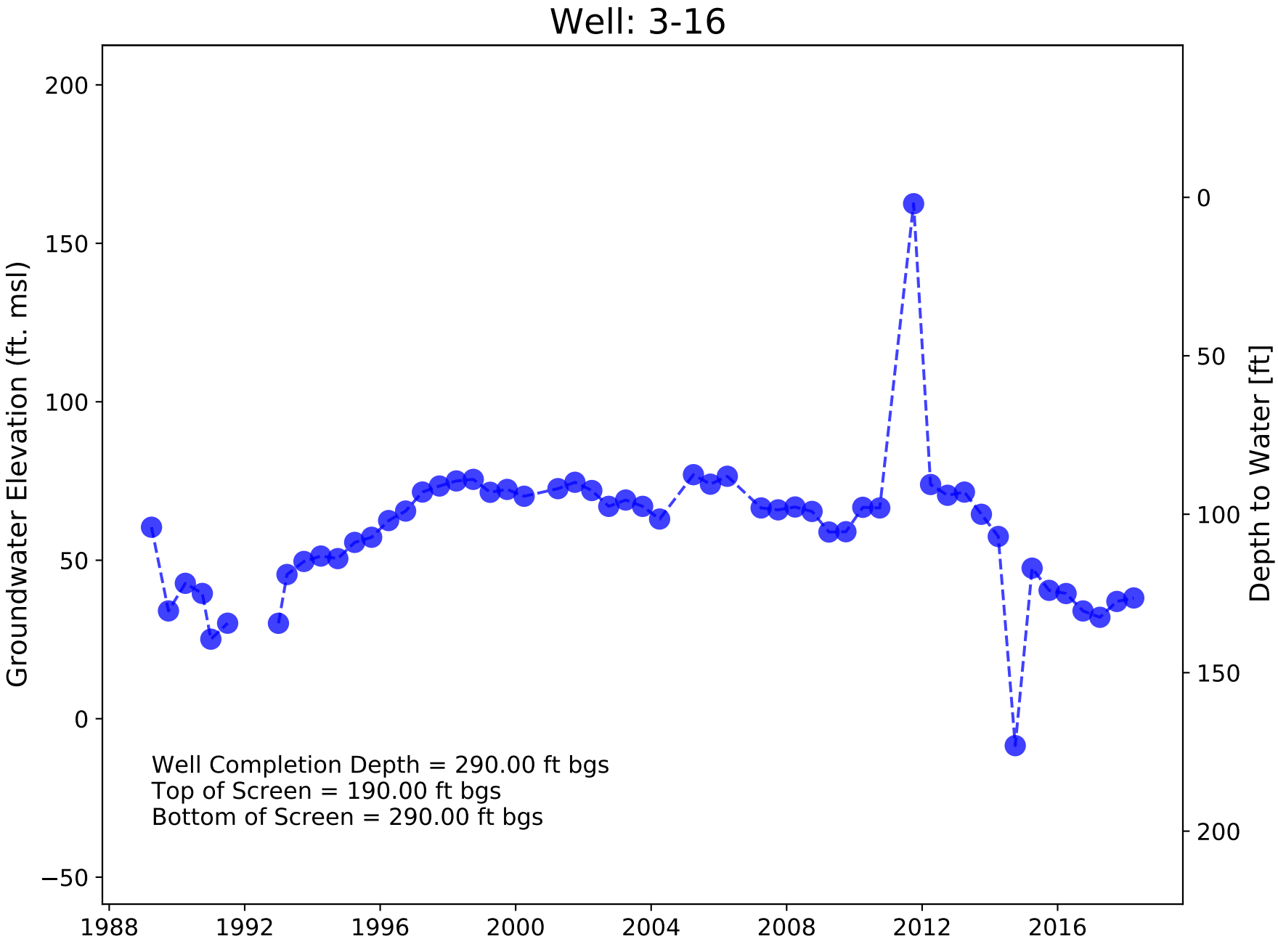

Well: 3-7
Groundwater Elevation (ft. msl)
Depth to Water [ft]
60
40
20
0
−20
−40
−60
−40
−20
0
20
40
60
80
100
1980
1985
1990
1995
2000
2005
2010
2015
2020
Well Completion Depth = 150.00 ft bgs
Top of Screen = 60.00 ft bgs
Bottom of Screen = 150.00 ft bgs

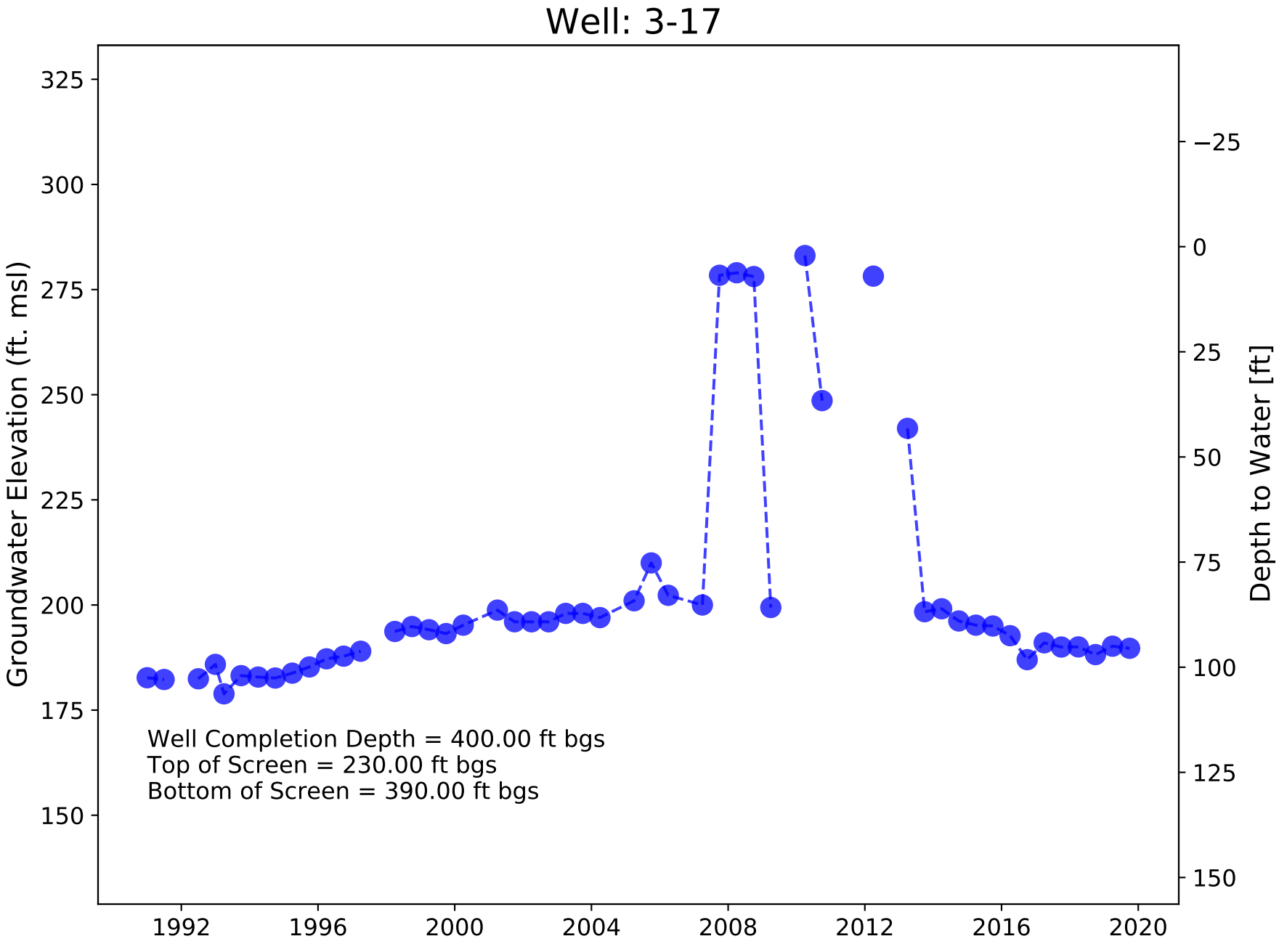

Well: 3-8
Groundwater Elevation (ft. msl)
Depth to Water [ft]
100
80
60
40
20
0
−20
−40
−60
0
20
40
60
80
100
120
140
160
1960
1970
1980
1990
2000
2010
2020
Well Completion Depth = 685.00 ft bgs
Top of Screen = 192.00 ft bgs
Bottom of Screen = 684.00 ft bgs

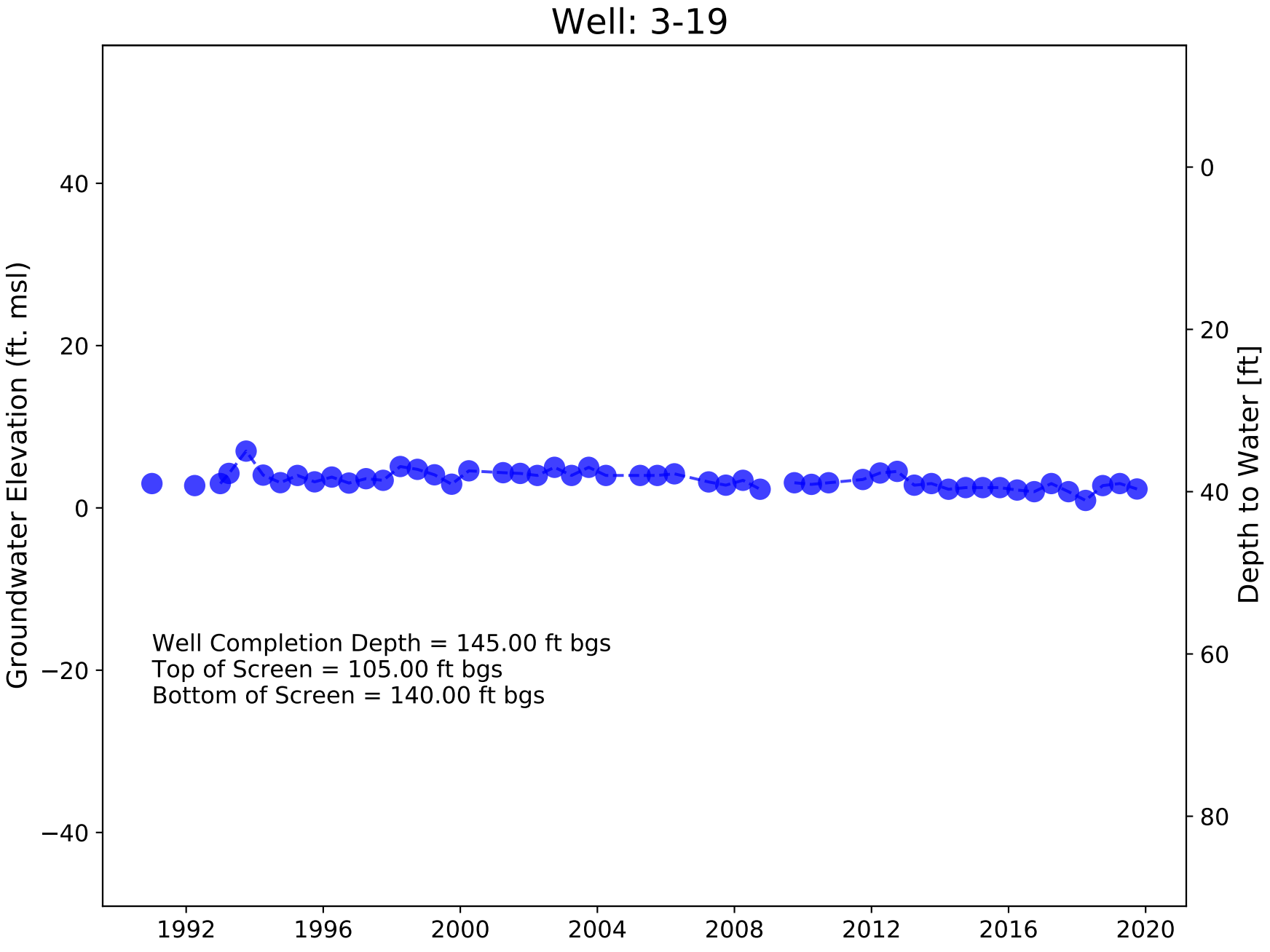

Well: 3-9
Groundwater Elevation (ft. msl)
Depth to Water [ft]
80
60
40
20
0
−20
−40
0
20
40
60
80
100
120
1980
1985
1990
1995
2000
2005
2010
2015
2020
Well Completion Depth = Unknown
Top of Screen = Unknown
Bottom of Screen = Unknown

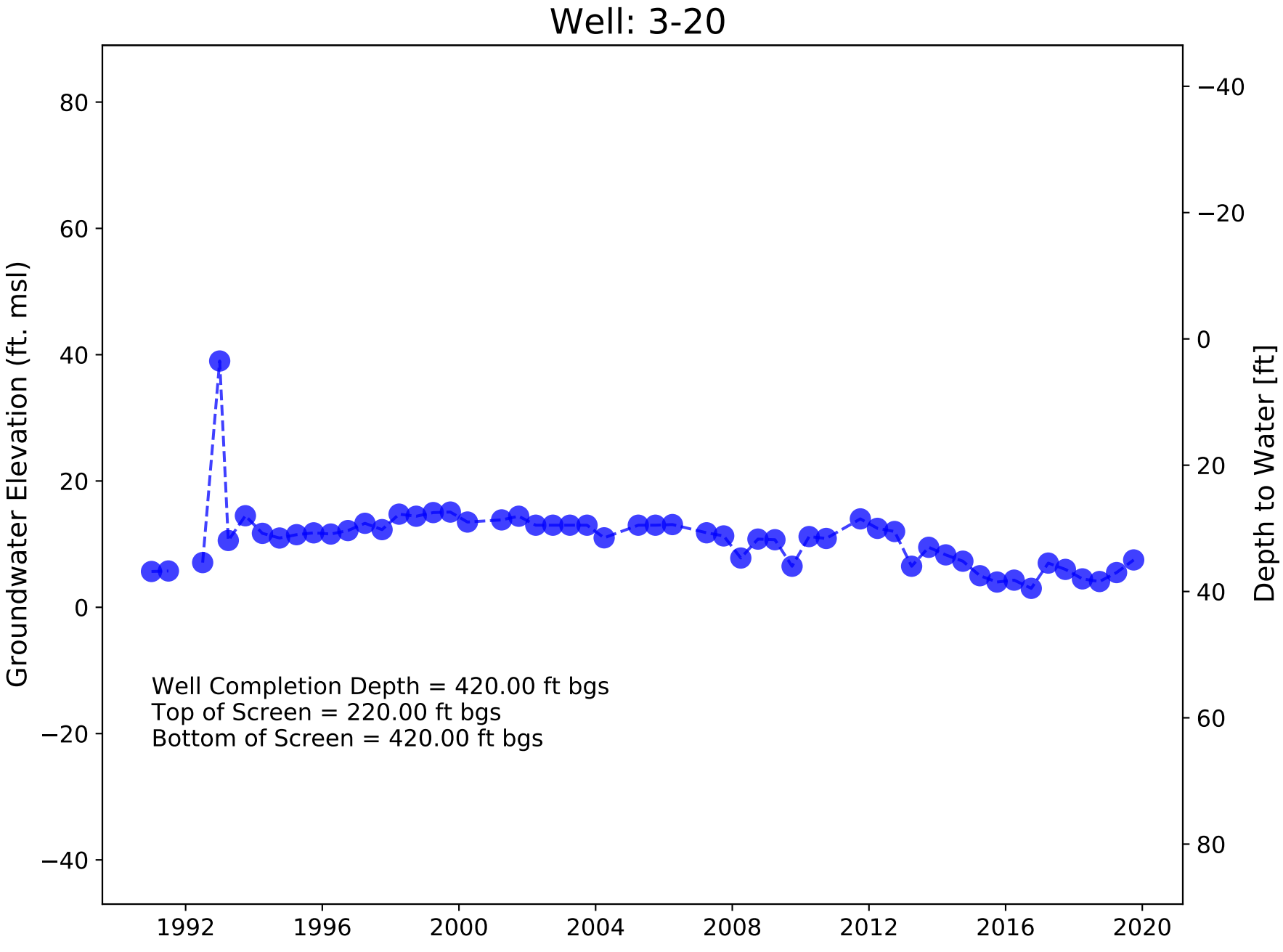

Well: 3-12a
Groundwater Elevation (ft. msl)
Depth to Water [ft]
50
25
0
−25
−50
−75
−100
−125
0
25
50
75
100
125
150
175
200
2013
2014
2015
2016
2017
2018
2019
2020
Well Completion Depth = Unknown
Top of Screen = Unknown
Bottom of Screen = Unknown

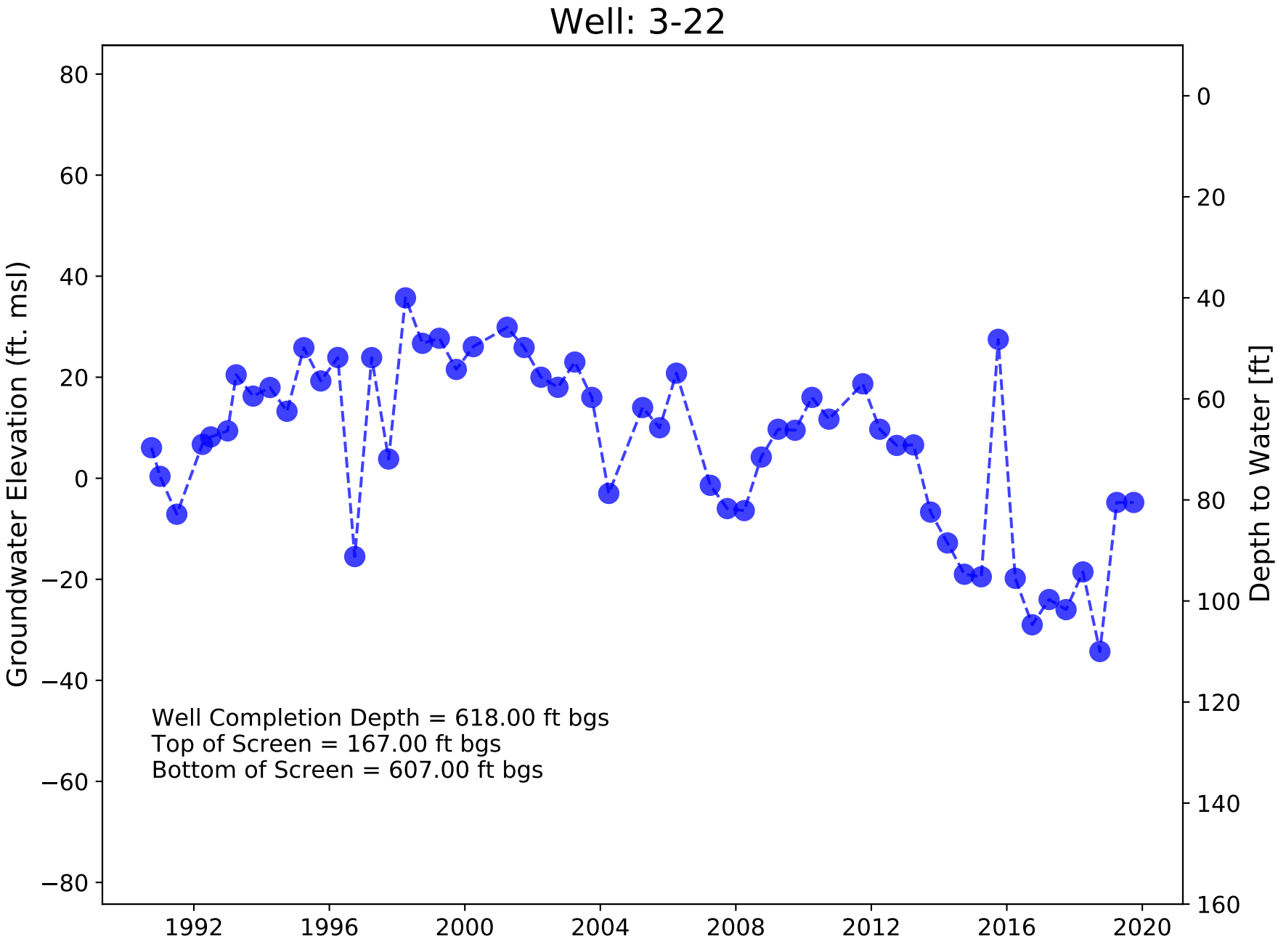

Well: 3-15
Groundwater Elevation (ft. msl)
Depth to Water [ft]
100
80
60
40
20
0
−20
−40
−60
−40
−20
0
20
40
60
80
100
120
1970
1980
1990
2000
2010
2020
Well Completion Depth = Unknown
Top of Screen = Unknown
Bottom of Screen = Unknown

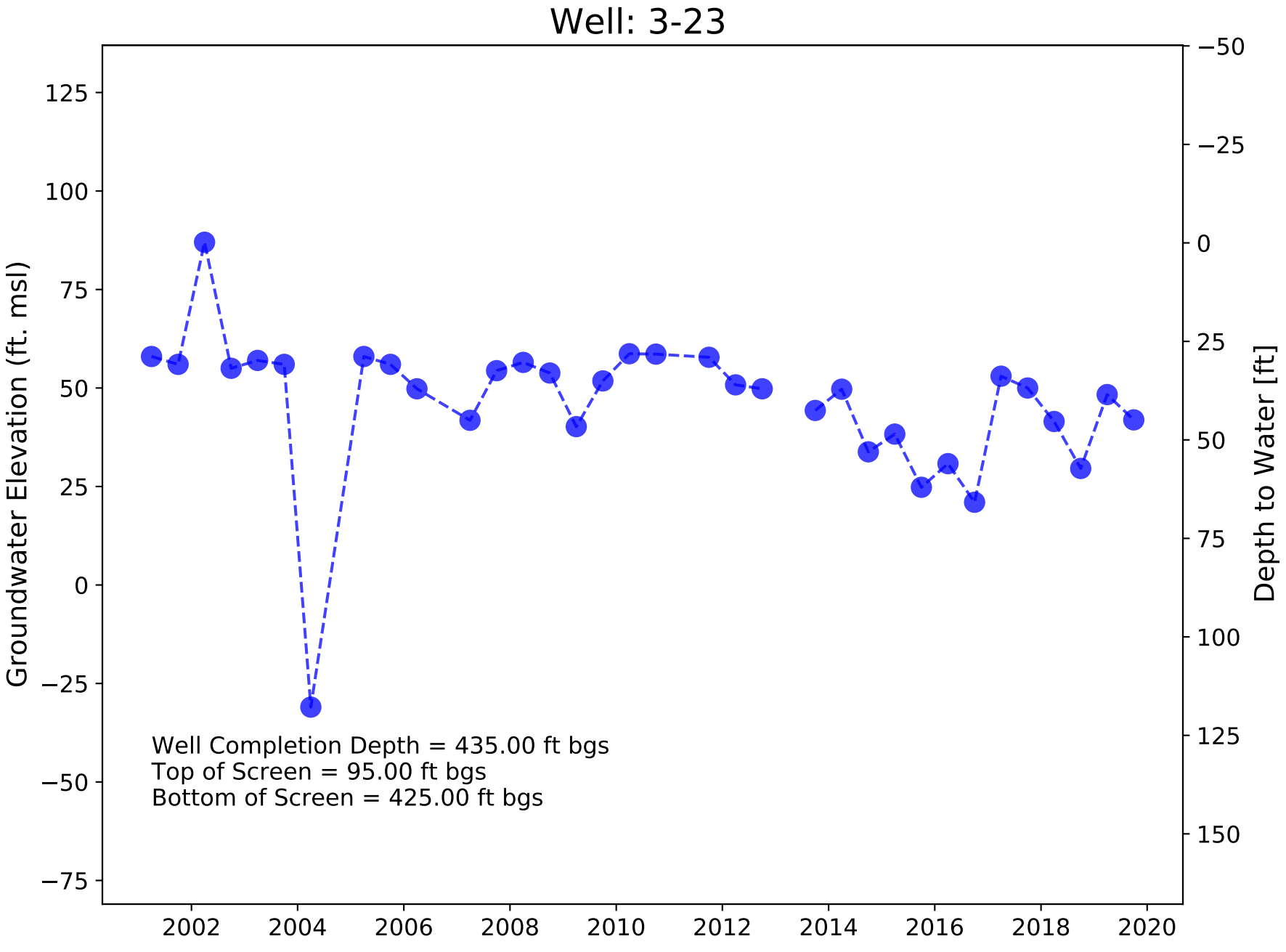

Well: 3-16
Groundwater Elevation (ft. msl)
Depth to Water [ft]
200
150
100
50
0
−50
0
50
100
150
200
1988
1992
1996
2000
2004
2008
2012
2016
Well Completion Depth = 290.00 ft bgs
Top of Screen = 190.00 ft bgs
Bottom of Screen = 290.00 ft bgs

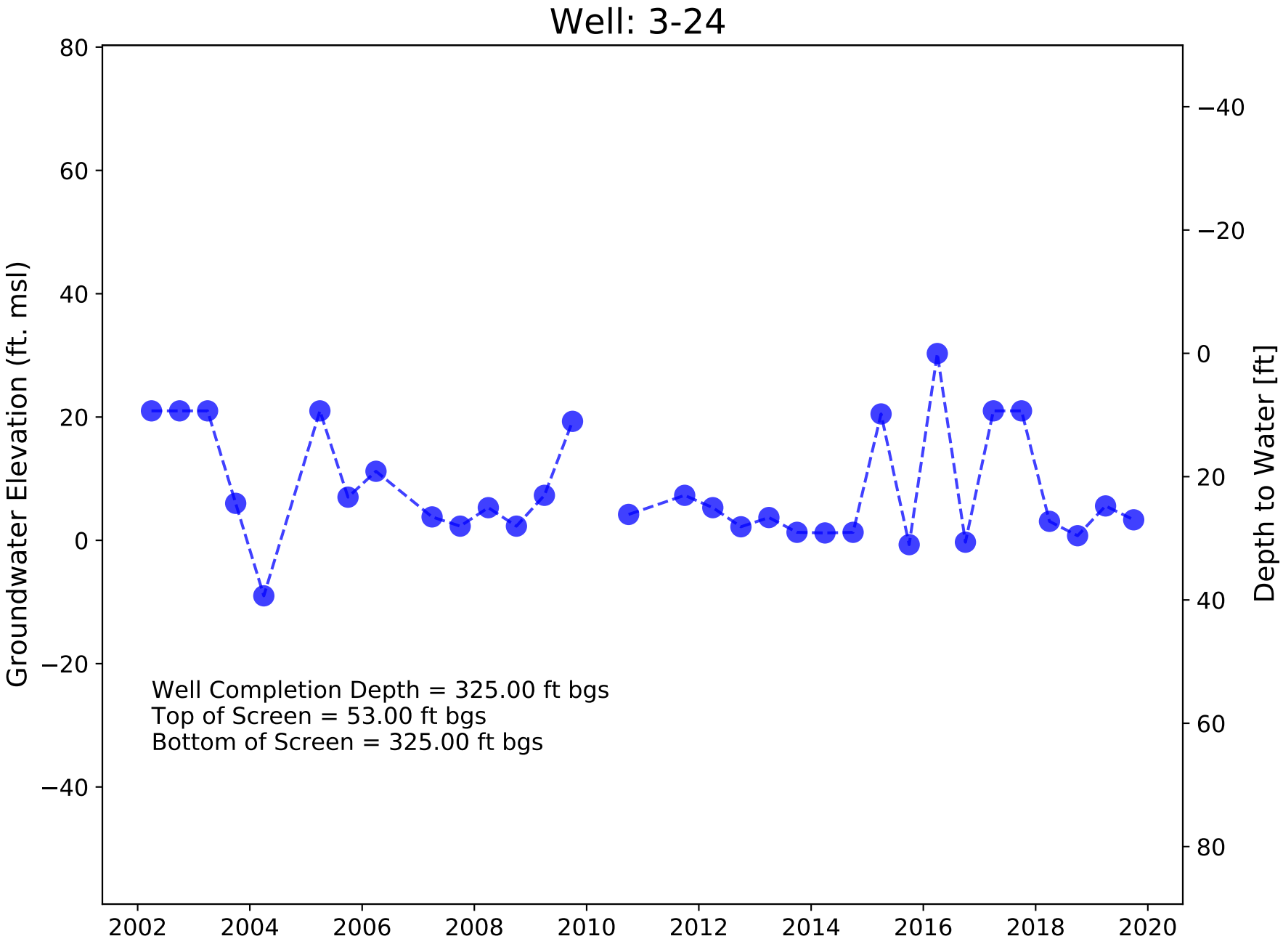

Well: 3-17
Groundwater Elevation (ft. msl)
Depth to Water [ft]
325
300
275
250
225
200
175
150
−25
0
25
50
75
100
125
150
1992
1996
2000
2004
2008
2012
2016
2020
Well Completion Depth = 400.00 ft bgs
Top of Screen = 230.00 ft bgs
Bottom of Screen = 390.00 ft bgs

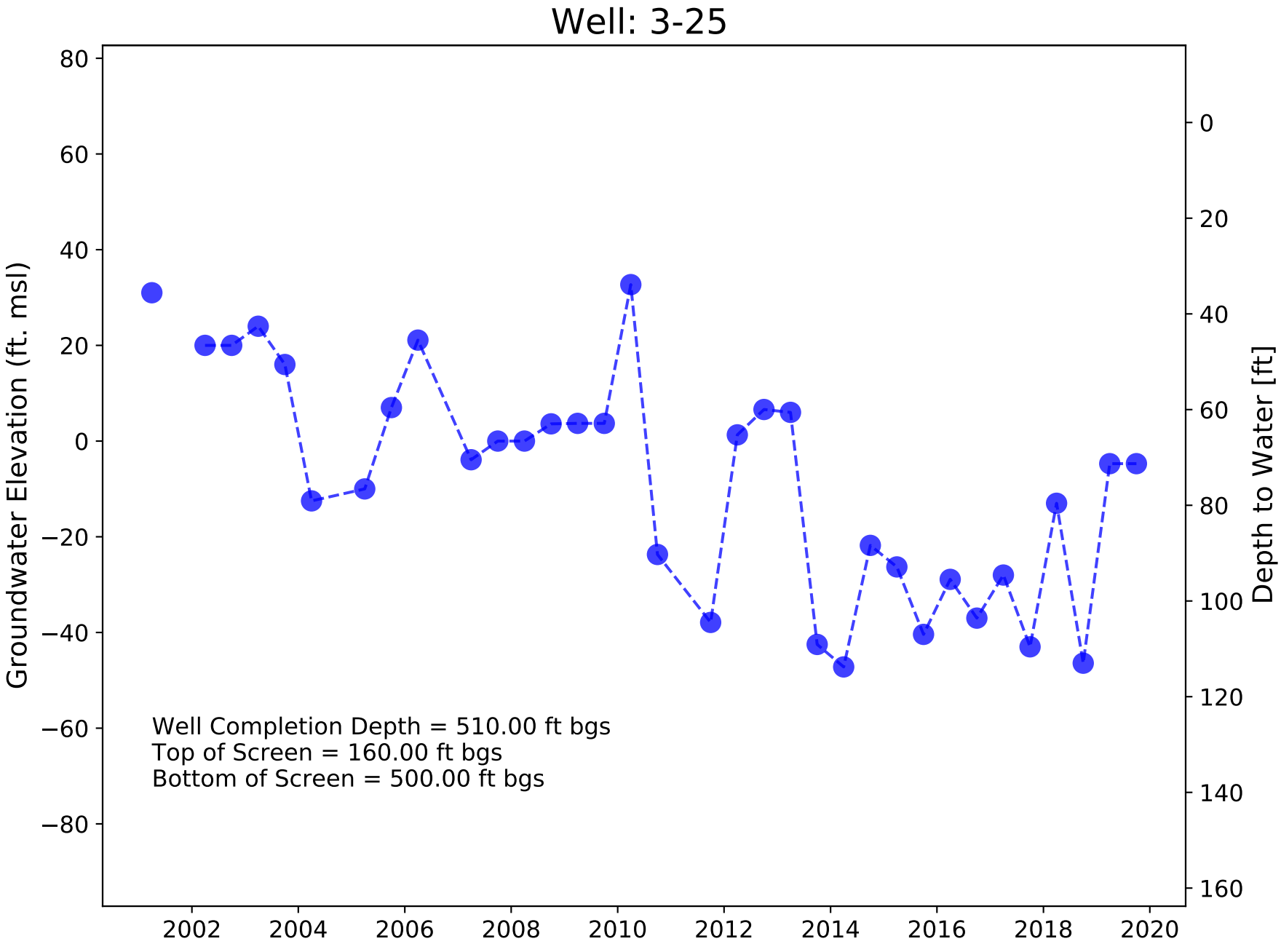

Well: 3-19
Groundwater Elevation (ft. msl)
Depth to Water [ft]
40
20
0
−20
−40
0
20
40
60
80
1992
1996
2000
2004
2008
2012
2016
2020
Well Completion Depth = 145.00 ft bgs
Top of Screen = 105.00 ft bgs
Bottom of Screen = 140.00 ft bgs

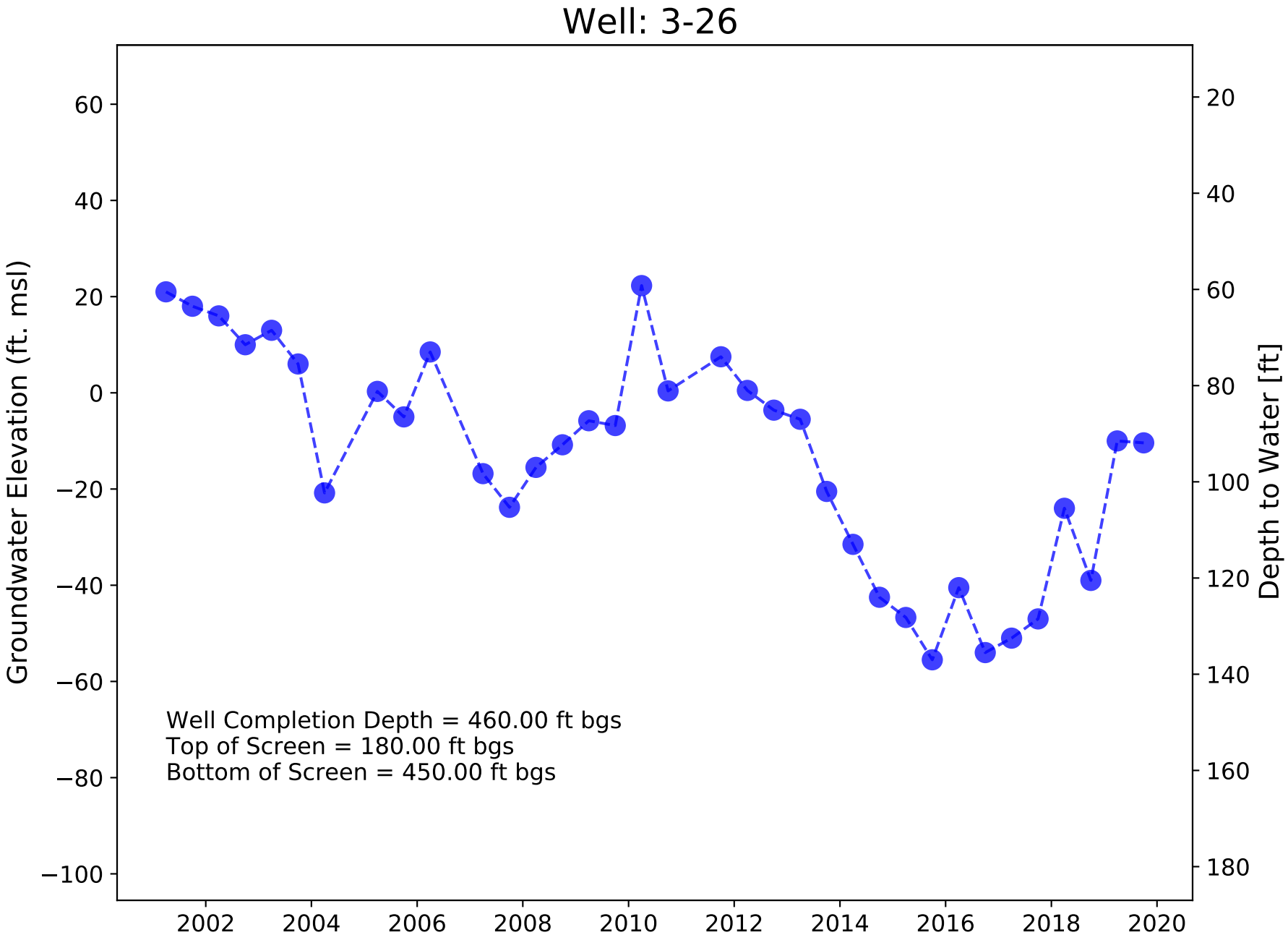

Well: 3-20
Groundwater Elevation (ft. msl)
Depth to Water [ft]
80
60
40
20
0
−20
−40
−40
−20
0
20
40
60
80
1992
1996
2000
2004
2008
2012
2016
2020
Well Completion Depth = 420.00 ft bgs
Top of Screen = 220.00 ft bgs
Bottom of Screen = 420.00 ft bgs

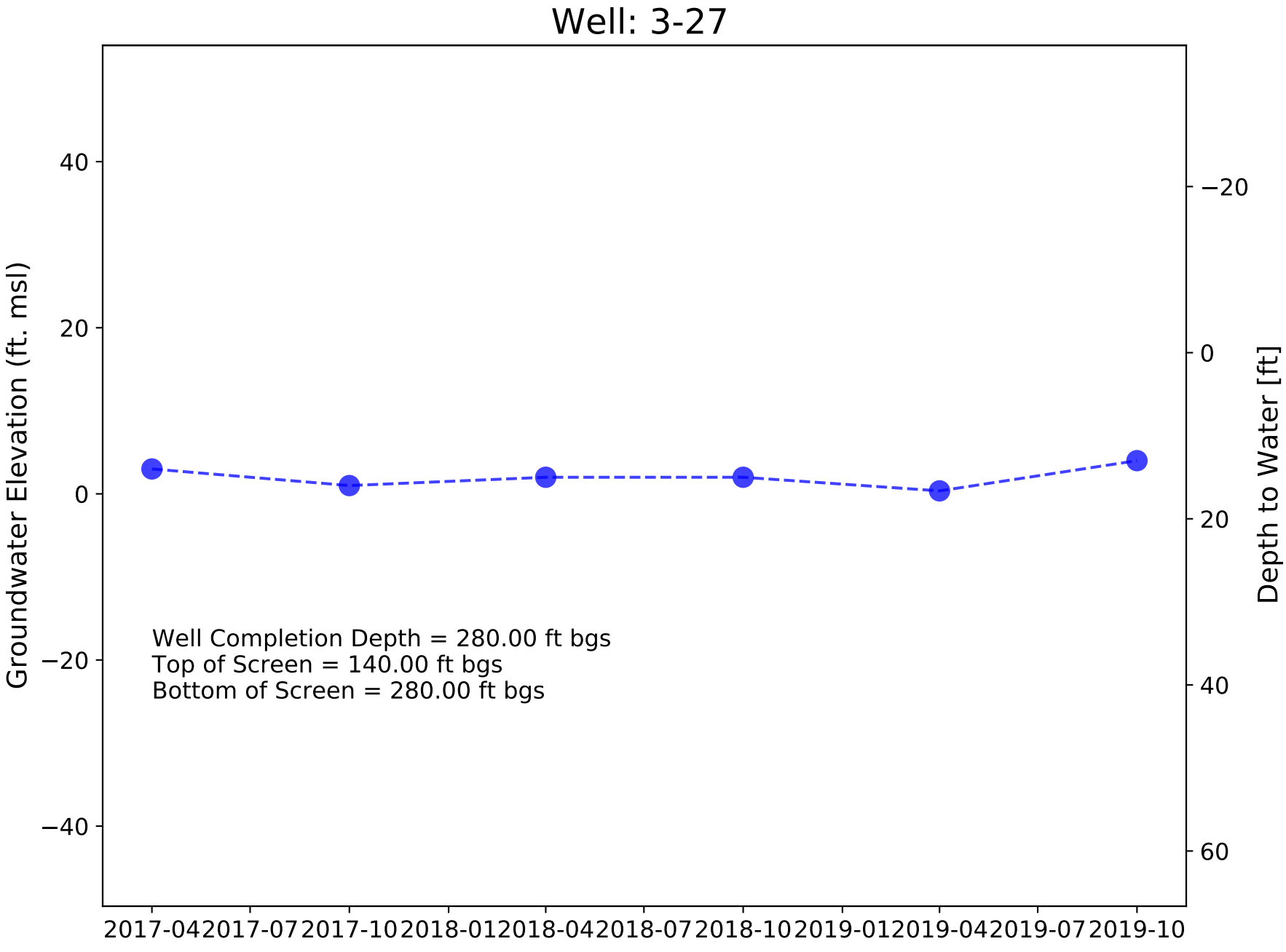

Well: 3-22
Groundwater Elevation (ft. msl)
Depth to Water [ft]
80
60
40
20
0
−20
−40
−60
−80
0
20
40
60
80
100
120
140
160
1992
1996
2000
2004
2008
2012
2016
2020
Well Completion Depth = 618.00 ft bgs
Top of Screen = 167.00 ft bgs
Bottom of Screen = 607.00 ft bgs

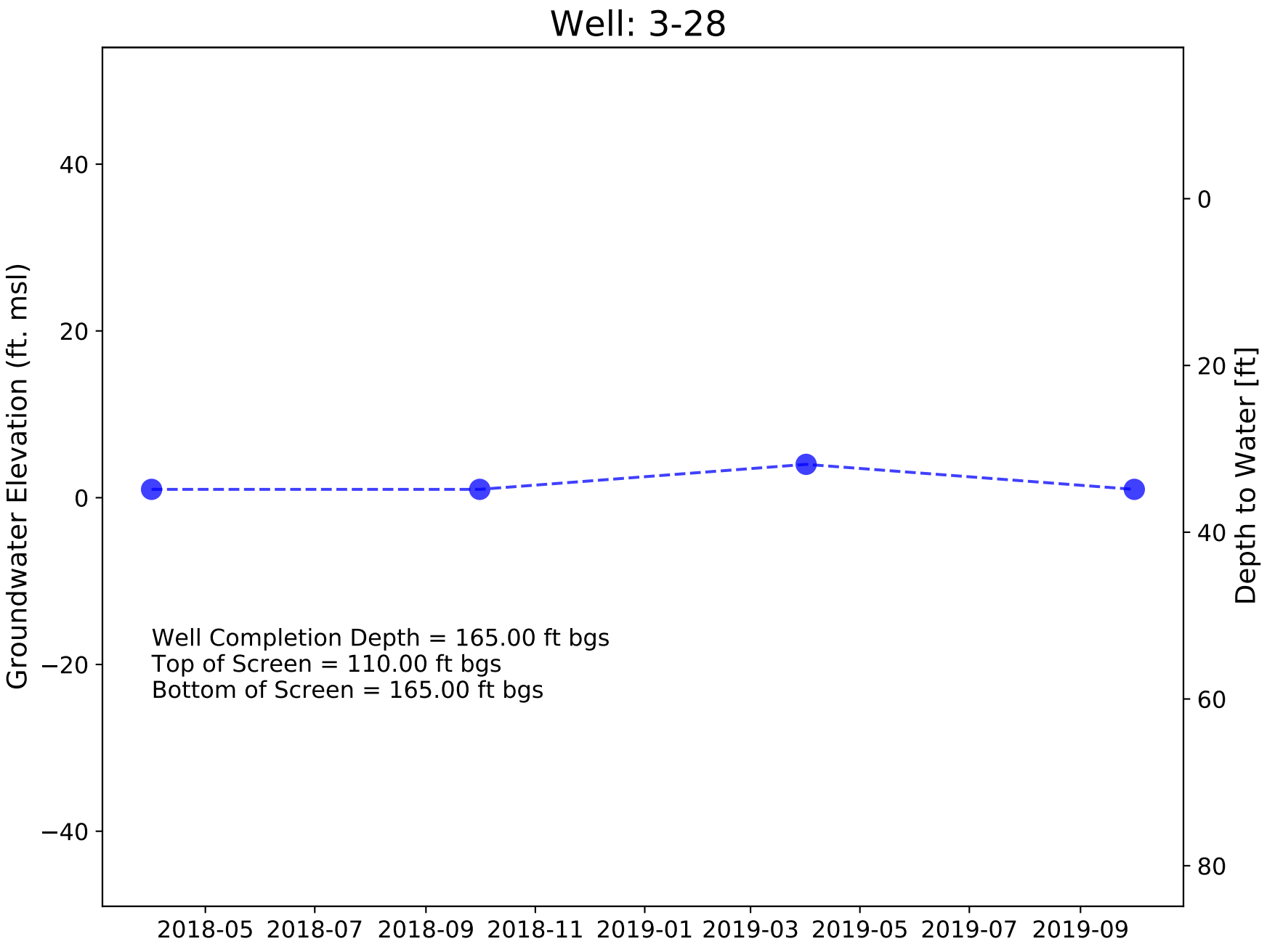

Well: 3-23
Groundwater Elevation (ft. msl)
Depth to Water [ft]
125
100
75
50
25
0
−25
−50
−75
−50
−25
0
25
50
75
100
125
150
2002
2004
2006
2008
2010
2012
2014
2016
2018
2020
Well Completion Depth = 435.00 ft bgs
Top of Screen = 95.00 ft bgs
Bottom of Screen = 425.00 ft bgs

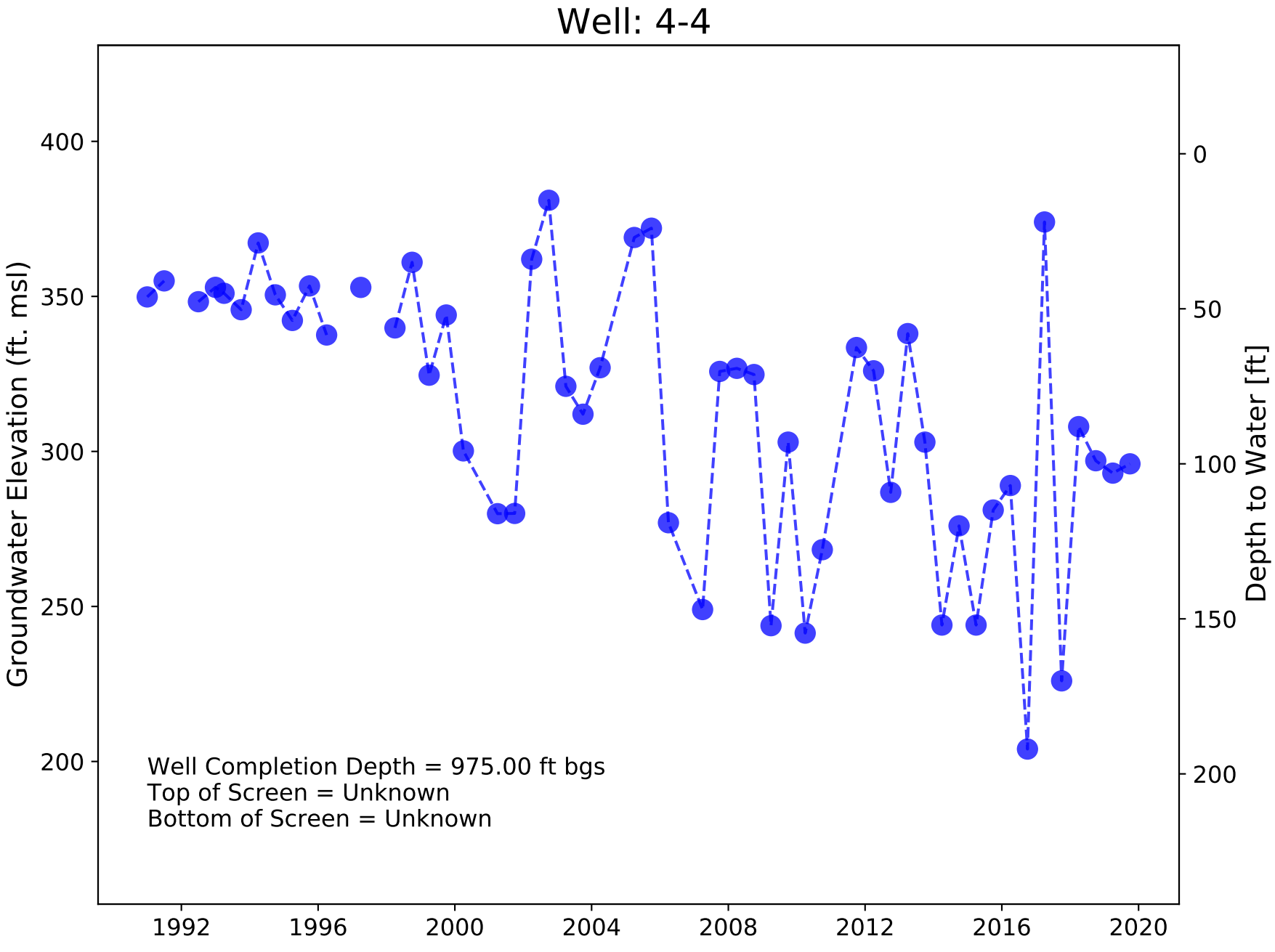

Well: 3-24
Groundwater Elevation (ft. msl)
Depth to Water [ft]
80
60
40
20
0
−20
−40
−40
−20
0
20
40
60
80
2002
2004
2006
2008
2010
2012
2014
2016
2018
2020
Well Completion Depth = 325.00 ft bgs
Top of Screen = 53.00 ft bgs
Bottom of Screen = 325.00 ft bgs

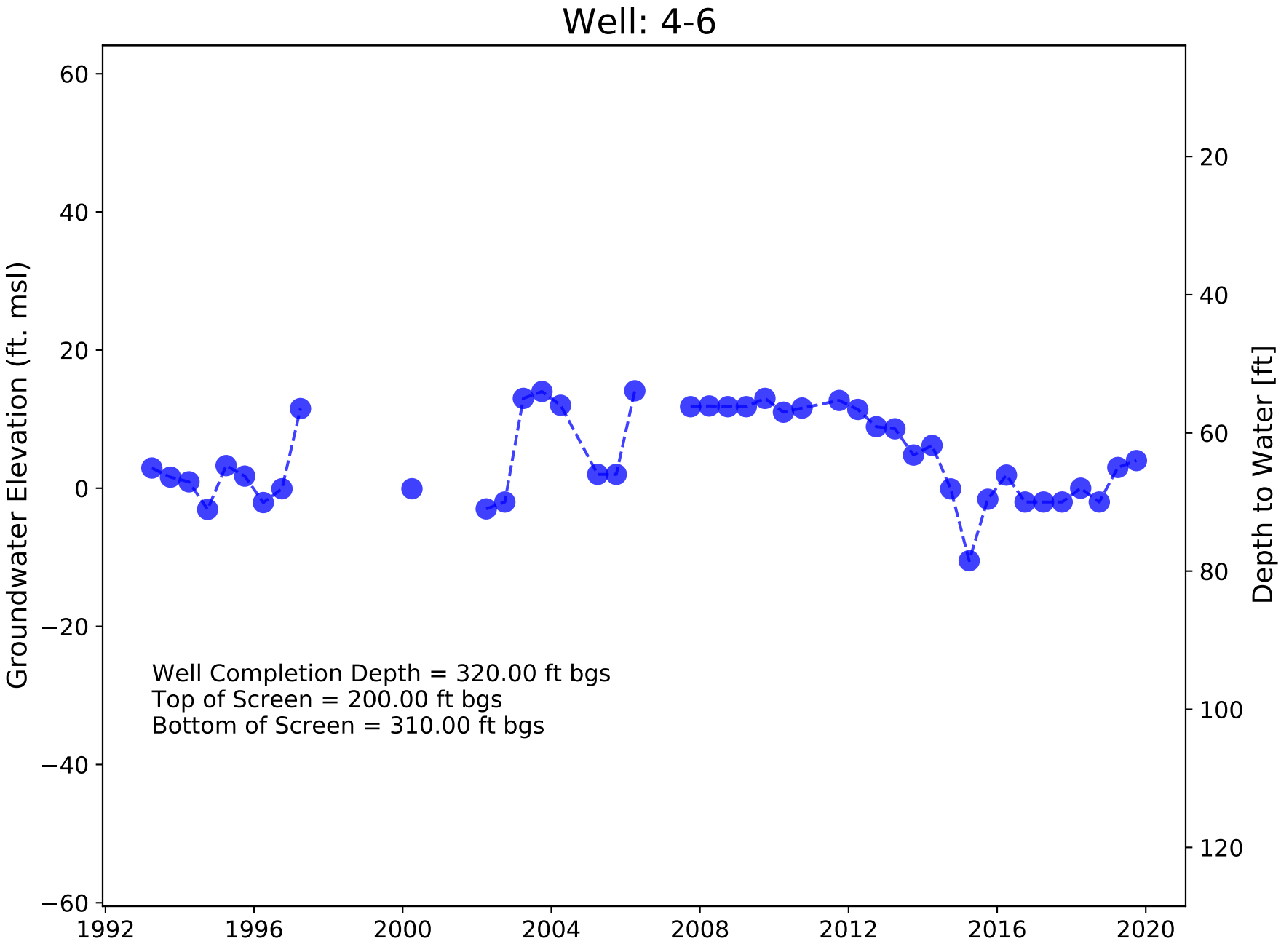

Well: 3-25
Groundwater Elevation (ft. msl)
Depth to Water [ft]
80
60
40
20
0
−20
−40
−60
−80
0
20
40
60
80
100
120
140
160
2002
2004
2006
2008
2010
2012
2014
2016
2018
2020
Well Completion Depth = 510.00 ft bgs
Top of Screen = 160.00 ft bgs
Bottom of Screen = 500.00 ft bgs

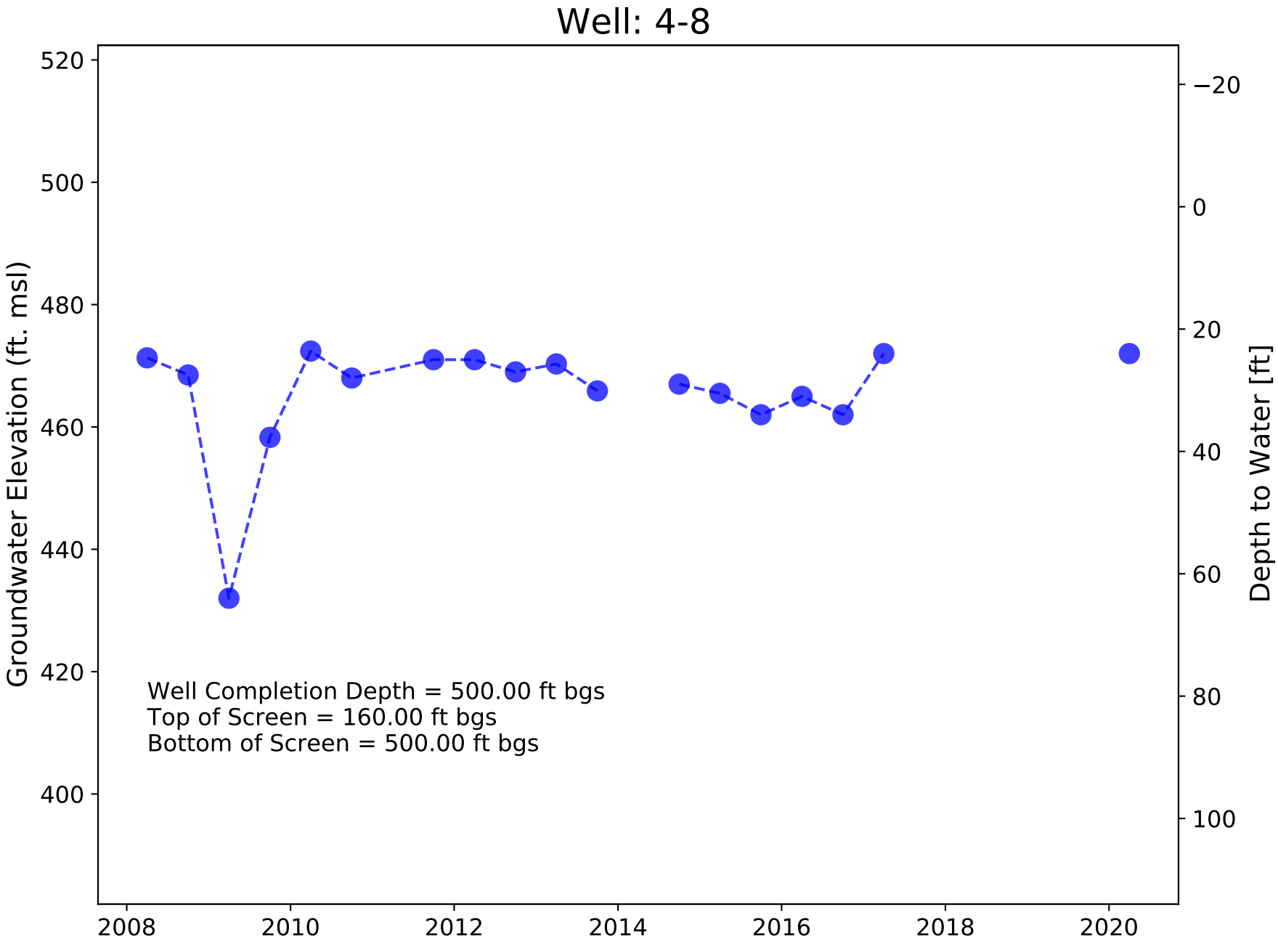

Well: 3-26
Groundwater Elevation (ft. msl)
Depth to Water [ft]
60
40
20
0
−20
−40
−60
−80
−100
20
40
60
80
100
120
140
160
180
2002
2004
2006
2008
2010
2012
2014
2016
2018
2020
Well Completion Depth = 460.00 ft bgs
Top of Screen = 180.00 ft bgs
Bottom of Screen = 450.00 ft bgs


Well: 3-27
Groundwater Elevation (ft. msl)
Depth to Water [ft]
40
20
0
−20
−40
−20
0
20
40
60
Well Completion Depth = 280.00 ft bgs
Top of Screen = 140.00 ft bgs
Bottom of Screen = 280.00 ft bgs
2017-04
2017-07
2017-10
2018-01
2018-04
2018-07
2018-10
2019-01
2019-04
2019-07
2019-10


Well: 3-28
Groundwater Elevation (ft. msl)
Depth to Water [ft]
40
20
0
−20
−40
0
20
40
60
80
2018-05
2018-07
2018-09
2018-11
2019-01
2019-03
2019-05
2019-07
2019-09
Well Completion Depth = 165.00 ft bgs
Top of Screen = 110.00 ft bgs
Bottom of Screen = 165.00 ft bgs


Well: 4-4
Groundwater Elevation (ft. msl)
Depth to Water [ft]
400
350
300
250
200
0
50
100
150
200
1992
1996
2000
2004
2008
2012
2016
2020
Well Completion Depth = 975.00 ft bgs
Top of Screen = Unknown
Bottom of Screen = Unknown


Well: 4-6
Groundwater Elevation (ft. msl)
Depth to Water [ft]
60
40
20
0
−20
−40
−60
20
40
60
80
100
120
1992
1996
2000
2004
2008
2012
2016
2020
Well Completion Depth = 320.00 ft bgs
Top of Screen = 200.00 ft bgs
Bottom of Screen = 310.00 ft bgs


Well: 4-8
Groundwater Elevation (ft. msl)
Depth to Water [ft]
520
500
480
460
440
420
400
−20
0
20
40
60
80
100
2008
2010
2012
2014
2016
2018
2020
Well Completion Depth = 500.00 ft bgs
Top of Screen = 160.00 ft bgs
Bottom of Screen = 500.00 ft bgs

Appendix F
Groundwater-Dependent Ecosystem Data

This appendix contains information developed by various environmental organizations, including The Nature Conservancy (TNC), that characterize the potential presence of riparian and biologic habitat that may rely on groundwater within the Montecito Groundwater Basin (MGB). The California Department of Water Resources (DWR) recommends using these resources during the development of Groundwater Sustainability Plans to support evaluations of interconnected surface water bodies (GSP Emergency Regulations §354.16(f)) and groundwater dependent ecosystems (GDEs; GSP Emergency Regulations §354.16(g)). The information presented in this appendix pertains specifically to GDEs and is meant to help inform the mapping and evaluation of GDEs and supplement the Montecito GSA's understanding of local surface water hydrology, groundwater conditions, and geology within the MGB. However, the information from these datasets, along with the physical measurements collected from within the MGB, are not sufficient to determine the presence of GDEs in the MGB at this time. The analyses described herein indicate that additional analyses and data is required to accurately characterize the presence of ecosystems in the MGB and the degree in which they rely on groundwater. Consistent with the Plan's emphasis on reducing or closing important data gaps, over the next 5 years, the Montecito GSA has planned projects to gather data necessary to define the interaction of surface and groundwater in the MGB, if any, and determine the existence of GDEs.

(This appendix is referenced in Section 2.2 of this GSP.)

APPENDIX F1
INVENTORY OF FRESHWATER SPECIES THAT MAY INHABIT THE PLAN AREA

The Montecito Groundwater Basin (MGB) provides habitat that supports a variety of aquatic and terrestrial freshwater species, several of which are listed as threatened, endangered, and/or species of special concern. Table F-1 provides an inventory of freshwater species that may be found in the MGB. The list of freshwater species was generated by selecting species from the California Freshwater Species Database version 2.0.9 that are found in the Mission Creek-Frontal Santa Barbara Channel and Carpinteria Creek-Frontal Santa Barbara Channel watersheds. The database contains information on 3,906 vascular plants, macroinvertebrates, and vertebrates native to California that depend on fresh water for at least one stage of their life cycle. The threatened and/or endangered species that may be found in the MGB include the willow flycatcher (*Empidonax traillii* and *Empidonax traillii brewsteri*), bald eagle (*Haliaeetus leucocephalus*), tidewater goby (*Eucyclogobius newberryi*), Southern California steelhead (*Oncorhynchus mykiss*), salt marsh bird's beak (*Chloropyron maritimum maritimum*), Gambel's water cress (*Nasturtium gambelii*), and California red-legged frog (*Rana draytonii*).

Table F-1. Inventory of Freshwater Species that May Inhabit the Plan Area

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

Table F-1. Inventory of Freshwater Species that May Inhabit the Plan Area

Scientific Name	Common Name	Legal Protected Status		
		Federal	*State*	*Other*
Bucephala albeola	Bufflehead	N/A	N/A	N/A
Bucephala clangula	Common Goldeneye	N/A	N/A	N/A
Butorides virescens	Green Heron	N/A	N/A	N/A
Calidris alpina	Dunlin	N/A	N/A	N/A
Calidris mauri	Western Sandpiper	N/A	N/A	N/A
Calidris minutilla	Least Sandpiper	N/A	N/A	N/A
Chen caerulescens	Snow Goose	N/A	N/A	N/A
Chen rossii	Ross's Goose	N/A	N/A	N/A
Chlidonias niger	Black Tern	N/A	Special Concern	BSSC - Second priority
Chroicocephalus philadelphia	Bonaparte's Gull	N/A	N/A	N/A
Cinclus mexicanus	American Dipper	N/A	N/A	N/A
Cistothorus palustris palustris	Marsh Wren	N/A	N/A	N/A
Coturnicops noveboracensis	Yellow Rail	Bird of Conservation Concern	Special Concern	BSSC - Second priority
Cygnus columbianus	Tundra Swan	N/A	N/A	N/A
Cypseloides niger	Black Swift	Bird of Conservation Concern	Special Concern	BSSC - Third priority
Dendrocygna bicolor	Fulvous Whistling-Duck	N/A	Special Concern	BSSC - First priority
Egretta thula	Snowy Egret	N/A	N/A	N/A
Empidonax traillii	Willow Flycatcher	Bird of Conservation Concern	Endangered	N/A
Empidonax traillii brewsteri	Willow Flycatcher	Bird of Conservation Concern	Endangered	N/A
Fulica americana	American Coot	N/A	N/A	N/A
Gallinago delicata	Wilson's Snipe	N/A	N/A	N/A
Gallinula chloropus	Common Moorhen	N/A	N/A	N/A
Haliaeetus leucocephalus	Bald Eagle	Bird of Conservation Concern	Endangered	N/A
Himantopus mexicanus	Black-necked Stilt	N/A	N/A	N/A
Histrionicus histrionicus	Harlequin Duck	N/A	Special Concern	BSSC - Second priority
Icteria virens	Yellow-breasted Chat	N/A	Special Concern	BSSC - Third priority
Ixobrychus exilis hesperis	Western Least Bittern	N/A	Special Concern	BSSC - Second priority
Limnodromus scolopaceus	Long-billed Dowitcher	N/A	N/A	N/A
Lophodytes cucullatus	Hooded Merganser	N/A	N/A	N/A

Table F-1. Inventory of Freshwater Species that May Inhabit the Plan Area

Scientific Name	Common Name	Legal Protected Status		
		Federal	*State*	*Other*
Megaceryle alcyon	Belted Kingfisher	N/A	N/A	N/A
Mergus merganser	Common Merganser	N/A	N/A	N/A
Mergus serrator	Red-breasted Merganser	N/A	N/A	N/A
Numenius americanus	Long-billed Curlew	N/A	N/A	N/A
Numenius phaeopus	Whimbrel	N/A	N/A	N/A
Nycticorax nycticorax	Black-crowned Night-Heron	N/A	N/A	N/A
Oreothlypis luciae	Lucy's Warbler	N/A	Special Concern	BSSC - Third priority
Oxyura jamaicensis	Ruddy Duck	N/A	N/A	N/A
Pelecanus erythrorhynchos	American White Pelican	N/A	Special Concern	BSSC - First priority
Phalacrocorax auritus	Double-crested Cormorant	N/A	N/A	N/A
Phalaropus tricolor	Wilson's Phalarope	N/A	N/A	N/A
Pipilo aberti	Abert's Towhee	N/A	N/A	N/A
Piranga rubra	Summer Tanager	N/A	Special Concern	BSSC - First priority
Plegadis chihi	White-faced Ibis	N/A	Watch list	N/A
Pluvialis squatarola	Black-bellied Plover	N/A	N/A	N/A
Podiceps nigricollis	Eared Grebe	N/A	N/A	N/A
Podilymbus podiceps	Pied-billed Grebe	N/A	N/A	N/A
Porzana carolina	Sora	N/A	N/A	N/A
Rallus limicola	Virginia Rail	N/A	N/A	N/A
Recurvirostra americana	American Avocet	N/A	N/A	N/A
Riparia riparia	Bank Swallow	N/A	Threatened	N/A
Rynchops niger	Black Skimmer	N/A	N/A	N/A
Setophaga petechia	Yellow Warbler	N/A	N/A	BSSC - Second priority
Tachycineta bicolor	Tree Swallow	N/A	N/A	N/A
Tringa melanoleuca	Greater Yellowlegs	N/A	N/A	N/A
Tringa semipalmata	Willet	N/A	N/A	N/A
Tringa solitaria	Solitary Sandpiper	N/A	N/A	N/A
Vireo bellii	Bell's Vireo	N/A	N/A	N/A
Xanthocephalus xanthocephalus	Yellow-headed Blackbird	N/A	Special Concern	BSSC - Third priority
Crustaceans				
Arcitalitrus sylvaticus	N/A	N/A	N/A	Not on any status lists
Cyprididae fam.	Cyprididae fam.	N/A	N/A	N/A
Gammarus spp.	Gammarus spp.	N/A	N/A	N/A
Gnorimosphaeroma spp.	Gnorimosphaeroma spp.	N/A	N/A	N/A
Hyalella spp.	Hyalella spp.	N/A	N/A	N/A

Table F-1. Inventory of Freshwater Species that May Inhabit the Plan Area

Scientific Name	Common Name	Legal Protected Status		
		Federal	*State*	*Other*
Fishes				
Entosphenus tridentata ssp. 1	Pacific lamprey	N/A	Special	Near-Threatened - Moyle 2013
Eucyclogobius newberryi	Tidewater goby	Endangered	Special Concern	Vulnerable - Moyle 2013
Fundulus parvipinnis	California killifish	N/A	N/A	Least Concern - Moyle 2013
Gasterosteus aculeatus aculeatus	Coastal threespine stickleback	N/A	N/A	Least Concern - Moyle 2013
Gila orcutti	Arroyo chub	N/A	Special Concern	Vulnerable - Moyle 2013
Oncorhynchus mykiss - Southern CA	Southern California steelhead	Endangered	Special Concern	Endangered - Moyle 2013
Oncorhynchus mykiss irideus	Coastal rainbow trout	N/A	N/A	Least Concern - Moyle 2013
Amphibians and Reptiles				
Actinemys marmorata marmorata	Western Pond Turtle	N/A	Special Concern	ARSSC
Anaxyrus boreas boreas	Boreal Toad	N/A	N/A	N/A
Anaxyrus boreas halophilus	California Toad	N/A	N/A	ARSSC
Pseudacris cadaverina	California Treefrog	N/A	N/A	ARSSC
Pseudacris hypochondriaca	Baja California Treefrog	N/A	N/A	N/A
Pseudacris regilla	Northern Pacific Chorus Frog	N/A	N/A	N/A
Rana aurora	Northern Red-legged Frog	N/A	Special Concern	ARSSC
Rana boylii	Foothill Yellow-legged Frog	Under Review in the Candidate or Petition Process	Special Concern	ARSSC
Rana draytonii	California Red-legged Frog	Threatened	Special Concern	ARSSC
Spea hammondii	Western Spadefoot	Under Review in the Candidate or Petition Process	Special Concern	ARSSC
Taricha torosa	Coast Range Newt	N/A	Special Concern	ARSSC
Thamnophis atratus atratus	Santa Cruz Gartersnake	N/A	N/A	Not on any status lists
Thamnophis couchii	Sierra Gartersnake	N/A	N/A	N/A
Thamnophis hammondii hammondii	Two-striped Gartersnake	N/A	Special Concern	ARSSC
Thamnophis sirtalis sirtalis	Common Gartersnake	N/A	N/A	N/A
Invertebrates				
Ablabesmyia spp.	Ablabesmyia spp.	N/A	N/A	N/A

Table F-1. Inventory of Freshwater Species that May Inhabit the Plan Area

Scientific Name	Common Name	Legal Protected Status		
		Federal	*State*	*Other*
Acilius abbreviatus	N/A	N/A	N/A	Not on any status lists
Aeshna spp.	Aeshna spp.	N/A	N/A	N/A
Aeshnidae fam.	Aeshnidae fam.	N/A	N/A	N/A
Agabinus glabrellus	N/A	N/A	N/A	Not on any status lists
Agabus disintegratus	N/A	N/A	N/A	Not on any status lists
Agabus spp.	Agabus spp.	N/A	N/A	N/A
Agapetus spp.	Agapetus spp.	N/A	N/A	N/A
Alotanypus spp.	Alotanypus spp.	N/A	N/A	N/A
Anacaena signaticollis	N/A	N/A	N/A	Not on any status lists
Apedilum spp.	Apedilum spp.	N/A	N/A	N/A
Archilestes californica	California Spreadwing	N/A	N/A	N/A
Archilestes grandis	Great Spreadwing	N/A	N/A	N/A
Archilestes spp.	Archilestes spp.	N/A	N/A	N/A
Argia hinei	Lavender Dancer	N/A	N/A	N/A
Argia lugens	Sooty Dancer	N/A	N/A	N/A
Argia spp.	Argia spp.	N/A	N/A	N/A
Argia vivida	Vivid Dancer	N/A	N/A	N/A
Baetidae fam.	Baetidae fam.	N/A	N/A	N/A
Baetis adonis	A Mayfly	N/A	N/A	N/A
Baetis spp.	Baetis spp.	N/A	N/A	N/A
Baetis tricaudatus	A Mayfly	N/A	N/A	N/A
Berosus spp.	Berosus spp.	N/A	N/A	N/A
Blepharicera spp.	Blepharicera spp.	N/A	N/A	N/A
Blephariceridae fam.	Blephariceridae fam.	N/A	N/A	N/A
Brachycentridae fam.	Brachycentridae fam.	N/A	N/A	N/A
Brillia spp.	Brillia spp.	N/A	N/A	N/A
Caenis bajaensis	A Mayfly	N/A	N/A	N/A
Caenis spp.	Caenis spp.	N/A	N/A	N/A
Calineuria californica	Western Stone	N/A	N/A	N/A
Callibaetis californicus	A Mayfly	N/A	N/A	N/A
Callibaetis spp.	Callibaetis spp.	N/A	N/A	N/A
Centroptilum spp.	Centroptilum spp.	N/A	N/A	N/A
Chimarra utahensis	A Caddisfly	N/A	N/A	N/A
Chironomidae fam.	Chironomidae fam.	N/A	N/A	N/A
Chironomus spp.	Chironomus spp.	N/A	N/A	N/A
Chloroperlidae fam.	Chloroperlidae fam.	N/A	N/A	N/A
Cloeodes excogitatus	A Mayfly	N/A	N/A	N/A
Coenagrionidae fam.	Coenagrionidae fam.	N/A	N/A	N/A
Cordulegaster dorsalis	Pacific Spiketail	N/A	N/A	N/A
Corixidae fam.	Corixidae fam.	N/A	N/A	N/A
Corydalidae fam.	Corydalidae fam.	N/A	N/A	N/A

Table F-1. Inventory of Freshwater Species that May Inhabit the Plan Area

Scientific Name	Common Name	Legal Protected Status		
		Federal	*State*	*Other*
Crenitis dissimilis	N/A	N/A	N/A	Not on any status lists
Cricotopus spp.	Cricotopus spp.	N/A	N/A	N/A
Culex spp.	Culex spp.	N/A	N/A	N/A
Culicidae fam.	Culicidae fam.	N/A	N/A	N/A
Cymbiodyta columbiana	N/A	N/A	N/A	Not on any status lists
Cymbiodyta punctatostriata	N/A	N/A	N/A	Not on any status lists
Cymbiodyta spp.	Cymbiodyta spp.	N/A	N/A	N/A
Diamesa spp.	Diamesa spp.	N/A	N/A	N/A
Dicrotendipes spp.	Dicrotendipes spp.	N/A	N/A	N/A
Diphetor hageni	Hagen's Small Minnow Mayfly	N/A	N/A	N/A
Dixidae fam.	Dixidae fam.	N/A	N/A	N/A
Drunella spp.	Drunella spp.	N/A	N/A	N/A
Dytiscidae fam.	Dytiscidae fam.	N/A	N/A	N/A
Enallagma praevarum	Arroyo Bluet	N/A	N/A	N/A
Enochrus californicus	N/A	N/A	N/A	Not on any status lists
Enochrus hamiltoni	N/A	N/A	N/A	Not on any status lists
Epeorus spp.	Epeorus spp.	N/A	N/A	N/A
Ephemerellidae fam.	Ephemerellidae fam.	N/A	N/A	N/A
Ephydridae fam.	Ephydridae fam.	N/A	N/A	N/A
Erythemis collocata	Western Pondhawk	N/A	N/A	N/A
Eubrianax edwardsii	N/A	N/A	N/A	Not on any status lists
Eucorethra underwoodi	N/A	N/A	N/A	Not on any status lists
Eukiefferiella spp.	Eukiefferiella spp.	N/A	N/A	N/A
Euryhapsis spp.	Euryhapsis spp.	N/A	N/A	N/A
Fallceon quilleri	A Mayfly	N/A	N/A	N/A
Farula spp.	Farula spp.	N/A	N/A	N/A
Gomphidae fam.	Gomphidae fam.	N/A	N/A	N/A
Gumaga spp.	Gumaga spp.	N/A	N/A	N/A
Gyrinus spp.	Gyrinus spp.	N/A	N/A	N/A
Heptageniidae fam.	Heptageniidae fam.	N/A	N/A	N/A
Hetaerina americana	American Rubyspot	N/A	N/A	N/A
Hydrobaenus spp.	Hydrobaenus spp.	N/A	N/A	N/A
Hydrochara lineata	N/A	N/A	N/A	Not on any status lists
Hydrophilidae fam.	Hydrophilidae fam.	N/A	N/A	N/A
Hydrophilus triangularis	N/A	N/A	N/A	Not on any status lists

Table F-1. Inventory of Freshwater Species that May Inhabit the Plan Area

Scientific Name	Common Name	Legal Protected Status		
		Federal	*State*	*Other*
Hydropsyche spp.	Hydropsyche spp.	N/A	N/A	N/A
Hydropsychidae fam.	Hydropsychidae fam.	N/A	N/A	N/A
Hydroptila spp.	Hydroptila spp.	N/A	N/A	N/A
Hydroptilidae fam.	Hydroptilidae fam.	N/A	N/A	N/A
Ironodes californicus	A Mayfly	N/A	N/A	N/A
Ischnura cervula	Pacific Forktail	N/A	N/A	N/A
Ischnura denticollis	Black-fronted Forktail	N/A	N/A	N/A
Isoperla denningi	Angeles Stripetail	N/A	N/A	N/A
Labrundinia spp.	Labrundinia spp.	N/A	N/A	N/A
Laccobius nevadensis	N/A	N/A	N/A	Not on any status lists
Lepidostoma spp.	Lepidostoma spp.	N/A	N/A	N/A
Leucrocuta spp.	Leucrocuta spp.	N/A	N/A	N/A
Libellula saturata	Flame Skimmer	N/A	N/A	N/A
Libellulidae fam.	Libellulidae fam.	N/A	N/A	N/A
Limnophyes spp.	Limnophyes spp.	N/A	N/A	N/A
Liodessus spp.	Liodessus spp.	N/A	N/A	N/A
Malenka spp.	Malenka spp.	N/A	N/A	N/A
Marilia flexuosa	A Caddisfly	N/A	N/A	N/A
Maruina lanceolata	N/A	N/A	N/A	Not on any status lists
Meringodixa chalonensis	N/A	N/A	N/A	Not on any status lists
Micrasema spp.	Micrasema spp.	N/A	N/A	N/A
Microcylloepus spp.	Microcylloepus spp.	N/A	N/A	N/A
Micropsectra spp.	Micropsectra spp.	N/A	N/A	N/A
Microtendipes spp.	Microtendipes spp.	N/A	N/A	N/A
Mideopsis spp.	Mideopsis spp.	N/A	N/A	N/A
Nanocladius spp.	Nanocladius spp.	N/A	N/A	N/A
Narpus spp.	Narpus spp.	N/A	N/A	N/A
Nemouridae fam.	Nemouridae fam.	N/A	N/A	N/A
Neoclypeodytes spp.	Neoclypeodytes spp.	N/A	N/A	N/A
Neohermes spp.	Neohermes spp.	N/A	N/A	N/A
Neophylax spp.	Neophylax spp.	N/A	N/A	N/A
Neoporus spp.	Neoporus spp.	N/A	N/A	N/A
Neotrichia spp.	Neotrichia spp.	N/A	N/A	N/A
Nixe kennedyi	A Mayfly	N/A	N/A	N/A
Notonecta spp.	Notonecta spp.	N/A	N/A	N/A
Ochrotrichia spp.	Ochrotrichia spp.	N/A	N/A	N/A
Ochthebius puncticollis	N/A	N/A	N/A	Not on any status lists
Ochthebius spp.	Ochthebius spp.	N/A	N/A	N/A
Oecetis disjuncta	A Caddisfly	N/A	N/A	N/A
Oecetis spp.	Oecetis spp.	N/A	N/A	N/A
Optioservus spp.	Optioservus spp.	N/A	N/A	N/A

Table F-1. Inventory of Freshwater Species that May Inhabit the Plan Area

Scientific Name	Common Name	Legal Protected Status		
		Federal	*State*	*Other*
Ordobrevia nubifera	N/A	N/A	N/A	Not on any status lists
Oreodytes spp.	Oreodytes spp.	N/A	N/A	N/A
Pachydiplax longipennis	Blue Dasher	N/A	N/A	N/A
Paltothemis lineatipes	Red Rock Skimmer	N/A	N/A	N/A
Pantala flavescens	Wandering Glider	N/A	N/A	N/A
Paracladopelma spp.	Paracladopelma spp.	N/A	N/A	N/A
Paracymus spp.	Paracymus spp.	N/A	N/A	N/A
Parakiefferiella spp.	Parakiefferiella spp.	N/A	N/A	N/A
Paraleptophlebia spp.	Paraleptophlebia spp.	N/A	N/A	N/A
Parametriocnemus spp.	Parametriocnemus spp.	N/A	N/A	N/A
Paratanytarsus spp.	Paratanytarsus spp.	N/A	N/A	N/A
Peltodytes simplex	N/A	N/A	N/A	Not on any status lists
Peltodytes spp.	Peltodytes spp.	N/A	N/A	N/A
Pentaneura spp.	Pentaneura spp.	N/A	N/A	N/A
Perlodidae fam.	Perlodidae fam.	N/A	N/A	N/A
Phaenopsectra spp.	Phaenopsectra spp.	N/A	N/A	N/A
Polycentropus spp.	Polycentropus spp.	N/A	N/A	N/A
Polypedilum spp.	Polypedilum spp.	N/A	N/A	N/A
Psectrocladius spp.	Psectrocladius spp.	N/A	N/A	N/A
Psephenus falli	N/A	N/A	N/A	Not on any status lists
Pseudochironomus spp.	Pseudochironomus spp.	N/A	N/A	N/A
Pseudosmittia spp.	Pseudosmittia spp.	N/A	N/A	N/A
Psychodidae fam.	Psychodidae fam.	N/A	N/A	N/A
Radotanypus spp.	Radotanypus spp.	N/A	N/A	N/A
Rhantus gutticollis	N/A	N/A	N/A	Not on any status lists
Rheotanytarsus spp.	Rheotanytarsus spp.	N/A	N/A	N/A
Rhionaeschna multicolor	Blue-eyed Darner	N/A	N/A	N/A
Rhyacophila betteni	A Caddisfly	N/A	N/A	N/A
Rhyacophila spp.	Rhyacophila spp.	N/A	N/A	N/A
Sanfilippodytes spp.	Sanfilippodytes spp.	N/A	N/A	N/A
Serratella spp.	Serratella spp.	N/A	N/A	N/A
Sialis spp.	Sialis spp.	N/A	N/A	N/A
Sigara spp.	Sigara spp.	N/A	N/A	N/A
Simulium spp.	Simulium spp.	N/A	N/A	N/A
Sperchon spp.	Sperchon spp.	N/A	N/A	N/A
Sperchontidae fam.	Sperchontidae fam.	N/A	N/A	N/A
Stictotarsus deceptus	N/A	N/A	N/A	Not on any status lists
Stictotarsus spp.	Stictotarsus spp.	N/A	N/A	N/A

Table F-1. Inventory of Freshwater Species that May Inhabit the Plan Area

Scientific Name	Common Name	Legal Protected Status		
		Federal	*State*	*Other*
Stictotarsus striatellus	N/A	N/A	N/A	Not on any status lists
Sweltsa spp.	Sweltsa spp.	N/A	N/A	N/A
Sympetrum corruptum	Variegated Meadowhawk	N/A	N/A	N/A
Sympetrum illotum	Cardinal Meadowhawk	N/A	N/A	N/A
Tanytarsus spp.	Tanytarsus spp.	N/A	N/A	N/A
Tinodes spp.	Tinodes spp.	N/A	N/A	N/A
Tipulidae fam.	Tipulidae fam.	N/A	N/A	N/A
Tramea lacerata	Black Saddlebags	N/A	N/A	N/A
Tricorythodes spp.	Tricorythodes spp.	N/A	N/A	N/A
Tropisternus californicus	N/A	N/A	N/A	Not on any status lists
Tropisternus spp.	Tropisternus spp.	N/A	N/A	N/A
Tvetenia spp.	Tvetenia spp.	N/A	N/A	N/A
Wormaldia spp.	Wormaldia spp.	N/A	N/A	N/A
Zaitzevia parvula	N/A	N/A	N/A	Not on any status lists
Zaitzevia spp.	Zaitzevia spp.	N/A	N/A	N/A
Zapada spp.	Zapada spp.	N/A	N/A	N/A
Zoniagrion exclamationis	Exclamation Damsel	N/A	N/A	N/A
Mollusks				
Assiminea californica	N/A	N/A	N/A	Not on any status lists
Gyraulus spp.	Gyraulus spp.	N/A	N/A	N/A
Helisoma spp.	Helisoma spp.	N/A	N/A	N/A
Lymnaea spp.	Lymnaea spp.	N/A	N/A	N/A
Menetus opercularis	Button Sprite	N/A	N/A	CS
Physa spp.	Physa spp.	N/A	N/A	N/A
Physella cooperi	Olive Physa	N/A	N/A	V
Pisidium spp.	Pisidium spp.	N/A	N/A	N/A
Sphaerium spp.	Sphaerium spp.	N/A	N/A	N/A
Plants				
Alisma triviale	Northern Water-plantain	N/A	N/A	N/A
Alnus rhombifolia	White Alder	N/A	N/A	N/A
Alopecurus saccatus	Pacific Foxtail	N/A	N/A	N/A
Ammannia coccinea	Scarlet Ammannia	N/A	N/A	N/A
Anemopsis californica	Yerba Mansa	N/A	N/A	N/A
Arundo donax	N/A	N/A	N/A	N/A
Azolla filiculoides	N/A	N/A	N/A	N/A
Baccharis glutinosa	N/A	N/A	N/A	Not on any status lists

Table F-1. Inventory of Freshwater Species that May Inhabit the Plan Area

Scientific Name	Common Name	Legal Protected Status		
		Federal	*State*	*Other*
Baccharis salicina	N/A	N/A	N/A	Not on any status lists
Bergia texana	Texas Bergia	N/A	N/A	N/A
Berula erecta	Wild Parsnip	N/A	N/A	N/A
Bidens laevis	Smooth Bur-marigold	N/A	N/A	N/A
Bolboschoenus maritimus paludosus	N/A	N/A	N/A	Not on any status lists
Callitriche marginata	Winged Water-starwort	N/A	N/A	N/A
Callitriche palustris	Vernal Water-starwort	N/A	N/A	N/A
Carex harfordii	Harford's Sedge	N/A	N/A	N/A
Carex lenticularis	Shore Sedge	N/A	N/A	N/A
Carex pellita	Woolly Sedge	N/A	N/A	N/A
Carex senta	Western Rough Sedge	N/A	N/A	N/A
Chloropyron maritimum maritimum	N/A	Endangered	Endangered	CRPR - 1B.2
Cotula coronopifolia	N/A	N/A	N/A	N/A
Cyperus erythrorhizos	Red-root Flatsedge	N/A	N/A	N/A
Cyperus involucratus	N/A	N/A	N/A	N/A
Datisca glomerata	Durango Root	N/A	N/A	N/A
Distichlis littoralis	N/A	N/A	N/A	Not on any status lists
Echinochloa oryzoides	N/A	N/A	N/A	N/A
Echinodorus berteroi	Upright Burhead	N/A	N/A	N/A
Eleocharis acicularis acicularis	Least Spikerush	N/A	N/A	N/A
Eleocharis macrostachya	Creeping Spikerush	N/A	N/A	N/A
Eleocharis montevidensis	Sand Spikerush	N/A	N/A	N/A
Eleocharis palustris	Creeping Spikerush	N/A	N/A	N/A
Eleocharis parishii	Parish's Spikerush	N/A	N/A	N/A
Elodea canadensis	Broad Waterweed	N/A	N/A	N/A
Epipactis gigantea	Giant Helleborine	N/A	N/A	N/A
Eryngium vaseyi vaseyi	Vasey's Coyote-thistle	N/A	N/A	Not on any status lists
Euthamia occidentalis	Western Fragrant Goldenrod	N/A	N/A	N/A
Helenium puberulum	Rosilla	N/A	N/A	N/A
Hydrocotyle ranunculoides	Floating Marsh-pennywort	N/A	N/A	N/A
Isolepis cernua	Low Bulrush	N/A	N/A	N/A
Jaumea carnosa	Fleshy Jaumea	N/A	N/A	N/A
Juncus acutus leopoldii	Spiny Rush	N/A	Special	CRPR - 4.2
Juncus effusus effusus	N/A	N/A	N/A	N/A
Juncus macrophyllus	Longleaf Rush	N/A	N/A	N/A

Table F-1. Inventory of Freshwater Species that May Inhabit the Plan Area

Scientific Name	Common Name	Legal Protected Status		
		Federal	*State*	*Other*
Juncus phaeocephalus phaeocephalus	Brown-head Rush	N/A	N/A	N/A
Juncus rugulosus	Wrinkled Rush	N/A	N/A	N/A
Juncus textilis	Basket Rush	N/A	N/A	N/A
Juncus xiphioides	Iris-leaf Rush	N/A	N/A	N/A
Lasthenia glabrata coulteri	Coulter's Goldfields	N/A	Special	CRPR - 1B.1
Lemna gibba	Inflated Duckweed	N/A	N/A	N/A
Lemna minor	Lesser Duckweed	N/A	N/A	N/A
Lemna valdiviana	Pale Duckweed	N/A	N/A	N/A
Limonium californicum	California Sea-lavender	N/A	N/A	N/A
Lobelia dunnii serrata	Dunn's Lobelia	N/A	N/A	N/A
Lythrum californicum	California Loosestrife	N/A	N/A	N/A
Mimulus cardinalis	Scarlet Monkeyflower	N/A	N/A	N/A
Mimulus guttatus	Common Large Monkeyflower	N/A	N/A	N/A
Mimulus pilosus	N/A	N/A	N/A	Not on any status lists
Nasturtium gambelii	N/A	Endangered	Threatened	CRPR - 1B.1
Paspalum distichum	Joint Paspalum	N/A	N/A	N/A
Persicaria amphibia	N/A	N/A	N/A	Not on any status lists
Persicaria lapathifolia	N/A	N/A	N/A	Not on any status lists
Persicaria punctata	N/A	N/A	N/A	Not on any status lists
Phacelia distans	N/A	N/A	N/A	N/A
Phyla nodiflora	Common Frog-fruit	N/A	N/A	N/A
Phyllospadix torreyi	Torrey's Surf-grass	N/A	N/A	N/A
Plagiobothrys acanthocarpus	Adobe Popcorn-flower	N/A	N/A	N/A
Plagiobothrys undulatus	N/A	N/A	N/A	Not on any status lists
Plantago elongata elongata	Slender Plantain	N/A	N/A	N/A
Platanus racemosa	California Sycamore	N/A	N/A	N/A
Populus trichocarpa	N/A	N/A	N/A	Not on any status lists
Potentilla anserina pacifica	N/A	N/A	N/A	Not on any status lists
Psilocarphus tenellus	N/A	N/A	N/A	N/A
Rumex conglomeratus	N/A	N/A	N/A	N/A
Rumex fueginus	N/A	N/A	N/A	Not on any status lists
Rumex kerneri	N/A	N/A	N/A	N/A

Table F-1. Inventory of Freshwater Species that May Inhabit the Plan Area

Scientific Name	Common Name	Legal Protected Status		
		Federal	*State*	*Other*
Rumex persicarioides	N/A	N/A	N/A	Not on any status lists
Rumex salicifolius salicifolius	Willow Dock	N/A	N/A	N/A
Ruppia cirrhosa	Widgeon-grass	N/A	N/A	N/A
Ruppia maritima	Ditch-grass	N/A	N/A	N/A
Salix babylonica	N/A	N/A	N/A	N/A
Salix exigua exigua	Narrowleaf Willow	N/A	N/A	N/A
Salix exigua hindsiana	N/A	N/A	N/A	Not on any status lists
Salix gooddingii	Goodding's Willow	N/A	N/A	N/A
Salix laevigata	Polished Willow	N/A	N/A	N/A
Salix lasiandra lasiandra	N/A	N/A	N/A	Not on any status lists
Salix lasiolepis lasiolepis	Arroyo Willow	N/A	N/A	N/A
Samolus parviflorus	N/A	N/A	N/A	Not on any status lists
Schoenoplectus acutus occidentalis	Hardstem Bulrush	N/A	N/A	N/A
Schoenoplectus americanus	Three-square Bulrush	N/A	N/A	N/A
Schoenoplectus californicus	California Bulrush	N/A	N/A	N/A
Schoenoplectus mucronatus	N/A	N/A	N/A	N/A
Scirpus microcarpus	Small-fruit Bulrush	N/A	N/A	N/A
Sinapis alba	N/A	N/A	N/A	N/A
Sparganium eurycarpum eurycarpum	N/A	N/A	N/A	N/A
Stachys albens	White-stem Hedge-nettle	N/A	N/A	N/A
Stuckenia pectinata	N/A	N/A	N/A	Not on any status lists
Suaeda calceoliformis	American Sea-blite	N/A	N/A	N/A
Suaeda esteroa	Estuary Suaeda	N/A	Special	CRPR - 1B.2
Symphyotrichum lanceolatum hesperium	Siskiyou Aster	N/A	N/A	N/A
Symphyotrichum lanceolatum lanceolatum	N/A	N/A	N/A	N/A
Thelypteris puberula sonorensis	N/A	N/A	Special	CRPR - 2B.2
Triglochin maritima	Common Bog Arrow-grass	N/A	N/A	N/A
Triglochin striata	Three-ribbed Arrow-grass	N/A	N/A	N/A
Typha domingensis	Southern Cattail	N/A	N/A	N/A
Typha latifolia	Broadleaf Cattail	N/A	N/A	N/A

Table F-1. Inventory of Freshwater Species that May Inhabit the Plan Area

Scientific Name	Common Name	Legal Protected Status		
		Federal	*State*	*Other*
Verbena scabra	Sandpaper Vervain	N/A	N/A	N/A
Veronica americana	American Speedwell	N/A	N/A	N/A
Veronica anagallis-aquatica	N/A	N/A	N/A	N/A
Veronica catenata	N/A	N/A	N/A	Not on any status lists
Zannichellia palustris	Horned Pondweed	N/A	N/A	N/A

Source: California Freshwater Species Database version 2.0.9.

Notes: N/A = not available/applicable; BSSC = Bird Species of Special Concern; ARSSC = Amphibian and Reptile Species of Special Concern; CS = candidate species; V = vulnerable; CRPR = California Rare Plant Rank.

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APPENDIX F2
GROUNDWATER-DEPENDENT ECOSYSTEMS

GROUNDWATER-DEPENDENT ECOSYSTEM CHARACTERIZATION

This appendix describes the characterization of the potential groundwater dependence of riparian habitat mapped across the Montecito Groundwater Basin (MGB) by the Natural Communities Commonly Associated with Groundwater (NCCAG) dataset. The NCCAG dataset was provided by the California Department of Water Resources (DWR) as a reference dataset and starting point for identification of groundwater-dependent ecosystems (GDEs) in groundwater basins. Because the scale of the dataset is statewide (i.e., coarse), it does not incorporate local, basin-specific groundwater conditions such as aquifer characteristics or current depths to groundwater. Therefore, the dataset is most appropriately used as an indicator of where GDEs are potentially present.

There is limited data characterizing the shallow groundwater conditions across the MGB. Because of this, available groundwater condition measurements used to assess the NCCAG dataset provide a measure of the potential likelihood of groundwater dependence but do not allow for a quantitative characterization of local habitat dependence on groundwater. As such, individual riparian habitats mapped by the NCCAG dataset were characterized as either priority potential GDEs or potential GDEs. The priority potential qualifier was used to indicate locations where existing data indicate the vegetation/wetland communities may rely on groundwater, and therefore additional, site-specific measurements are warranted.

To further relate local groundwater conditions to the potential likelihood of a habitat's reliance on groundwater, individual NCCAG habitat polygons were aggregated into large GDE evaluation units based on their location and underlying hydrogeologic conditions. Data supporting the characterization of each unit is described in detail below. The methods for identifying GDEs are outlined in Section 2.2.4.7 of the Groundwater Sustainability Plan.

Sycamore Creek Groundwater-Dependent Ecosystem Evaluation Unit

The Sycamore Creek GDE Evaluation Unit consists of approximately 45 acres of coast live oak (*Quercus agrifolia*) vegetation located along the bed and bank of intermittent streams in the upper Sycamore Creek watershed at the northwestern corner of the plan area (Figure F-1, Sycamore Creek, Montecito Creek, and Oak Creek GDE Evaluation Units). The community to the west (NCCAG polygon 51961) is entirely undeveloped land, while the communities to the east (NCCAG polygons 49400, 49405, 48656, and 51968) include mixed residential, institutional (Westmont College), and undeveloped land.

There is one groundwater well located within NCCAG polygon 48656. This is a privately owned well that the Montecito Groundwater Basin Groundwater Sustainability Agency (Montecito GSA) does not currently have access to for monitoring groundwater levels. The well is completed to a total depth of 900 feet and screened from 160 to 900 feet. The well completion report for this well indicates that the depth to water when the well was drilled in February 2014 was 68 feet below ground surface (bgs), which is deeper than the maximum rooting depth for coast live oak of 36 feet (Steinberg 2002).

Groundwater level data are available for six wells located within 1 kilometer of the GDE unit and indicate that groundwater levels have historically been as shallow as 11 feet bgs (Well 1-35), but generally greater than 36 feet bgs (Figure F-1 and Appendix E). However, four of these wells are screened in the bedrock formations that underlie the MGB (Wells 1-32, 1-35, 1-36, and 1-38), and two of the wells have unknown screen intervals (Wells 1-47 and 1-48); therefore, groundwater levels measured at these wells may not be indicative of the conditions encountered in the alluvium that underlie each mapped community.

Normalized Derived Moisture Index (NDMI) trends for the communities identified by NCCAG polygons 48656, 49405, and 51968 are positively correlated with groundwater levels in the principal aquifer as measured at Well 1-19, and NDMI trends for the community identified by NCCAG polygon 49400 are positively correlated with precipitation. The positive correlation between precipitation and vegetation health suggests that the vegetation may be supported by areal precipitation and intermittent surface flows emanating from the contributing watershed. Normalized Derived Vegetation Index (NDVI) and NDMI trends for community identified by NCCAG polygon 51961 are not correlated with groundwater levels or precipitation—during the last drought period both indices remained stable (Appendix F3).

All of the communities are characterized as potential GDEs. Although vegetation health trends for several of the communities (NCCAG polygons 48656, 49405, and 51968) are positively correlated with groundwater levels, groundwater levels have generally been greater than 36 feet bgs. Furthermore, these groundwater level measurements are likely indicative of conditions in the bedrock formations that underlie the MGB rather than the principal aquifer. The alluvial deposits that compose the principal aquifer in Sycamore Creek are known to be relatively thin. Almost all the wells in Sycamore Creek are completed in the bedrock formations that underlie the MGB.

Montecito Creek Groundwater-Dependent Ecosystem Evaluation Unit

The Montecito Creek GDE Evaluation Unit consists of approximately 125.8 acres of coast live oak and 1.6 acres of palustrine, forested, seasonally flooded vegetation and wetland communities. The majority of the unit is located along the bed and bank of upper Montecito Creek and a tributary in the northern part of the MGB. The remaining 6.5 acres of the unit are located approximately 1 kilometer downstream on the main stem of Montecito Creek. Within the MGB, Montecito Creek is classified as an intermittent stream (Figure F-1). The majority of the unit is developed residential land except in the immediate vicinity of the stream channel.

There are 12 wells located within the mapped communities. All the wells are privately owned wells that the Montecito GSA does not currently have access to for monitoring groundwater levels. According to available well completion reports, the wells range in depth from 200 to over 1,000 feet, and depth to groundwater when the wells were drilled ranged from 78 to 205 feet bgs.

Groundwater level data are available for 15 wells located within 1 kilometer of the unit and indicate that groundwater levels have historically been as shallow as 0 feet bgs (Wells 1-6, 1-7, and 2-2), and frequently less than 36 feet bgs (Figure F-1 and Appendix E). However, many of these wells have unknown screen intervals or are screened in the bedrock formations that underlie the MGB, and therefore groundwater levels measured at these wells may not be indicative of the conditions encountered in the alluvium that underlie each mapped community. Wells 1-31, 3-8, and 3-16 are known to be screened in the principal aquifer. Groundwater levels in Well 1-31 have historically been as shallow as 24 feet bgs, and frequently less than 36 feet bgs. Groundwater levels in Well 3-8 have always been greater than 36 feet bgs. Groundwater levels in Well 3-16 have reportedly been as shallow as 2 feet bgs (on one occasion), but generally much greater than 36 feet bgs (Appendix E).

NDMI trends for most all the coast live oak communities (NCCAG polygons 48443, 48445, 48462, 49360, 49403, and 51975) are positively correlated with the groundwater levels in the principal aquifer as measured at Wells 1-19 and 3-8. NDVI and NDMI trends for the remaining coast live oak community (NCCAG polygon 49395) and the palustrine, forested, seasonally flooded communities (NCCAG polygons 94552 and 94569) are not correlated with groundwater levels. A clear decline in vegetation health across most of the unit occurred between 2017 and 2018, corresponding with a wildfire and subsequent debris flow that removed much of the vegetation along Montecito Creek (Appendix F3).

Because vegetation health trends for the palustrine, forested, seasonally flooded communities (NCCAG polygons 94552 and 94569) and coast live oak community identified by NCCAG polygon 49395 are not correlated with groundwater levels and the communities persisted during periods when underlying groundwater levels were much deeper than 36 feet bgs, the communities are characterized as potential GDEs. Additionally, the coast live oak community identified by NCCAG polygon 49360 is characterized as a potential GDE. Although vegetation health trends for NCCAG polygon 49360 are correlated with groundwater levels, groundwater levels in nearby wells have always been greater than 36 feet bgs. The remaining coast live oak communities identified by NCCAG polygons 48443, 48445, 48462, 49403, and 51975 are characterized as priority potential GDEs. Groundwater levels and vegetation health trends are positively correlated, and groundwater levels have frequently been less than 36 feet bgs. However, the groundwater level data that indicate groundwater levels in the principal aquifer have frequently been within the rooting depth for coast live oak are limited to a single well (Well 1-31). Additionally, aerial photographs show that the unit was impacted by a debris flow in 2018, which could be the cause for the sudden decline in vegetation health around that time.

Oak Creek Groundwater-Dependent Ecosystem Evaluation Unit

The Oak Creek GDE Evaluation Unit consists of approximately 7.6 acres of coast live oak vegetation located on the bank of Oak Creek in the central part of the MGB. Oak Creek is classified as an intermittent stream (Figure F-1). Approximately one half of the unit is developed residential and recreational land and includes a park (Manning Park) and paved parking lot.

Groundwater level data are available for 12 wells located within 1 kilometer of the unit and indicate that groundwater levels have historically been as shallow as 0 feet bgs (Wells 1-6, 1-7, 1-14, 1-15, 1-17, and 1-18), and frequently less than 36 feet bgs (Figure F-1 and Appendix E). However, many of these wells have unknown screen intervals or are screened in the bedrock formations that underlie the MGB, and therefore groundwater levels measured at these wells may not be indicative of the conditions encountered in the alluvium that underlie the coast live oak community. Wells 1-15 and 1-17 are known to be screened in the principal aquifer. Groundwater levels at both wells have historically frequently been less than 36 feet bgs (Appendix E).

NDMI trends for the coast live oak community (NCCAG polygon 49368) are positively correlated with groundwater levels in the principal aquifer as measured at Well 1-15 (Appendix F3).

Because vegetation health trends for the community are positively correlated with groundwater levels in the principal aquifer and groundwater levels in nearby wells have frequently been less than 36 feet bgs, the unit is characterized as a priority potential GDE.

San Ysidro Creek Groundwater-Dependent Ecosystem Evaluation Unit

The San Ysidro Creek GDE Evaluation Unit consists of approximately 61.9 acres of coast live oak vegetation located on the bed and bank of San Ysidro Creek and a tributary. Within the MGB, San Ysidro Creek is classified as an intermittent stream (Figure F-2, San Ysidro Creek, Romero Creek, and Toro Canyon Creek GDE Evaluation Units). The majority of the unit is undeveloped to sparsely developed residential land.

There are seven wells located within the mapped communities. Most of the wells are privately owned wells that the Montecito GSA does not currently have access to for monitoring groundwater levels. According to available well completion reports, the wells range in depth from 170 to 420 feet, and depth to groundwater when the wells were drilled ranged from 30 to 90 feet bgs.

Groundwater level data are available for one well monitored by the Montecito GSA (Well 1-21) located in the center of NCCAG polygon 49402. Depth to groundwater in Well 1-21 has historically been as shallow as 0 feet bgs, and frequently less than 36 feet bgs. Well 1-21 is known to be screened in the principal aquifer. Additional groundwater level data are available for 21 wells located within 1 kilometer of the unit and indicate that groundwater levels have historically been less than 36 feet bgs at the majority of the wells (Figure F-2 and Appendix E). However, many of these wells have unknown screen intervals or are screened in the bedrock formations that underlie the MGB, and therefore groundwater levels measured at these wells may not be indicative of the conditions encountered in the alluvium that underlie each mapped community.

NDMI trends for the upstream communities on San Ysidro Creek (NCCAG polygons 49402, 51914, and 51929) are positively correlated with groundwater levels in the principal aquifer as measured at Well 1-37. NDVI and NDMI trends for the downstream communities on San Ysidro Creek (NCCAG polygons 49363 and 49365) and a community on the tributary to San Ysidro Creek (NCCAG polygon 51955) are not correlated with groundwater levels. A clear decline in vegetation health across most of the unit occurred between 2017 and 2018, corresponding with a debris flow that removed much of the vegetation along San Ysidro Creek (Appendix F3).

The communities identified by NCCAG polygons 49402, 51914, and 51929 are characterized as priority potential GDEs. Vegetation health trends and groundwater levels are positively correlated, and groundwater levels in nearby wells have frequently been less than 36 feet bgs. However, it is not definitively known if the apparent decline in vegetation health is due to declining groundwater levels during the last drought period or the debris flow. Additionally, the communities identified by NCCAG polygons 49363 and 49365 are characterized as priority potential GDEs. Although vegetation health trends and groundwater levels are not correlated, groundwater levels in nearby wells have frequently been less than 36 feet bgs. The community identified by NCCAG polygon 51955 is characterized as a potential GDE. Vegetation health trends and groundwater levels are not correlated, and groundwater levels in nearby wells have generally been greater than 36 feet bgs. However, these groundwater level measurements are likely indicative of conditions in the bedrock formations that underlie the MGB rather than the principal aquifer.

Romero Creek Groundwater-Dependent Ecosystem Evaluation Unit

The Romero Creek GDE Evaluation Unit consists of approximately 159 acres of coast live oak, 6.7 acres of riparian mixed hardwood, and 1.4 acres of palustrine, forested, seasonally flooded vegetation and wetland communities. The coast live oak and riparian mixed hardwood vegetation communities are located along the bed and bank of Romero Creek and tributaries, while the palustrine, forested, seasonally flooded wetland habitat is located in an unnamed drainage near the San Ysidro Creek/Romero Creek watershed divide. Within the MGB, Romero Creek is classified as an intermittent stream (Figure F-2). The majority of the unit is developed residential land, although a couple of the coast live oak communities and the riparian mixed hardwood habitat on the main stem of Romero Creek (NCCAG polygons 48594, 49369, and 52312) are entirely undeveloped land.

There are 18 wells located within the mapped communities. All the wells are privately owned wells that the Montecito GSA does not currently have access to for monitoring groundwater levels. According to available well completion reports, the wells range in depth from 18 to 1,000 feet, and depth to groundwater when the wells were drilled ranged from 32 to 110 feet bgs.

Groundwater level data are available for 24 wells located within 1 kilometer of the unit and indicate that groundwater levels have historically been as shallow as 0 feet bgs (Wells 1-3 and 1-28), and frequently less than 36 feet bgs (Figure F-2 and Appendix E). However, many of these wells have unknown screen intervals or are screened in the bedrock formations that underlie the MGB, and therefore groundwater levels measured at these

wells may not be indicative of the conditions encountered in the alluvium that underlie each mapped community. Wells 1-49, 1-50, and 1-54 are known to be screened in the principal aquifer. Groundwater levels at these wells have historically frequently been less than 36 feet bgs and are usually within 10 to 20 feet bgs (Appendix E).

NDMI trends for several of the northwestern-most coast live oak communities (NCCAG polygons 51915, 51920, 51934, 51938, and 51941), two coast live oak communities on the main stem of Romero Creek (NCCAG polygons 51900 and 51904), and riparian mixed hardwood community (NCCAG polygon 52312) are positively correlated with groundwater levels in the principal aquifer as measured at Well 1-3. Additionally, NDMI trends for several of the coast live oak communities (NCCAG polygons 48594, 49370, 51900, and 51913) and the riparian mixed hardwood community (NCCAG polygon 52312) are positively correlated with precipitation. The positive correlation between precipitation and vegetation health suggests that the vegetation may be supported by areal precipitation and intermittent surface flows emanating from the contributing watershed. The vegetation health of the remaining coast live oak communities (NCCAG polygons 49353, 49361, 49369, 51927, and 51959) are not correlated with precipitation or groundwater levels. A clear decline in NDVI and NDMI for NCCAG polygons 51959 (coast live oak) and 52312 (riparian mixed hardwood) occurred between 2017 and 2018, corresponding with a debris flow that removed much of the vegetation in those areas of the Romero Creek watershed (Appendix F3). Vegetation health indices are not available for the palustrine, forested, seasonally flooded wetland (NCCAG polygon 94560).

The coast live oak communities identified by NCCAG polygons 51900, 51904, 51915, 51920, 51934, 51938, and 51941, and riparian mixed hardwood community (NCCAG polygon 52312) are characterized as priority potential GDEs. Vegetation health trends and groundwater levels are positively correlated, and groundwater levels in nearby wells have frequently been less than 36 feet bgs. Additionally, the coast live oak communities identified by NCCAG polygons 48594, 49353, 49361, 49369, 49370, and 51913 are characterized as priority potential GDEs. Although vegetation health trends and groundwater levels are not correlated, groundwater levels in nearby wells have frequently been less than 36 feet bgs. The remaining coast live oak communities identified by NCCAG polygons 51927 and 51959 are characterized as potential GDEs. There is not sufficient groundwater level data to characterize groundwater conditions beneath the communities. In addition, the palustrine, forested, seasonally flooded wetland (NCCAG polygon 94560) is characterized as a potential GDE because vegetation health indices are not available.

Toro Canyon Creek Groundwater-Dependent Ecosystem Evaluation Unit

The Toro Canyon Creek GDE Evaluation Unit consists of approximately 109.5 acres of coast live oak; 7.5 acres of riparian mixed hardwood; 13 acres of palustrine, forested, seasonally flooded; and 0.8 acres of riverine, unknown perennial, unconsolidated bottom, semi-permanently flooded vegetation and wetland communities. The vegetation and wetland communities are located along the bed and bank of Toro Canyon Creek and tributaries. Toro Canyon Creek is classified as a perennial stream from its origin to approximately 1 mile south of the northern MGB boundary, where it transitions to an intermittent stream (Figure F-2). The wetland communities, a few of the coast live oak communities (NCCAG polygons 49348, 51942, and 51883), and the riparian mixed hardwood habitat (NCCAG polygon 52598) are largely undeveloped land, while the remaining coast live oak communities are developed residential land.

There are seven wells located within the mapped communities. All the wells are privately owned wells that the Montecito GSA does not currently have access to for monitoring groundwater levels. According to available well completion reports the wells range in depth from 45 to 900 feet, and depth to groundwater when the wells were drilled ranged from 28 to 39 feet bgs.

Groundwater level data are available for four wells located within 1 kilometer of the unit and indicate that groundwater levels have historically been as shallow as 15 feet bgs (Well 4-4), and frequently less than 36 feet bgs. However, Wells 1-43 and 4-8 are completely screened in the bedrock formations that underlie the MGB, and the screened interval of Well 4-4 is not known; therefore, groundwater levels measured at these wells may not be indicative of the conditions encountered in the alluvium that underlie each mapped community. Well 4-6 is known to be screened in the principal aquifer. Groundwater levels in Well 4-6 have always been greater than 36 feet bgs (Appendix E).

NDMI trends for the coast live oak community identified by NCCAG polygon 51919 are positively correlated with groundwater levels in the principal aquifer as measured at Well 1-3. Additionally, NDMI trends for community are positively correlated with precipitation. NDMI trends for the coast live oak community identified by NCCAG polygon 51883 are also positively correlated with precipitation. The positive correlation between precipitation and vegetation health suggests that the vegetation may be supported by areal precipitation and intermittent surface flows emanating from the contributing watershed. The vegetation health of the remaining vegetation and wetland communities (NCCAG polygons 49348, 51882, 51888, 51895, 51897, 51902, 51903, 51933, 51942, 51962, 52598, and 94554) are not correlated with groundwater levels or precipitation (Appendix F3). Vegetation health indices are not available for the palustrine, forested, seasonally flooded wetland communities identified by NCCAG polygons 94540 and 94561, or the riverine, unknown perennial, unconsolidated bottom, semi-permanently flooded wetland communities identified by NCCAG polygons 102683 and 102688.

All of the vegetation and wetland communities are characterized as potential GDEs because available groundwater level data to characterize conditions in the principal aquifer beneath the communities is limited to a single well (Well 4-6), which indicates groundwater levels have always been greater than 36 feet bgs. The alluvial deposits that compose the principal aquifer in upper Toro Canyon Creek are known to be relatively thin. Most wells in upper Toro Canyon Creek are completed in the bedrock formations that underlie the MGB.

Summary of Groundwater-Dependent Ecosystem Characterization

The NCCAG dataset identified 56 individual vegetation/wetland communities within the plan area that may depend on groundwater. Of the 56 communities, 25 were characterized as priority potential GDEs and 31 were characterized as potential GDEs. Additionally, 20 of the communities identified as potential GDEs were characterized as not likely to be impacted by groundwater pumping. Table F-1 provides a summary of the GDE characterization results by individual NCCAG polygon. Figure F-3 shows the location of priority potential GDEs.

Table F-1. Characterization of NCCAG Dataset Polygons in the Plan Area

NCCAG Polygon ID	GDE Evaluation Unit	Vegetation or Wetland Type	GDE Characterization	Justification	Impacted by Groundwater Extraction
48656	Sycamore Creek	Coast live oak	Potential GDE	Vegetation health correlated with groundwater levels but levels generally greater than 36 feet bgs and shallow depth to bedrock	Potential to be impacted by groundwater pumping
49400	Sycamore Creek	Coast live oak	Potential GDE	Vegetation health not correlated with	Not likely to be impacted by

Table F-1. Characterization of NCCAG Dataset Polygons in the Plan Area

NCCAG Polygon ID	GDE Evaluation Unit	Vegetation or Wetland Type	GDE Characterization	Justification	Impacted by Groundwater Extraction
				groundwater levels, levels generally greater than 36 feet bgs, and shallow depth to bedrock	groundwater pumping
49405	Sycamore Creek	Coast live oak	Potential GDE	Vegetation health correlated with groundwater levels but levels generally greater than 36 feet bgs and shallow depth to bedrock	Potential to be impacted by groundwater pumping
51961	Sycamore Creek	Coast live oak	Potential GDE	Vegetation health not correlated with groundwater levels, levels generally greater than 36 feet bgs, and shallow depth to bedrock	Not likely to be impacted by groundwater pumping
51968	Sycamore Creek	Coast live oak	Potential GDE	Vegetation health correlated with groundwater levels but levels generally greater than 36 feet bgs and shallow depth to bedrock	Potential to be impacted by groundwater pumping
49368	Oak Creek	Coast live oak	Priority Potential GDE	Vegetation health correlated with groundwater levels and levels frequently less than 36 feet bgs	Potential to be impacted by groundwater pumping
48443	Montecito Creek	Coast live oak	Priority Potential GDE	Vegetation health correlated with groundwater levels and levels frequently less than 36 feet bgs	Potential to be impacted by groundwater pumping
48445	Montecito Creek	Coast live oak	Priority Potential GDE	Vegetation health correlated with groundwater levels and levels frequently less than 36 feet bgs	Potential to be impacted by groundwater pumping

Table F-1. Characterization of NCCAG Dataset Polygons in the Plan Area

NCCAG Polygon ID	GDE Evaluation Unit	Vegetation or Wetland Type	GDE Characterization	Justification	Impacted by Groundwater Extraction
48462	Montecito Creek	Coast live oak	Priority Potential GDE	Vegetation health correlated with groundwater levels and levels frequently less than 36 feet bgs	Potential to be impacted by groundwater pumping
49360	Montecito Creek	Coast live oak	Potential GDE	Vegetation health correlated with groundwater levels but levels always greater than 36 feet bgs	Potential to be impacted by groundwater pumping
49395	Montecito Creek	Coast live oak	Potential GDE	Vegetation health not correlated with groundwater levels and vegetation persisted when groundwater levels were much greater than 36 feet bgs	Not likely to be impacted by groundwater pumping
49403	Montecito Creek	Coast live oak	Priority Potential GDE	Vegetation health correlated with groundwater levels and levels frequently less than 36 feet bgs	Potential to be impacted by groundwater pumping
51975	Montecito Creek	Coast live oak	Priority Potential GDE	Vegetation health correlated with groundwater levels and levels frequently less than 36 feet bgs	Potential to be impacted by groundwater pumping
94552	Montecito Creek	Palustrine, forested, seasonally flooded	Potential GDE	Vegetation health not correlated with groundwater levels and vegetation persisted when groundwater levels were much greater than 36 feet bgs	Not likely to be impacted by groundwater pumping
94569	Montecito Creek	Palustrine, forested, seasonally flooded	Potential GDE	Vegetation health not correlated with groundwater levels and vegetation persisted when groundwater levels were much greater than 36 feet bgs	Not likely to be impacted by groundwater pumping

Table F-1. Characterization of NCCAG Dataset Polygons in the Plan Area

NCCAG Polygon ID	GDE Evaluation Unit	Vegetation or Wetland Type	GDE Characterization	Justification	Impacted by Groundwater Extraction
49363	San Ysidro Creek	Coast live oak	Priority Potential GDE	Vegetation health not correlated with groundwater levels but levels frequently less than 36 feet bgs	Potential to be impacted by groundwater pumping
49365	San Ysidro Creek	Coast live oak	Priority Potential GDE	Vegetation health not correlated with groundwater levels but levels frequently less than 36 feet bgs	Potential to be impacted by groundwater pumping
49402	San Ysidro Creek	Coast live oak	Priority Potential GDE	Vegetation health correlated with groundwater levels and levels frequently less than 36 feet bgs	Potential to be impacted by groundwater pumping
51914	San Ysidro Creek	Coast live oak	Priority Potential GDE	Vegetation health correlated with groundwater levels and levels frequently less than 36 feet bgs	Potential to be impacted by groundwater pumping
51929	San Ysidro Creek	Coast live oak	Priority Potential GDE	Vegetation health correlated with groundwater levels and levels frequently less than 36 feet bgs	Potential to be impacted by groundwater pumping
51955	San Ysidro Creek	Coast live oak	Potential GDE	Vegetation health not correlated with groundwater levels, levels generally greater than 36 feet bgs, and shallow depth to bedrock	Not likely to be impacted by groundwater pumping
48594	Romero Creek	Coast live oak	Priority Potential GDE	Vegetation health not correlated with groundwater levels but levels frequently less than 36 feet bgs	Potential to be impacted by groundwater pumping
49353	Romero Creek	Coast live oak	Priority Potential GDE	Vegetation health not correlated with groundwater levels but levels	Potential to be impacted by groundwater pumping

Table F-1. Characterization of NCCAG Dataset Polygons in the Plan Area

NCCAG Polygon ID	GDE Evaluation Unit	Vegetation or Wetland Type	GDE Characterization	Justification	Impacted by Groundwater Extraction
				frequently less than 36 feet bgs	
49361	Romero Creek	Coast live oak	Priority Potential GDE	Vegetation health not correlated with groundwater levels but levels frequently less than 36 feet bgs	Potential to be impacted by groundwater pumping
49369	Romero Creek	Coast live oak	Priority Potential GDE	Vegetation health not correlated with groundwater levels but levels frequently less than 36 feet bgs	Potential to be impacted by groundwater pumping
49370	Romero Creek	Coast live oak	Priority Potential GDE	Vegetation health not correlated with groundwater levels but levels frequently less than 36 feet bgs	Potential to be impacted by groundwater pumping
51900	Romero Creek	Coast live oak	Priority Potential GDE	Vegetation health correlated with groundwater levels and levels frequently less than 36 feet bgs	Potential to be impacted by groundwater pumping
51904	Romero Creek	Coast live oak	Priority Potential GDE	Vegetation health correlated with groundwater levels and levels frequently less than 36 feet bgs	Potential to be impacted by groundwater pumping
51913	Romero Creek	Coast live oak	Priority Potential GDE	Vegetation health not correlated with groundwater levels but levels frequently less than 36 feet bgs	Potential to be impacted by groundwater pumping
51915	Romero Creek	Coast live oak	Priority Potential GDE	Vegetation health correlated with groundwater levels and levels frequently less than 36 feet bgs	Potential to be impacted by groundwater pumping
51920	Romero Creek	Coast live oak	Priority Potential GDE	Vegetation health correlated with groundwater levels and levels	Potential to be impacted by groundwater pumping

Table F-1. Characterization of NCCAG Dataset Polygons in the Plan Area

NCCAG Polygon ID	GDE Evaluation Unit	Vegetation or Wetland Type	GDE Characterization	Justification	Impacted by Groundwater Extraction
				frequently less than 36 feet bgs	
51927	Romero Creek	Coast live oak	Potential GDE	Vegetation health not correlated with groundwater levels, limited available groundwater level data, and shallow depth to bedrock	Not likely to be impacted by groundwater pumping
51934	Romero Creek	Coast live oak	Priority Potential GDE	Vegetation health correlated with groundwater levels and levels frequently less than 36 feet bgs	Potential to be impacted by groundwater pumping
51938	Romero Creek	Coast live oak	Priority Potential GDE	Vegetation health correlated with groundwater levels and levels frequently less than 36 feet bgs	Potential to be impacted by groundwater pumping
51941	Romero Creek	Coast live oak	Priority Potential GDE	Vegetation health correlated with groundwater levels and levels frequently less than 36 feet bgs	Potential to be impacted by groundwater pumping
51959	Romero Creek	Coast live oak	Potential GDE	Vegetation health not correlated with groundwater levels, limited available groundwater level data, and shallow depth to bedrock	Not likely to be impacted by groundwater pumping
52312	Romero Creek	Riparian mixed hardwood	Priority Potential GDE	Vegetation health correlated with groundwater levels and levels frequently less than 36 feet bgs	Potential to be impacted by groundwater pumping
94560	Romero Creek	Palustrine, forested, seasonally flooded	Potential GDE	Insufficient data to characterize habitat health over time and limited available groundwater level data	Potential to be impacted by groundwater pumping

Table F-1. Characterization of NCCAG Dataset Polygons in the Plan Area

NCCAG Polygon ID	GDE Evaluation Unit	Vegetation or Wetland Type	GDE Characterization	Justification	Impacted by Groundwater Extraction
49348	Toro Canyon Creek	Coast live oak	Potential GDE	Vegetation health not correlated with groundwater levels and limited available groundwater level data	Potential to be impacted by groundwater pumping
51882	Toro Canyon Creek	Coast live oak	Potential GDE	Vegetation health not correlated with groundwater levels and limited available groundwater level data	Potential to be impacted by groundwater pumping
51883	Toro Canyon Creek	Coast live oak	Potential GDE	Vegetation health not correlated with groundwater levels and limited available groundwater level data	Potential to be impacted by groundwater pumping
51888	Toro Canyon Creek	Coast live oak	Potential GDE	Vegetation health not correlated with groundwater levels, limited available groundwater level data, and shallow depth to bedrock	Not likely to be impacted by groundwater pumping
51895	Toro Canyon Creek	Coast live oak	Potential GDE	Vegetation health not correlated with groundwater levels, limited available groundwater level data, and shallow depth to bedrock	Not likely to be impacted by groundwater pumping
51897	Toro Canyon Creek	Coast live oak	Potential GDE	Vegetation health not correlated with groundwater levels, limited available groundwater level data, and shallow depth to bedrock	Not likely to be impacted by groundwater pumping
51902	Toro Canyon Creek	Coast live oak	Potential GDE	Vegetation health not correlated with groundwater levels, limited	Not likely to be impacted by groundwater pumping

Table F-1. Characterization of NCCAG Dataset Polygons in the Plan Area

NCCAG Polygon ID	GDE Evaluation Unit	Vegetation or Wetland Type	GDE Characterization	Justification	Impacted by Groundwater Extraction
				available groundwater level data, and shallow depth to bedrock	
51903	Toro Canyon Creek	Coast live oak	Potential GDE	Vegetation health not correlated with groundwater levels, limited available groundwater level data, and shallow depth to bedrock	Not likely to be impacted by groundwater pumping
51919	Toro Canyon Creek	Coast live oak	Potential GDE	Vegetation health correlated with groundwater levels but limited available groundwater level data and shallow depth to bedrock	Potential to be impacted by groundwater pumping
51933	Toro Canyon Creek	Coast live oak	Potential GDE	Vegetation health not correlated with groundwater levels, limited available groundwater level data, and shallow depth to bedrock	Not likely to be impacted by groundwater pumping
51942	Toro Canyon Creek	Coast live oak	Potential GDE	Vegetation health not correlated with groundwater levels, limited available groundwater level data, and shallow depth to bedrock	Not likely to be impacted by groundwater pumping
51962	Toro Canyon Creek	Coast live oak	Potential GDE	Vegetation health not correlated with groundwater levels, limited available groundwater level data, and shallow depth to bedrock	Not likely to be impacted by groundwater pumping
52598	Toro Canyon Creek	Riparian mixed hardwood	Potential GDE	Vegetation health not correlated with groundwater levels and limited available	Potential to be impacted by groundwater pumping

Table F-1. Characterization of NCCAG Dataset Polygons in the Plan Area

NCCAG Polygon ID	GDE Evaluation Unit	Vegetation or Wetland Type	GDE Characterization	Justification	Impacted by Groundwater Extraction
				groundwater level data	
94540	Toro Canyon Creek	Palustrine, forested, seasonally flooded	Potential GDE	Insufficient data to characterize habitat health over time and limited available groundwater level data	Potential to be impacted by groundwater pumping
94554	Toro Canyon Creek	Palustrine, forested, seasonally flooded	Potential GDE	Vegetation health not correlated with groundwater levels, limited available groundwater level data, and shallow depth to bedrock	Not likely to be impacted by groundwater pumping
94561	Toro Canyon Creek	Palustrine, forested, seasonally flooded	Potential GDE	Insufficient data to characterize habitat health over time, limited available groundwater level data, and shallow depth to bedrock	Not likely to be impacted by groundwater pumping
102683	Toro Canyon Creek	Riverine, unknown perennial, unconsolidated bottom, semi-permanently flooded	Potential GDE	Insufficient data to characterize habitat health over time, limited available groundwater level data, and shallow depth to bedrock	Not likely to be impacted by groundwater pumping
102688	Toro Canyon Creek	Riverine, unknown perennial, unconsolidated bottom, semi-permanently flooded	Potential GDE	Insufficient data to characterize habitat health over time, limited available groundwater level data, and shallow depth to bedrock	Not likely to be impacted by groundwater pumping

Notes: NCCAG = Natural Communities Commonly Associated with Groundwater; GDE = groundwater-dependent ecosystem; bgs = below ground surface.

REFERENCES CITED

Steinberg, Peter D. 2002. "Quercus agrifolia." In *Fire Effects Information System*. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory. Accessed September 2020. https://www.fs.usda.gov/database/feis/plants/tree/queagr/all.html.

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Legend

- Montecito Groundwater Basin (3-049, Plan Area)
- Well Monitored by MWD
- Private Groundwater Well within Potenital GDE
- Private Groundwater Well

Stream

- Intermittent
- Perennial

Watershed

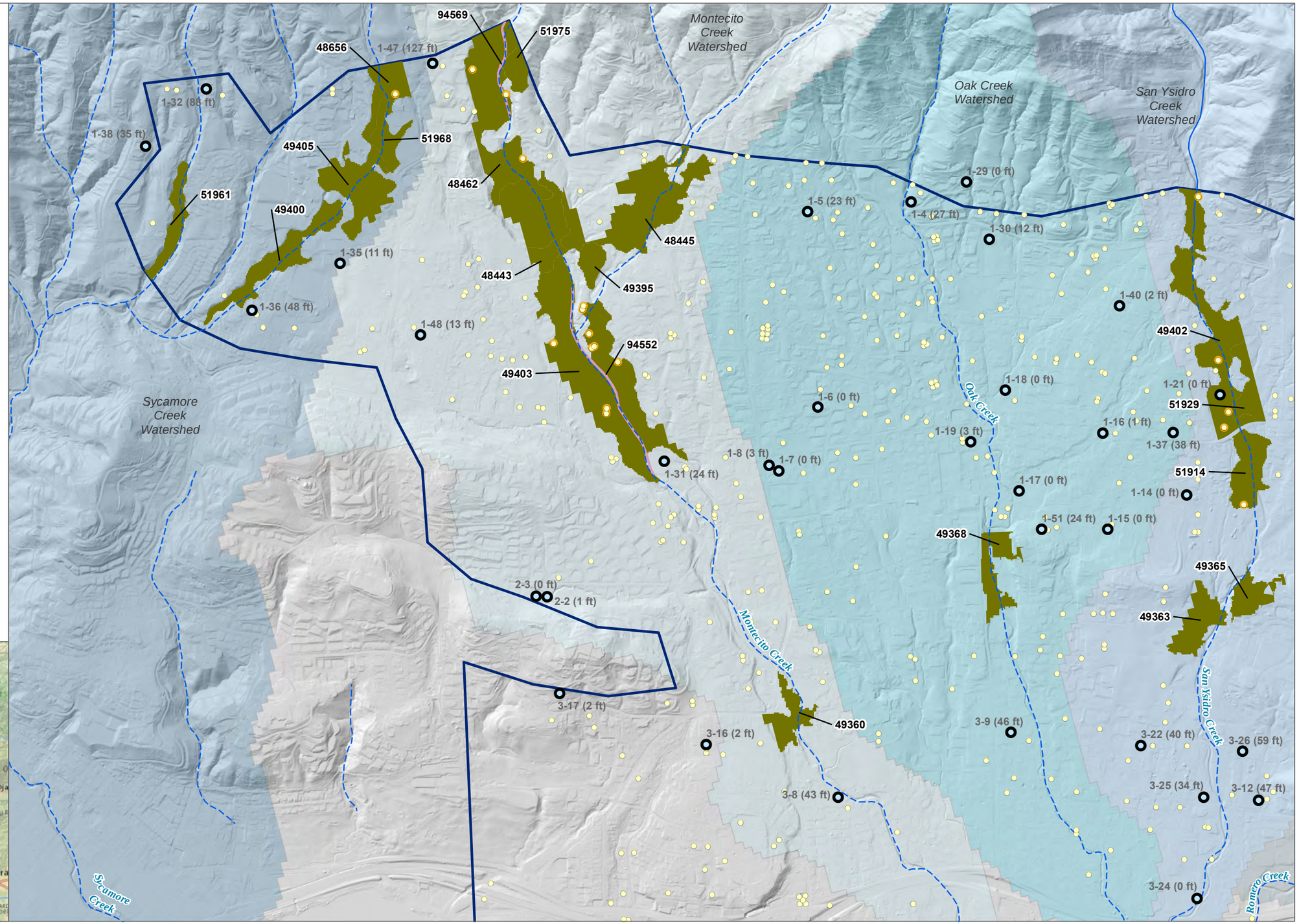
- Sycamore Creek Watershed
- Montecito Creek Watershed
- Oak Creek Watershed
- Romero Creek Watershed
- San Ysidro Creek Watershed

Natural Communities Commonly Associated with Groundwater

- Coast Live Oak
- Palustrine, Forested, Seasonally Flooded

Note: groundwater level in parentheses is shallowest depth to water measured at well





DATUM: NAD 1983 DATA SOURCE: ESRI; DWR; USGS

DUDEK

0 0.5 1 Kilometers

FIGURE F-1

Sycamore Creek, Montecito Creek, and Oak Creek GDE Evaluation Units

Montecito Groundwater Basin Groundwater Sustainability Plan

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Legend

- Montecito Groundwater Basin (3-049, Plan Area)
- Well Monitored by MWD
- Private Groundwater Well within Potenital GDE
- Private Groundwater Well

Stream

- Intermittent
- Perennial

Watershed

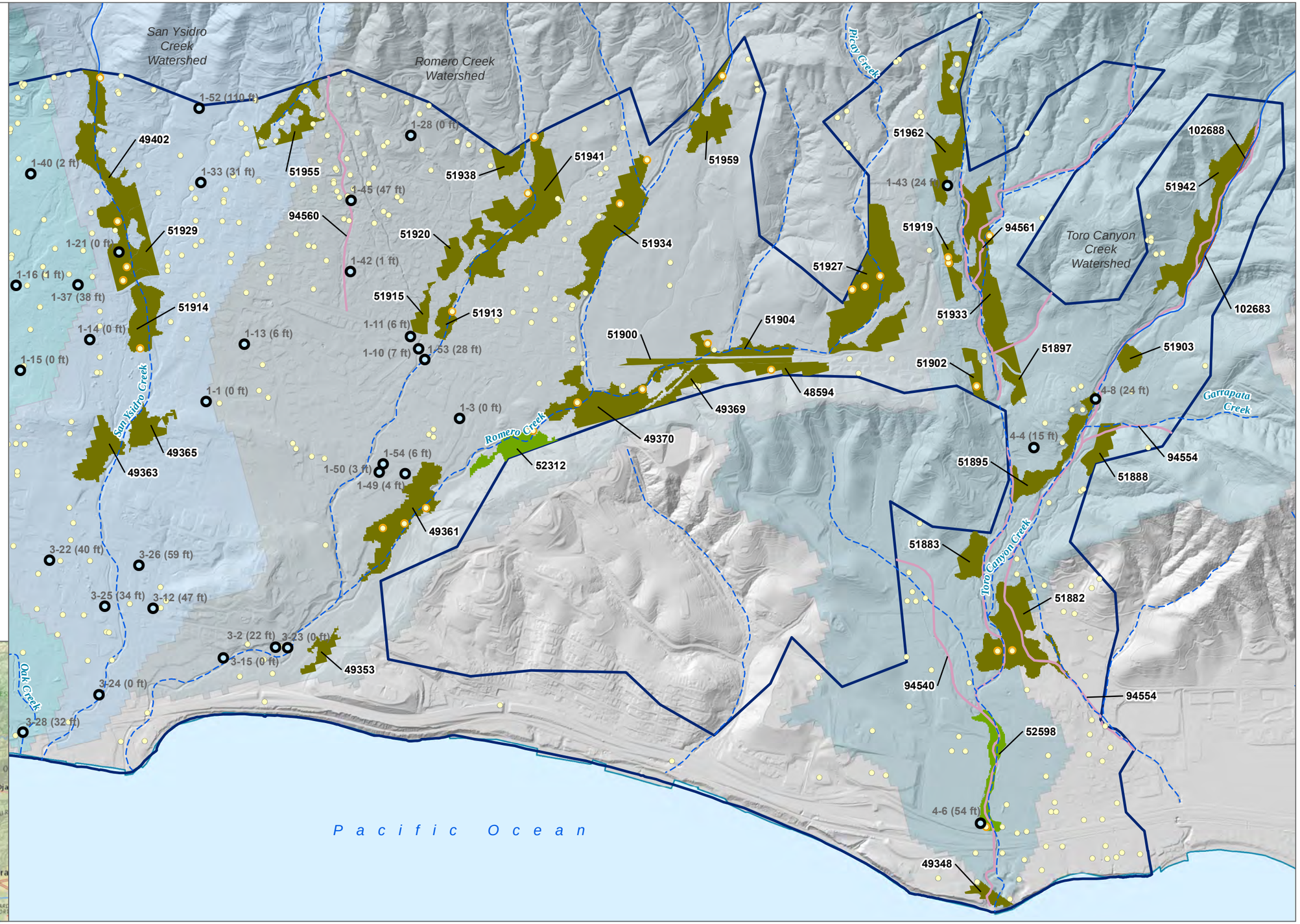
- Oak Creek Watershed
- Romero Creek Watershed
- San Ysidro Creek Watershed
- Toro Canyon Creek Watershed

Natural Communities Commonly Associated with Groundwater

- Coast Live Oak
- Riparian Mixed Hardwood
- Palustrine, Forested, Seasonally Flooded
- Riverine, Unknown Perennial, Unconsolidated Bottom, Semipermanently Flooded

Note: groundwater level in parentheses is shallowest depth to water measured at well





DATUM: NAD 1983 DATA SOURCE: ESRI; DWR; USGS

DUDEK

0 0.5 1 Kilometers

FIGURE F-2

San Ysidro Creek, Romero Creek, and Toro Canyon Creek GDE Evaluation Units

Montecito Groundwater Basin Groundwater Sustainability Plan

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Legend

- Montecito Groundwater Basin (3-049, Plan Area)
- Priority Potential GDEs

Stream

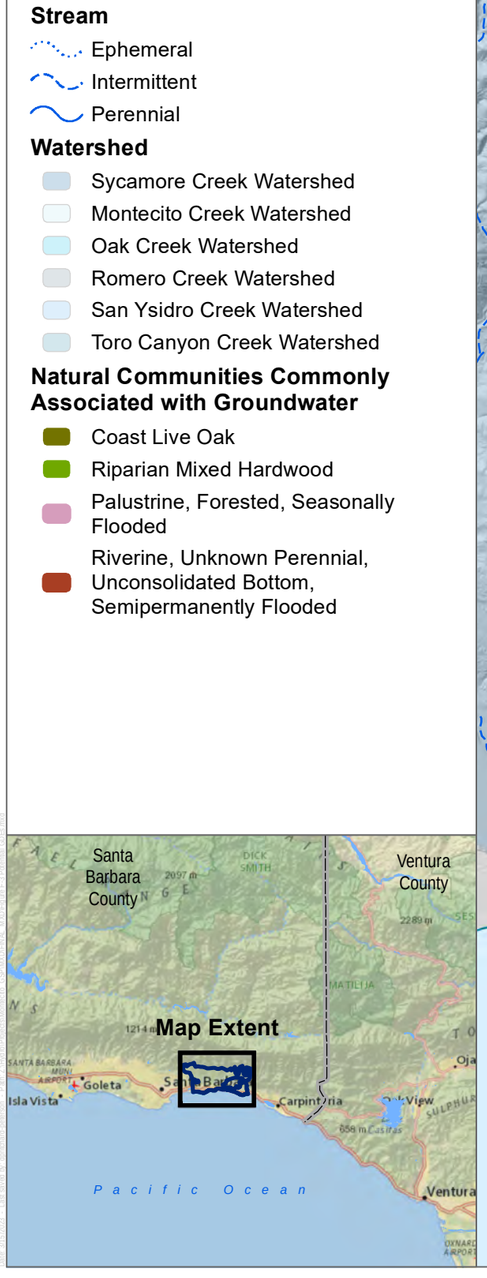
- Ephemeral
- Intermittent
- Perennial

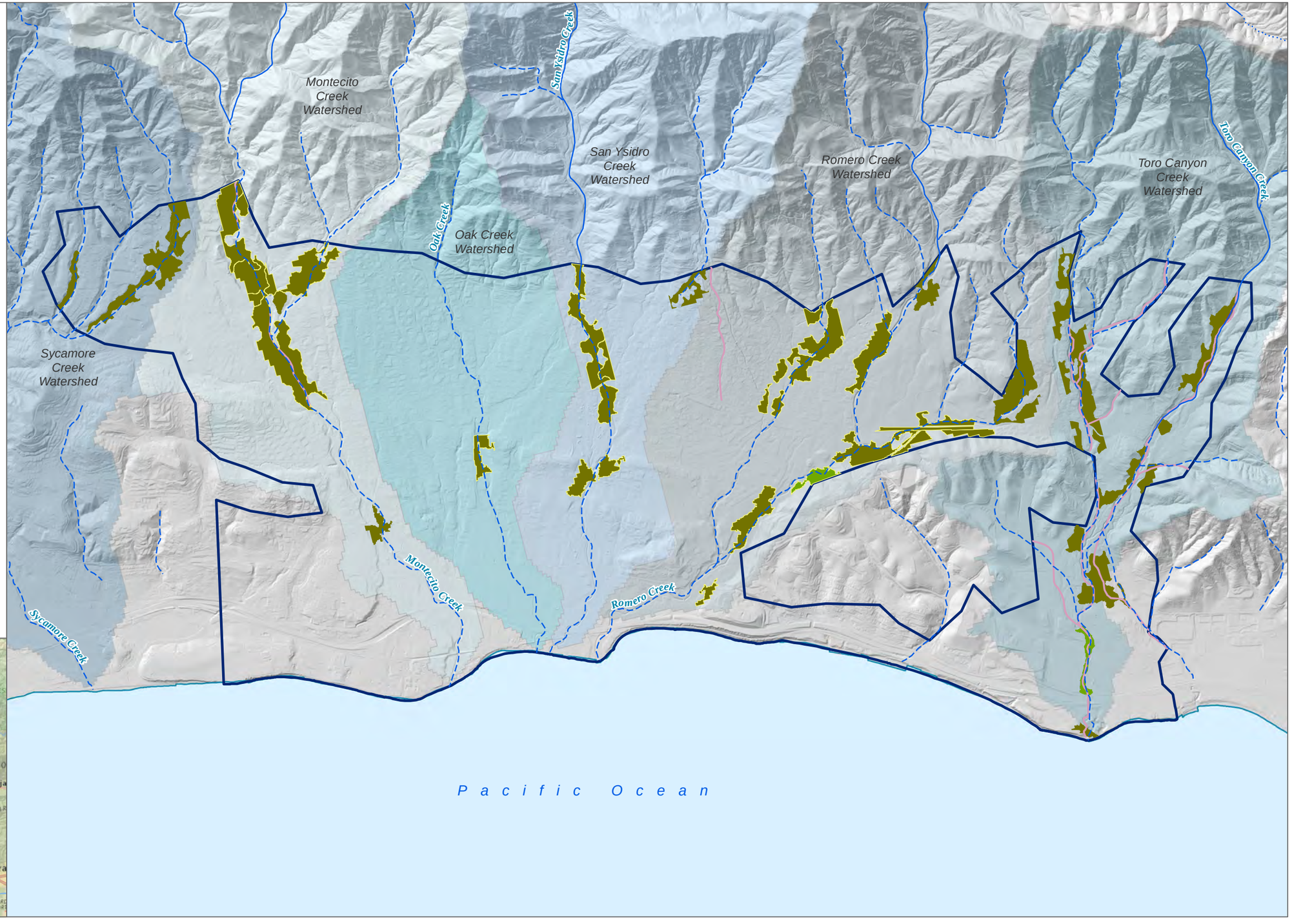
Watershed

- Sycamore Creek Watershed
- Montecito Creek Watershed
- Oak Creek Watershed
- Romero Creek Watershed
- San Ysidro Creek Watershed
- Toro Canyon Creek Watershed

Natural Communities Commonly Associated with Groundwater

- Coast Live Oak
- Riparian Mixed Hardwood
- Palustrine, Forested, Seasonally Flooded
- Riverine, Unknown Perennial, Unconsolidated Bottom, Semipermanently Flooded





DATUM: NAD 1983 DATA SOURCE: ESRI; DWR; USGS

DUDEK

0 0.5 1 Miles

FIGURE F-3

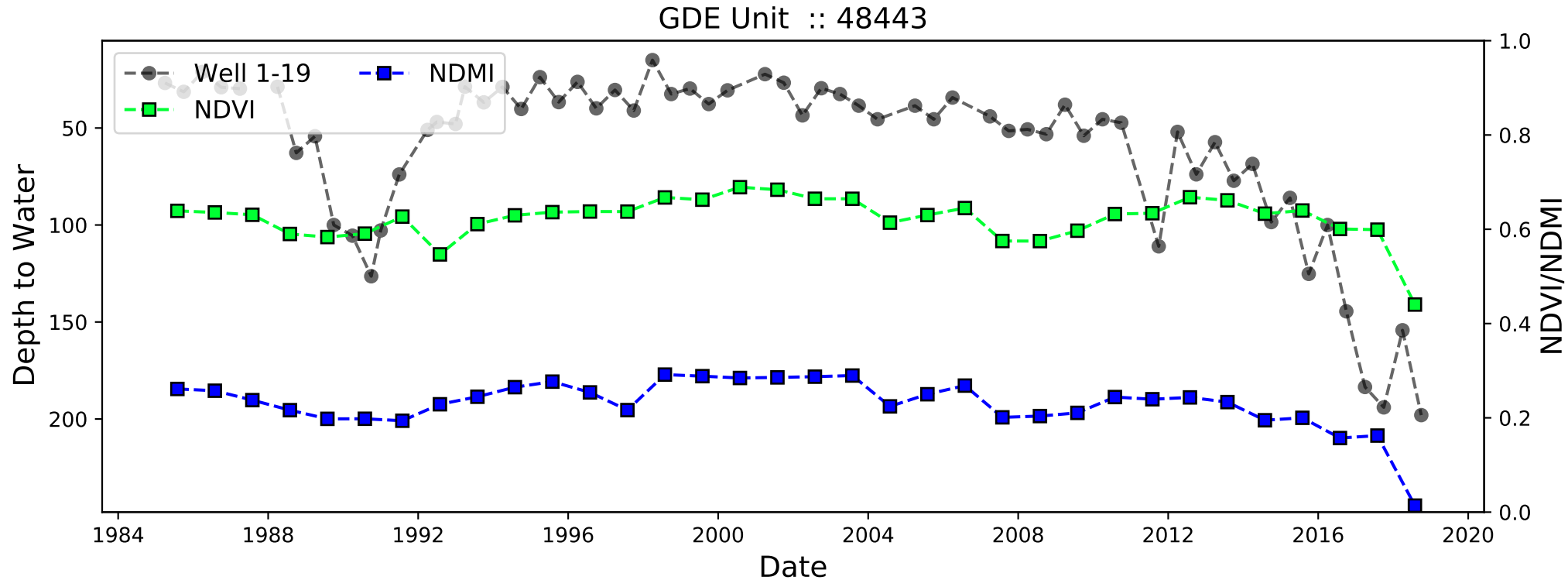
Potential Groundwater Dependent Ecosystems

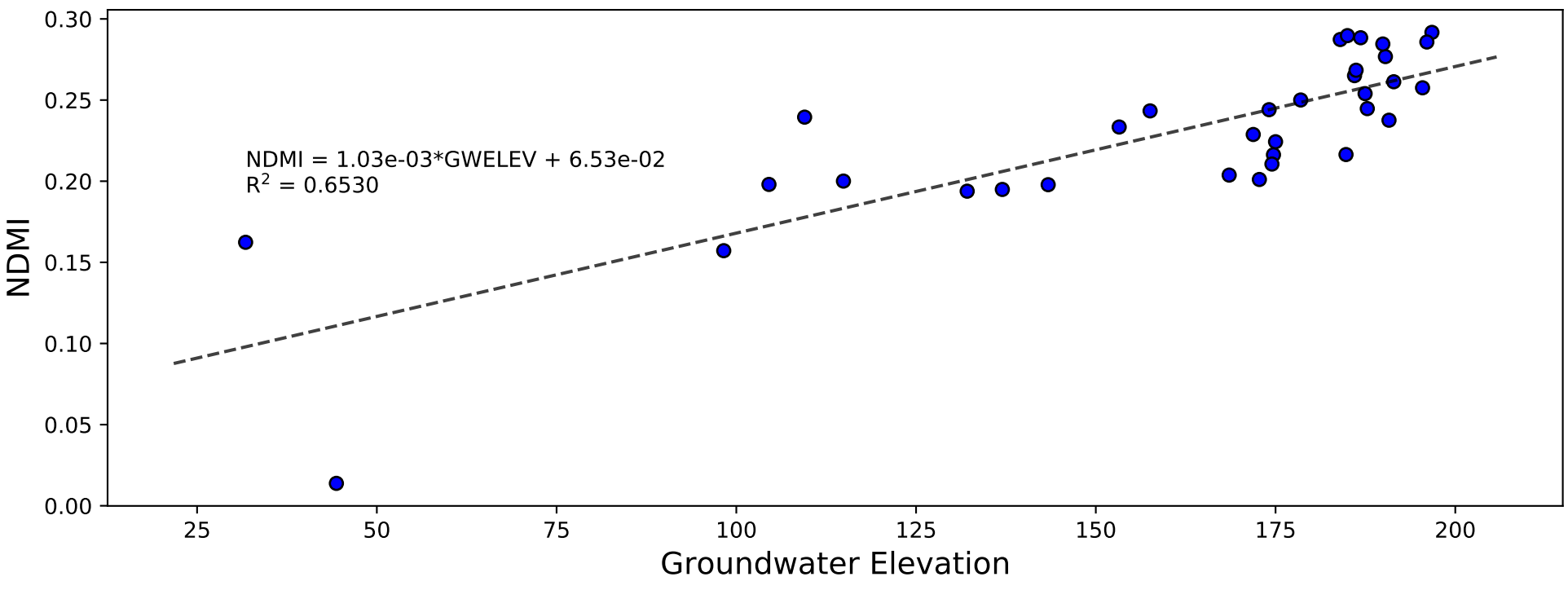
Montecito Groundwater Basin Groundwater Sustainability Plan

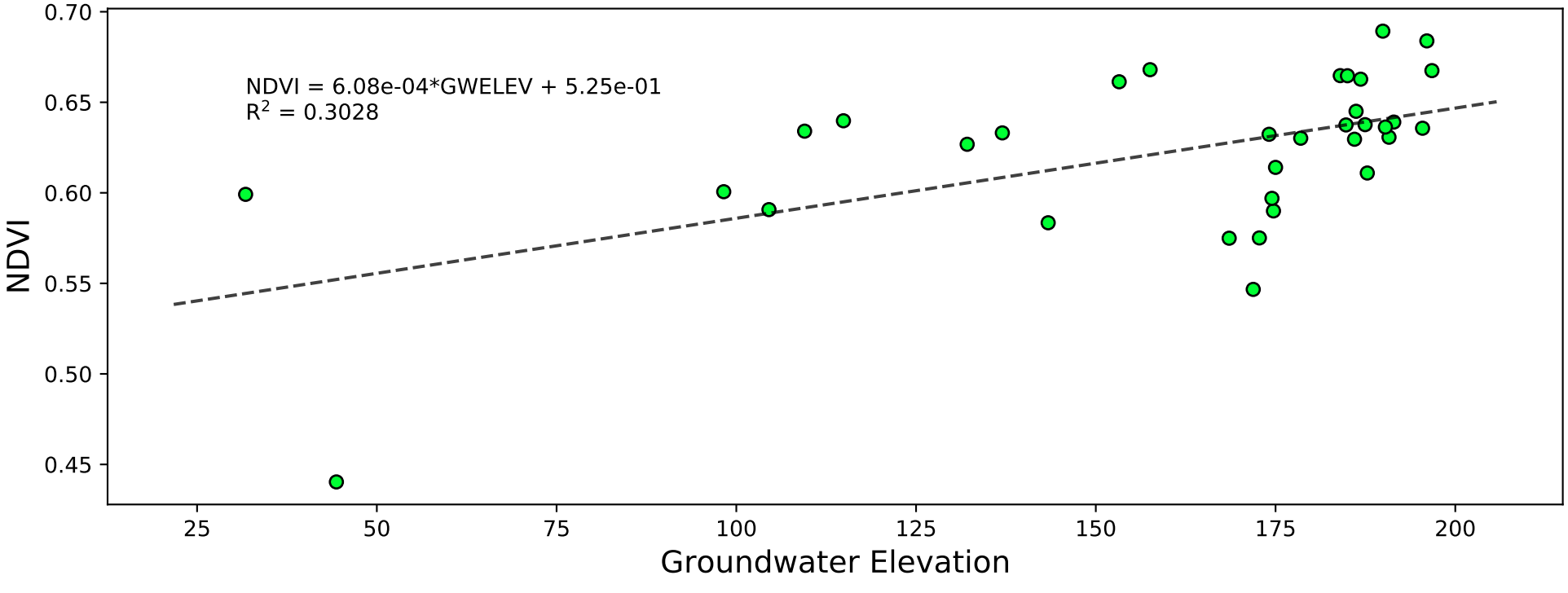
INTENTIONALLY LEFT BLANK

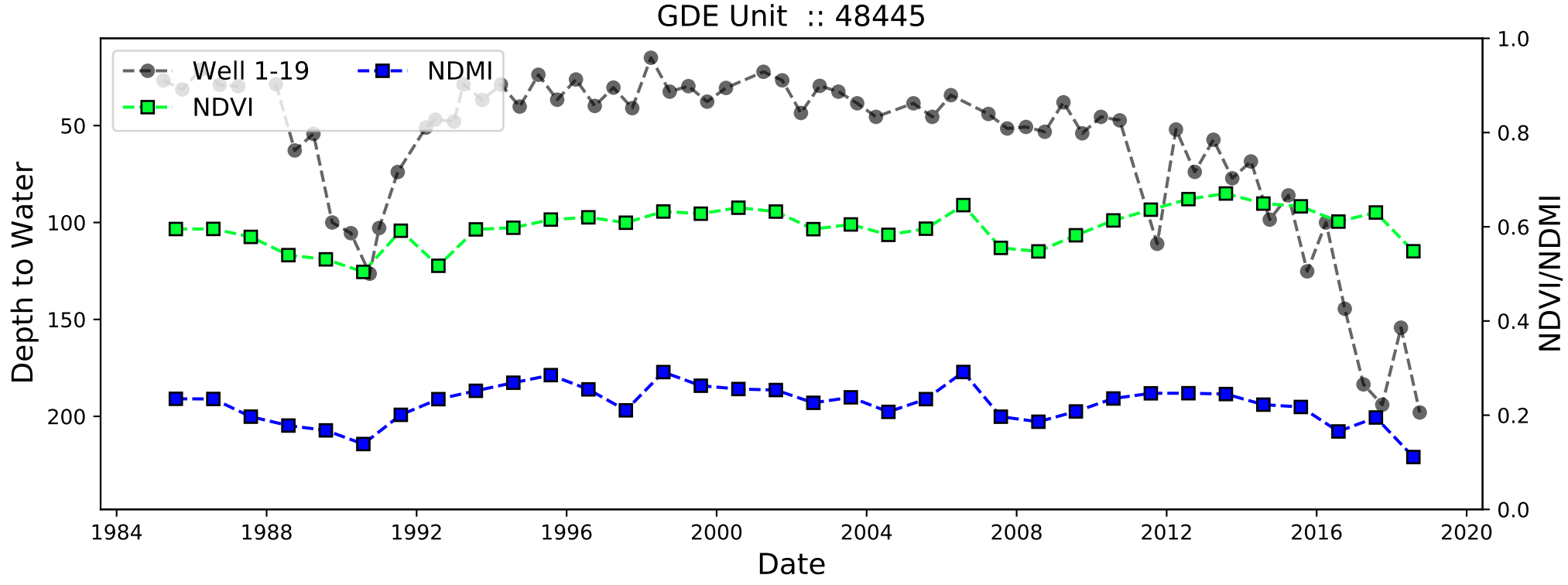
Montecito GDE Evaluation Unit

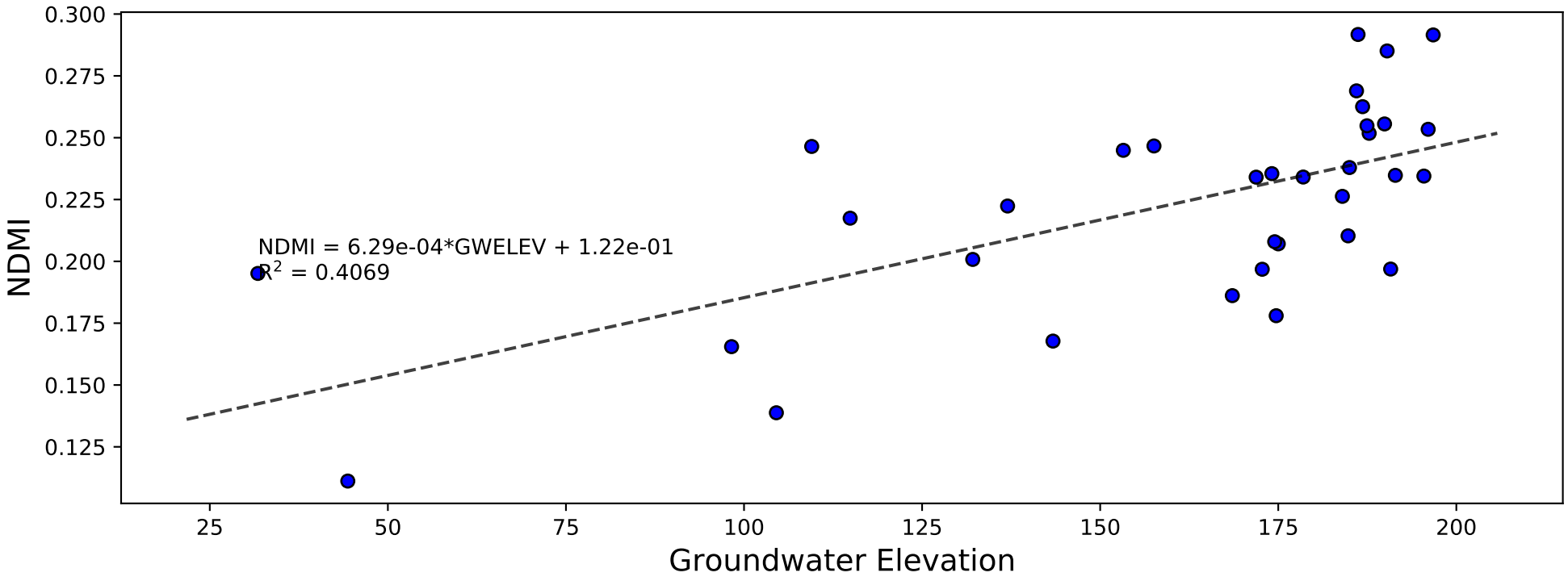
Groundwater Level and Habitat Health Correlations

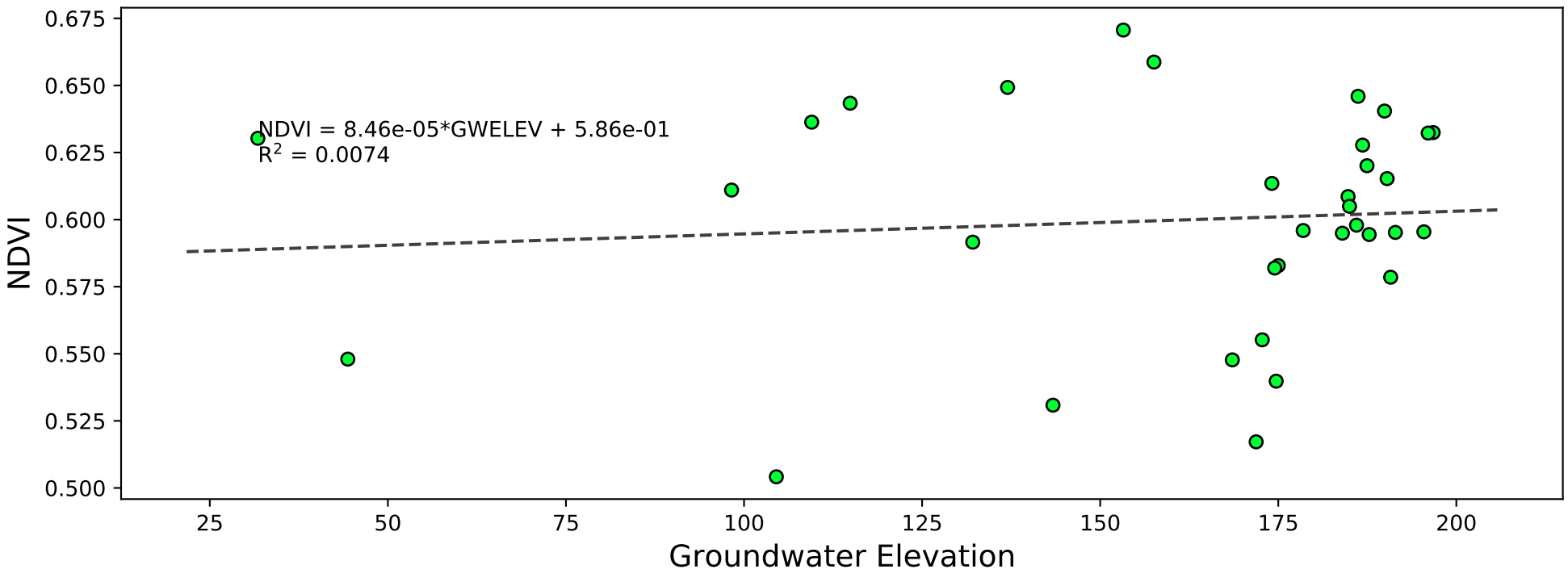

GDE Unit :: 48443
Well 1-19
NDMI
NDVI
Depth to Water
NDVI/NDMI
Date
1984
1988
1992
1996
2000
2004
2008
2012
2016
2020
50
100
150
200
0.0
0.2
0.4
0.6
0.8
1.0

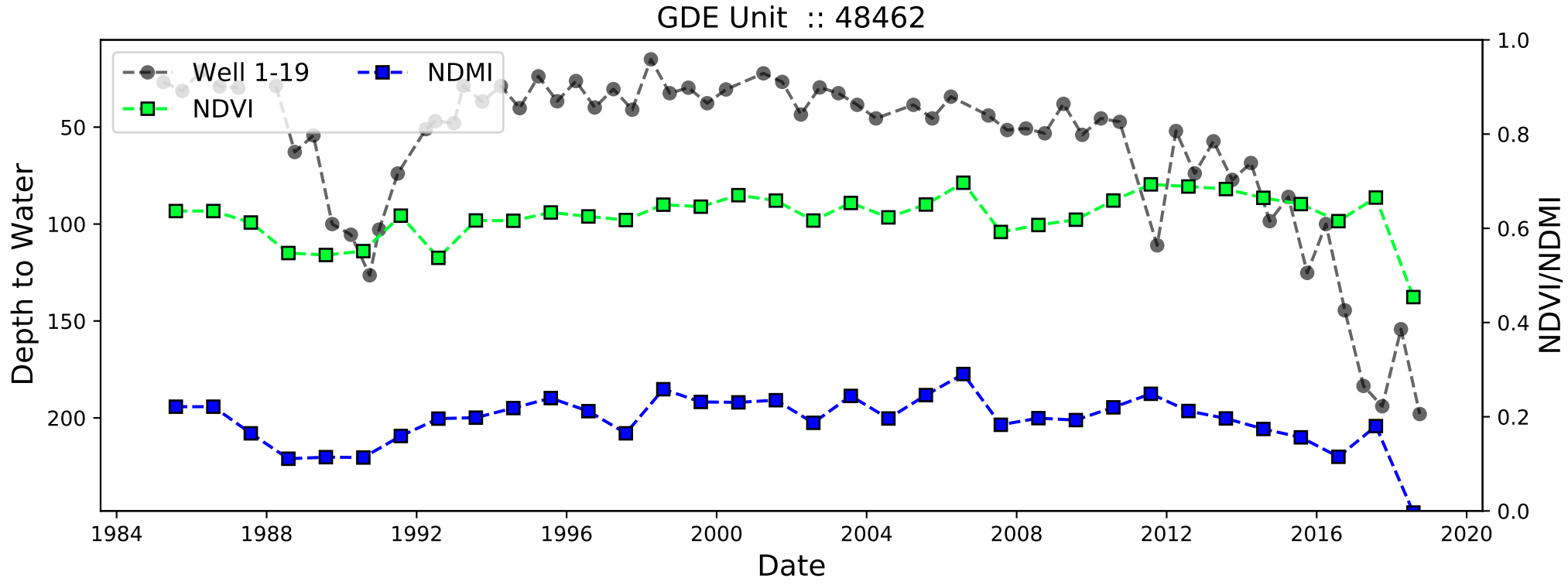

NDMI = 1.03e-03*GWELEV + 6.53e-02
R2 = 0.6530
NDMI
Groundwater Elevation
0.00
0.05
0.10
0.15
0.20
0.25
0.30
25
50
75
100
125
150
175
200

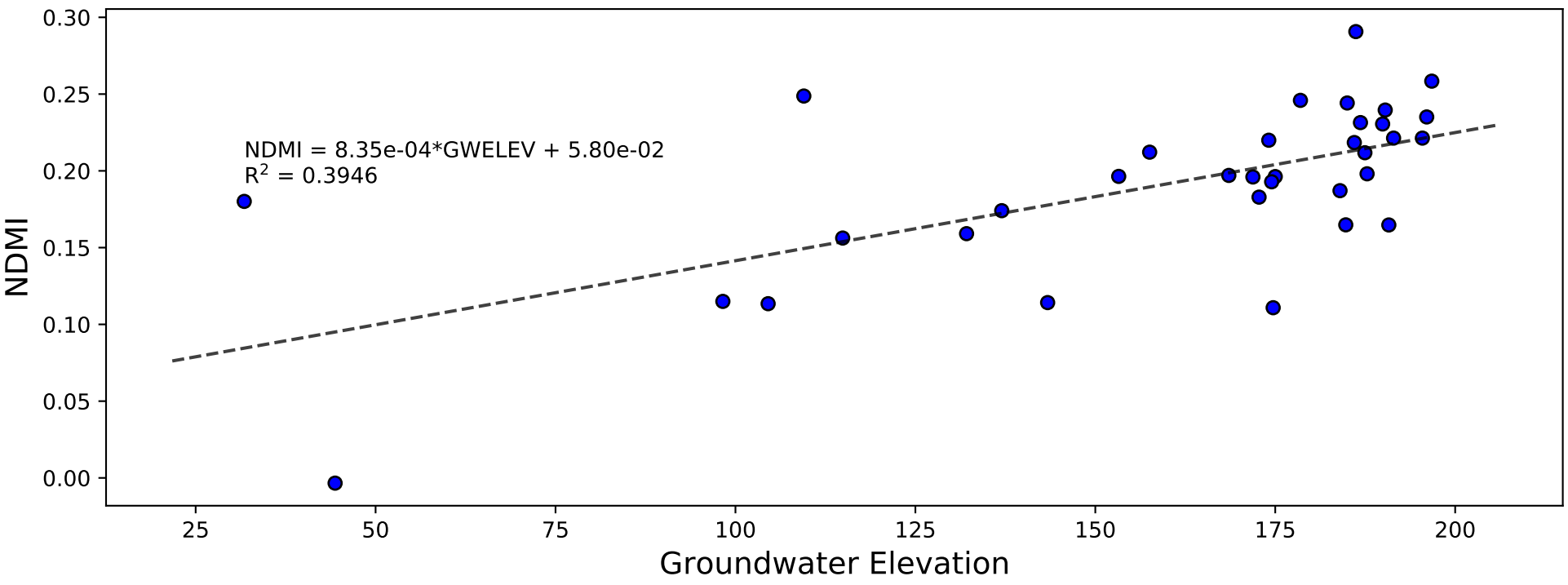

NDVI = 6.08e-04*GWELEV + 5.25e-01
R2 = 0.3028
NDVI
Groundwater Elevation
0.45
0.50
0.55
0.60
0.65
0.70
25
50
75
100
125
150
175
200

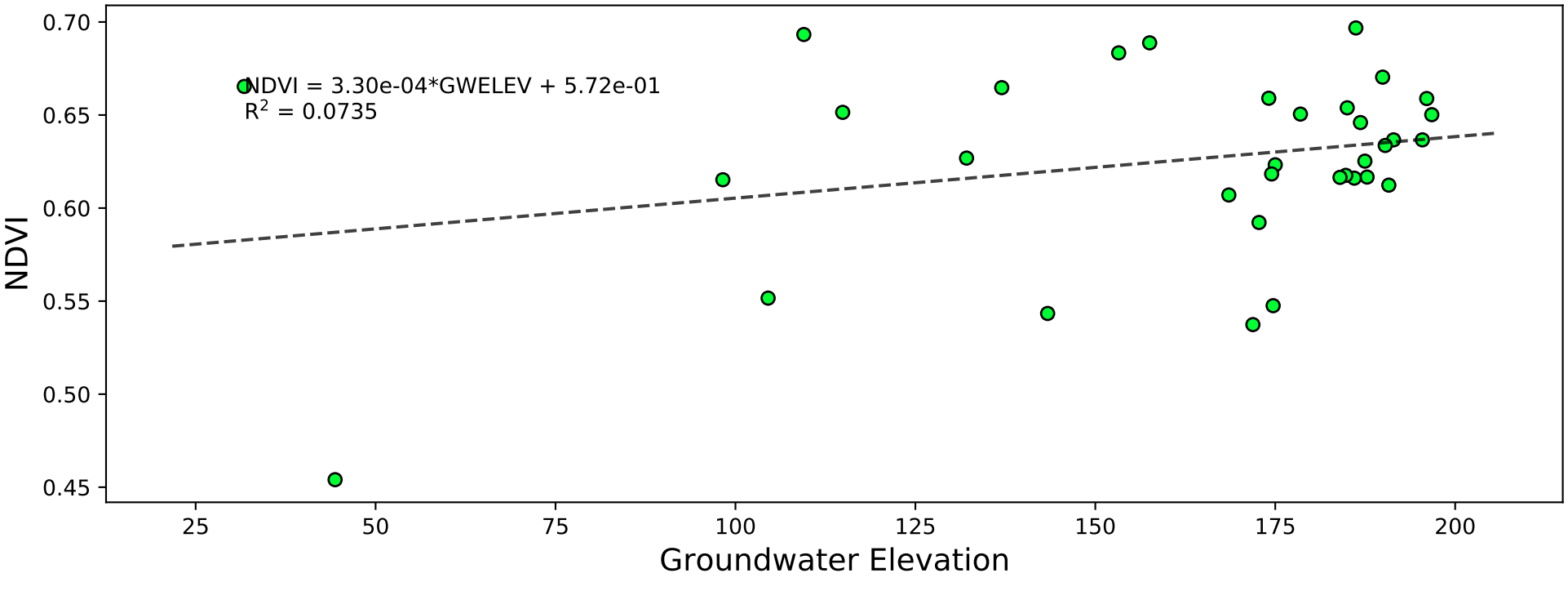

GDE Unit :: 48445
Well 1-19
NDMI
NDVI
Depth to Water
NDVI/NDMI
Date
1984
1988
1992
1996
2000
2004
2008
2012
2016
2020
50
100
150
200
1.0
0.8
0.6
0.4
0.2
0.0

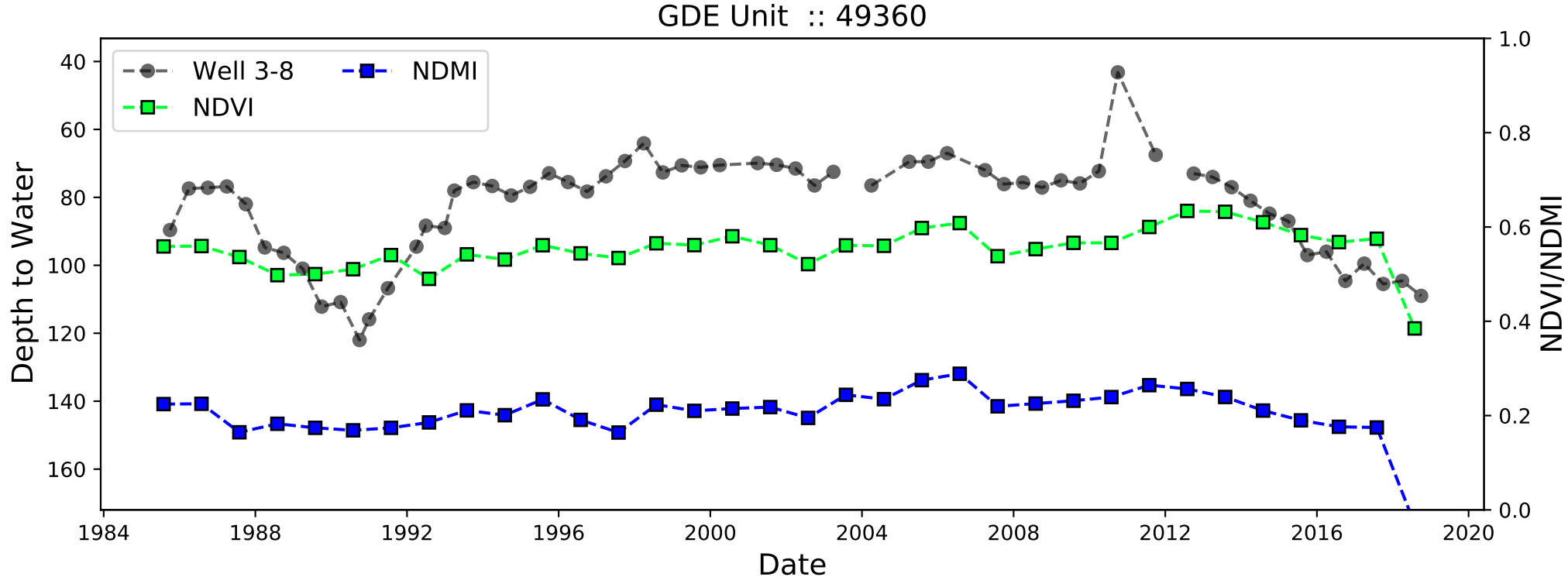

NDMI = 6.29e-04*GWELEV + 1.22e-01
R^2 = 0.4069
NDMI
Groundwater Elevation
0.300
0.275
0.250
0.225
0.200
0.175
0.150
0.125
25
50
75
100
125
150
175
200

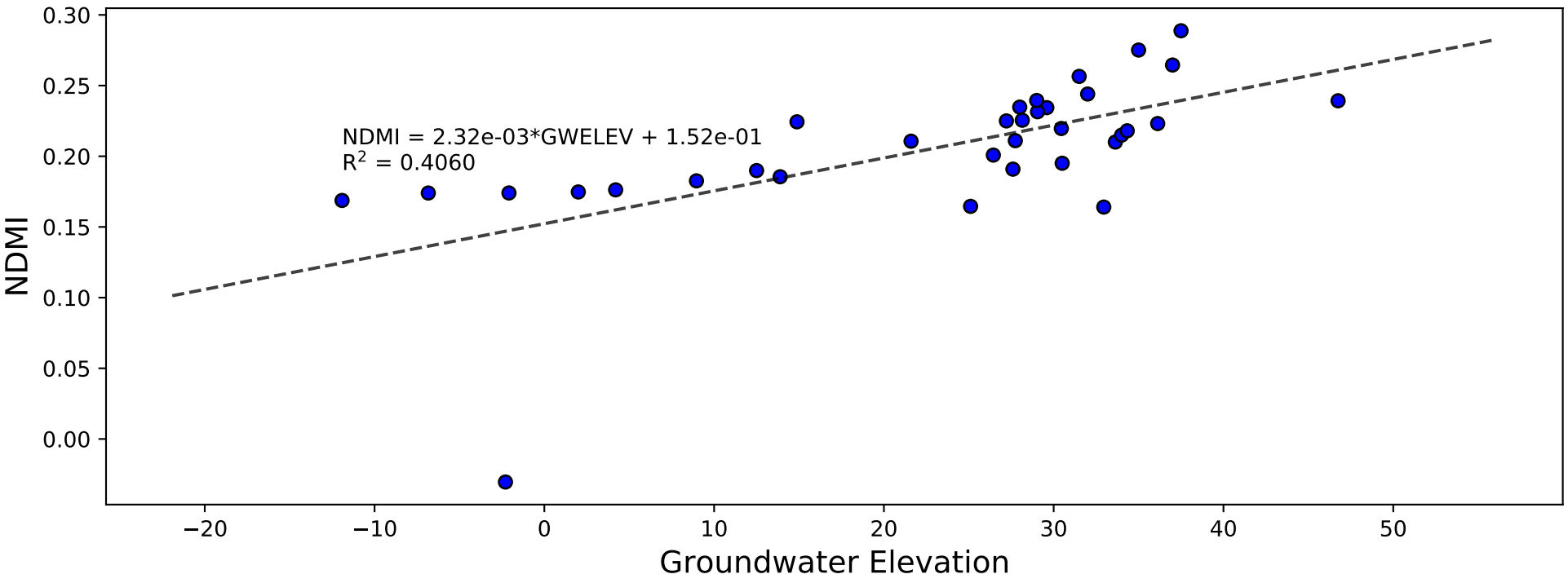

NDVI = 8.46e-05*GWELEV + 5.86e-01
R^2 = 0.0074
NDVI
Groundwater Elevation
0.675
0.650
0.625
0.600
0.575
0.550
0.525
0.500
25
50
75
100
125
150
175
200

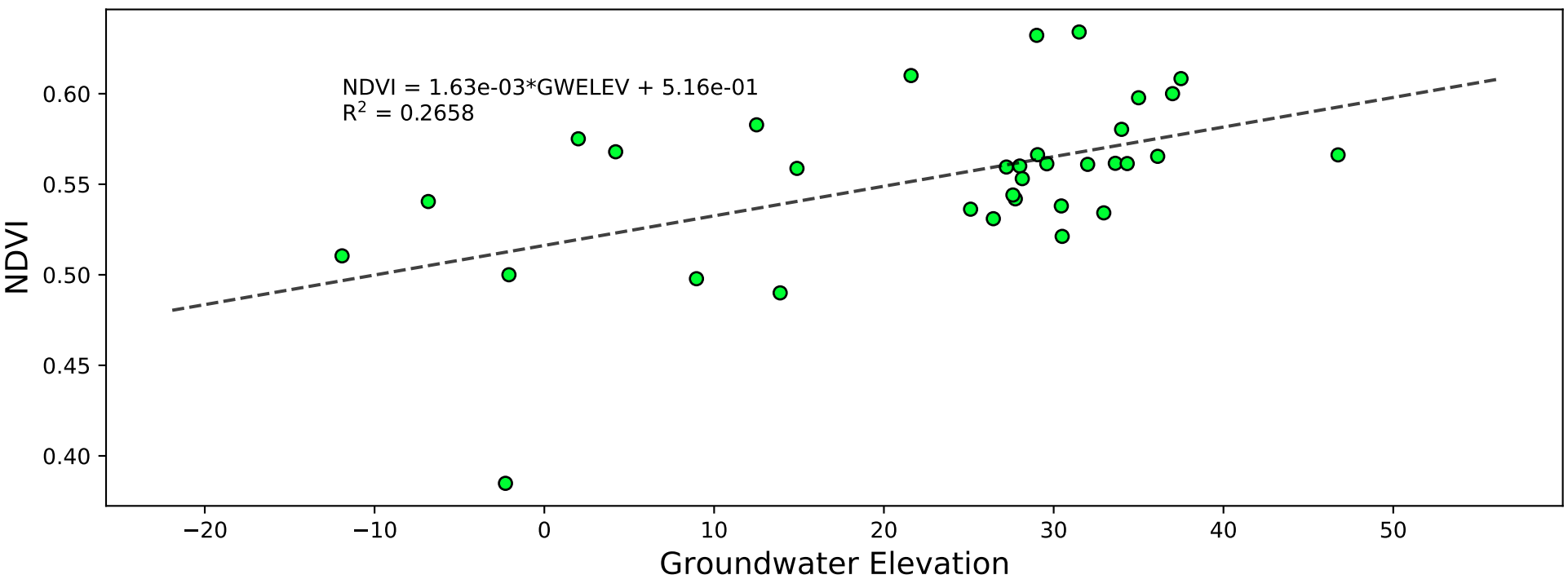

GDE Unit :: 48462
Well 1-19
NDMI
NDVI
Depth to Water
NDVI/NDMI
Date
50
100
150
200
0.0
0.2
0.4
0.6
0.8
1.0
1984
1988
1992
1996
2000
2004
2008
2012
2016
2020

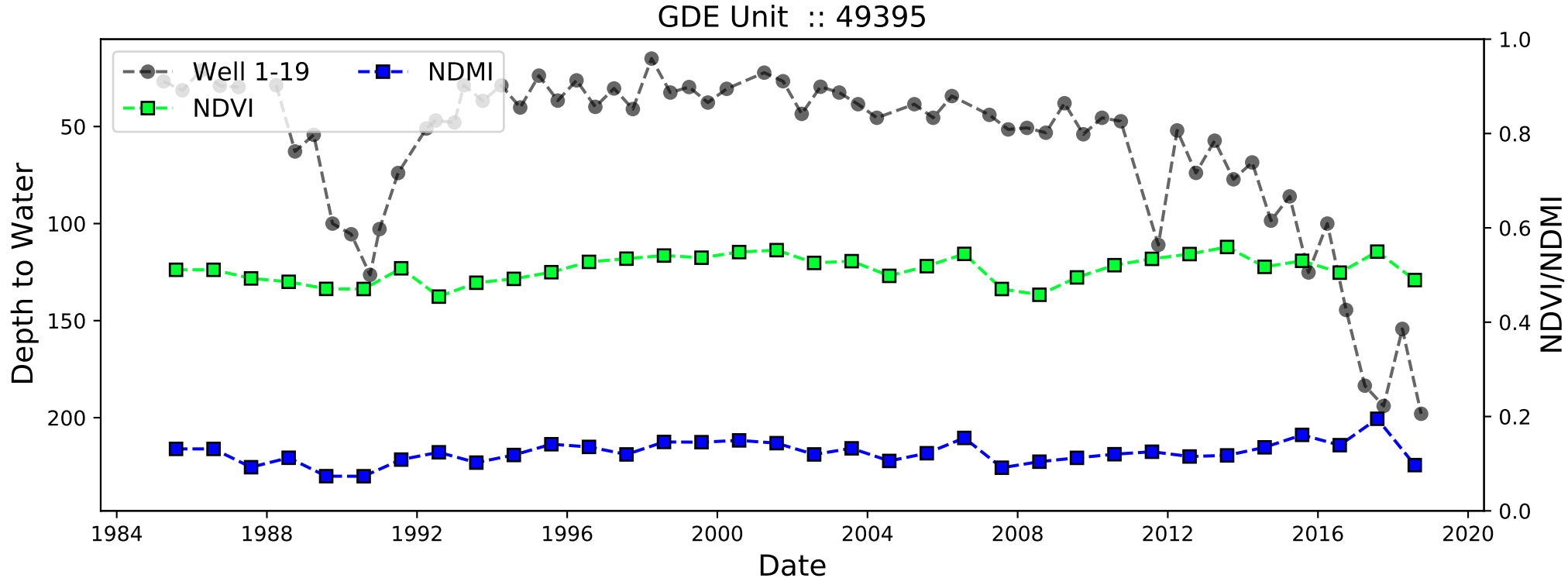

NDMI = 8.35e-04*GWELEV + 5.80e-02
R2 = 0.3946
NDMI
Groundwater Elevation
0.00
0.05
0.10
0.15
0.20
0.25
0.30
25
50
75
100
125
150
175
200

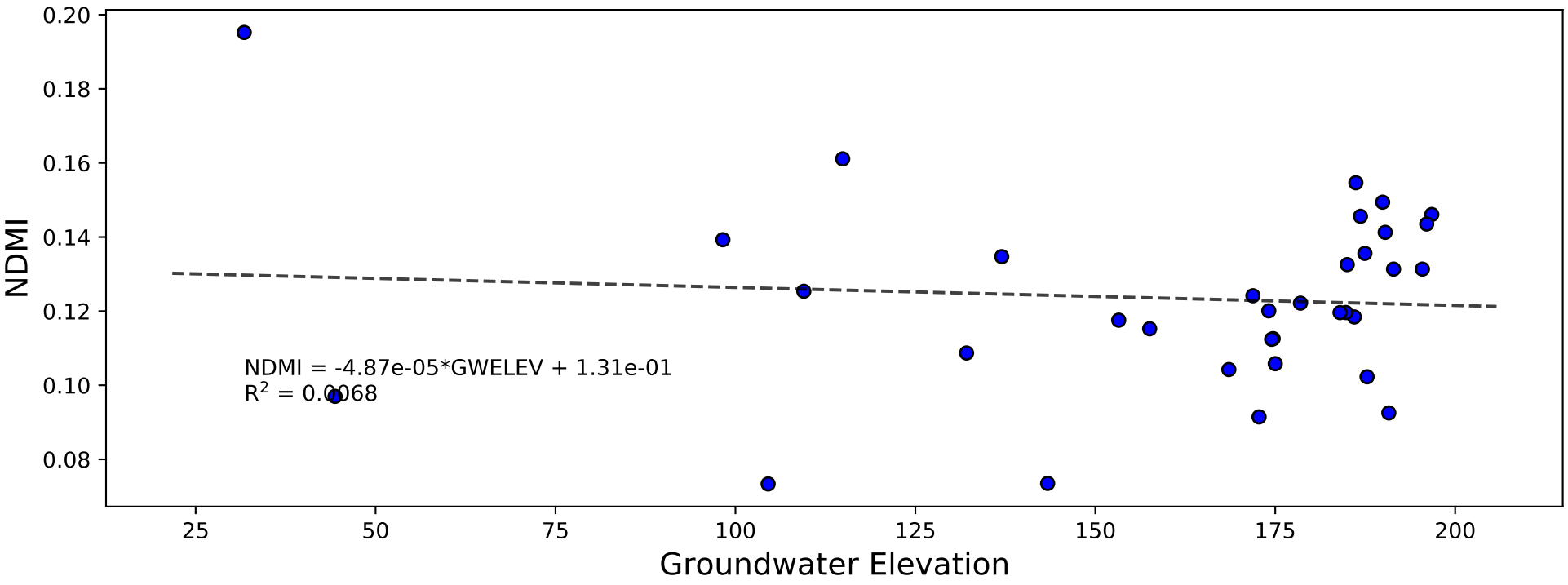

NDVI = 3.30e-04*GWELEV + 5.72e-01
R2 = 0.0735
NDVI
Groundwater Elevation
0.45
0.50
0.55
0.60
0.65
0.70
25
50
75
100
125
150
175
200

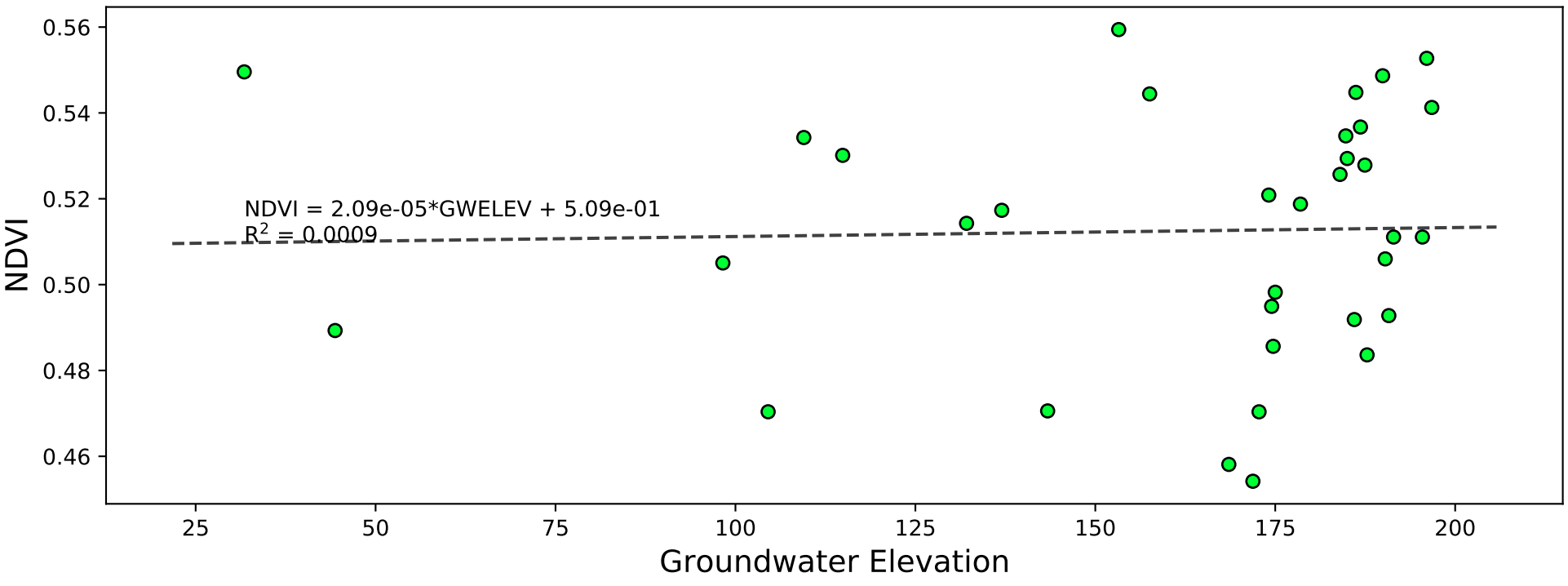

GDE Unit :: 49360
Well 3-8
NDMI
NDVI
Depth to Water
NDVI/NDMI
Date
40
60
80
100
120
140
160
1.0
0.8
0.6
0.4
0.2
0.0
1984
1988
1992
1996
2000
2004
2008
2012
2016
2020

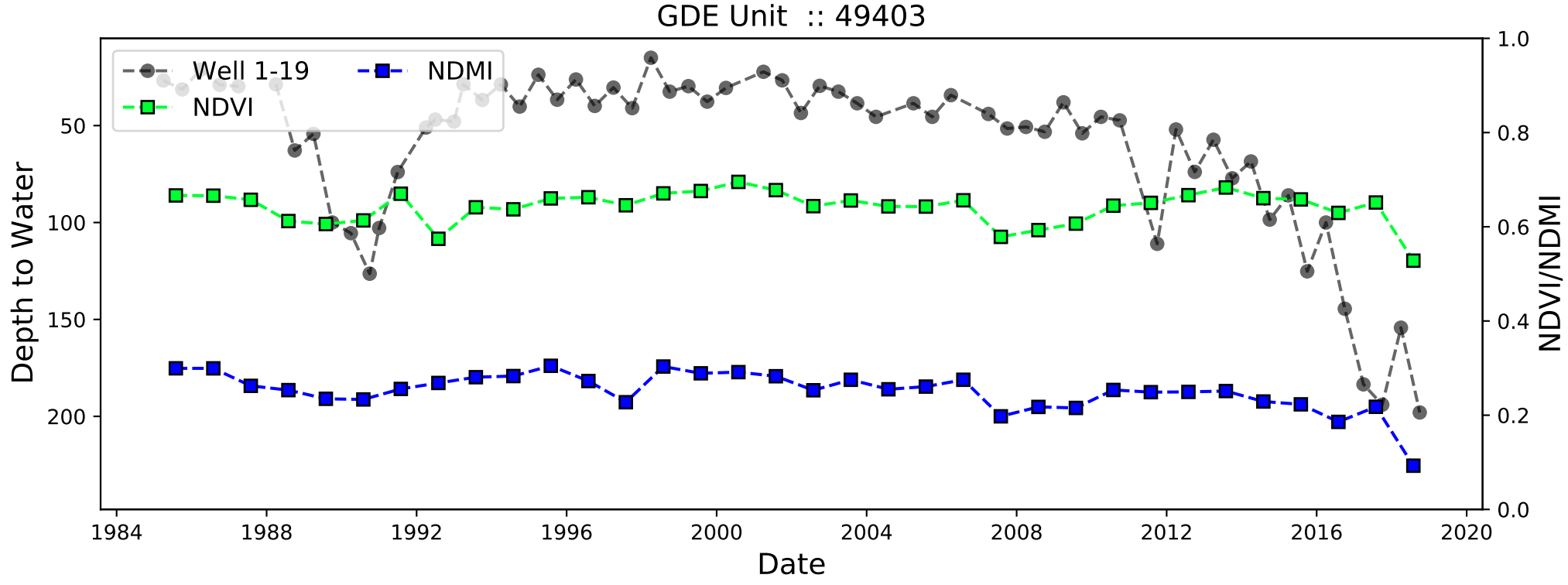

NDMI = 2.32e-03*GWELEV + 1.52e-01
R^2 = 0.4060
NDMI
Groundwater Elevation
0.30
0.25
0.20
0.15
0.10
0.05
0.00
−20
−10
0
10
20
30
40
50

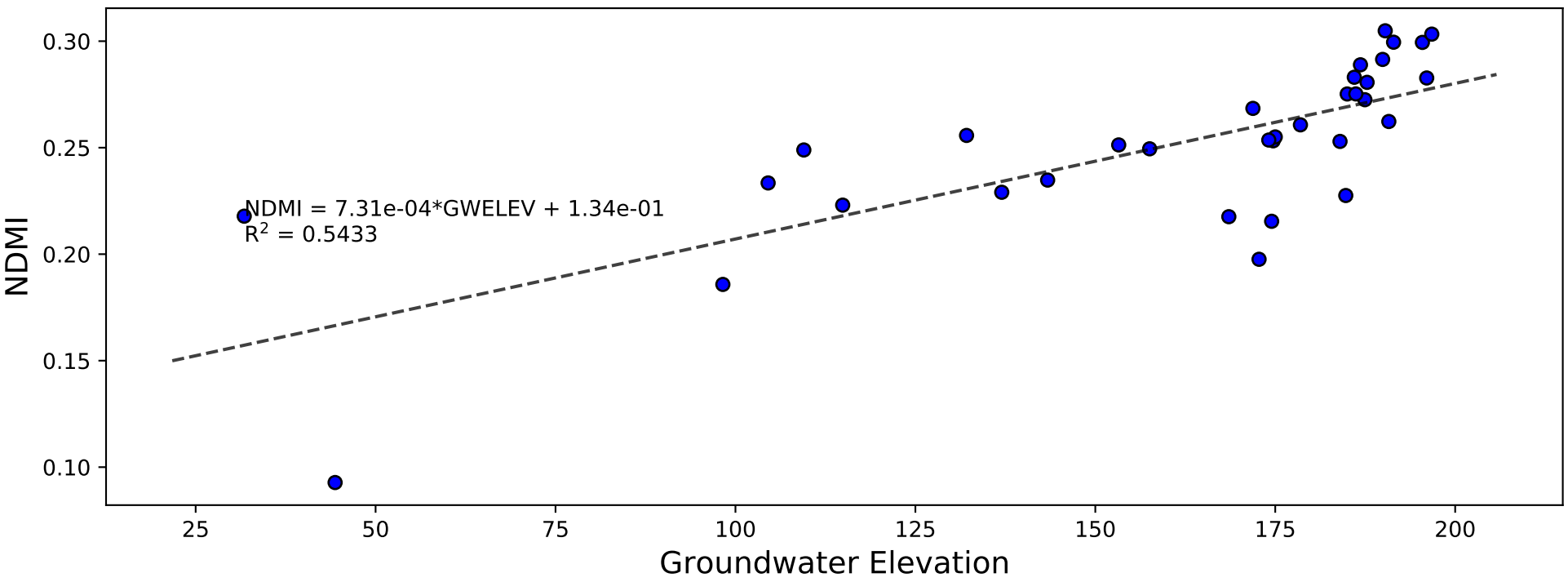

NDVI = 1.63e-03*GWELEV + 5.16e-01
R^2 = 0.2658
NDVI
Groundwater Elevation
0.60
0.55
0.50
0.45
0.40
−20
−10
0
10
20
30
40
50

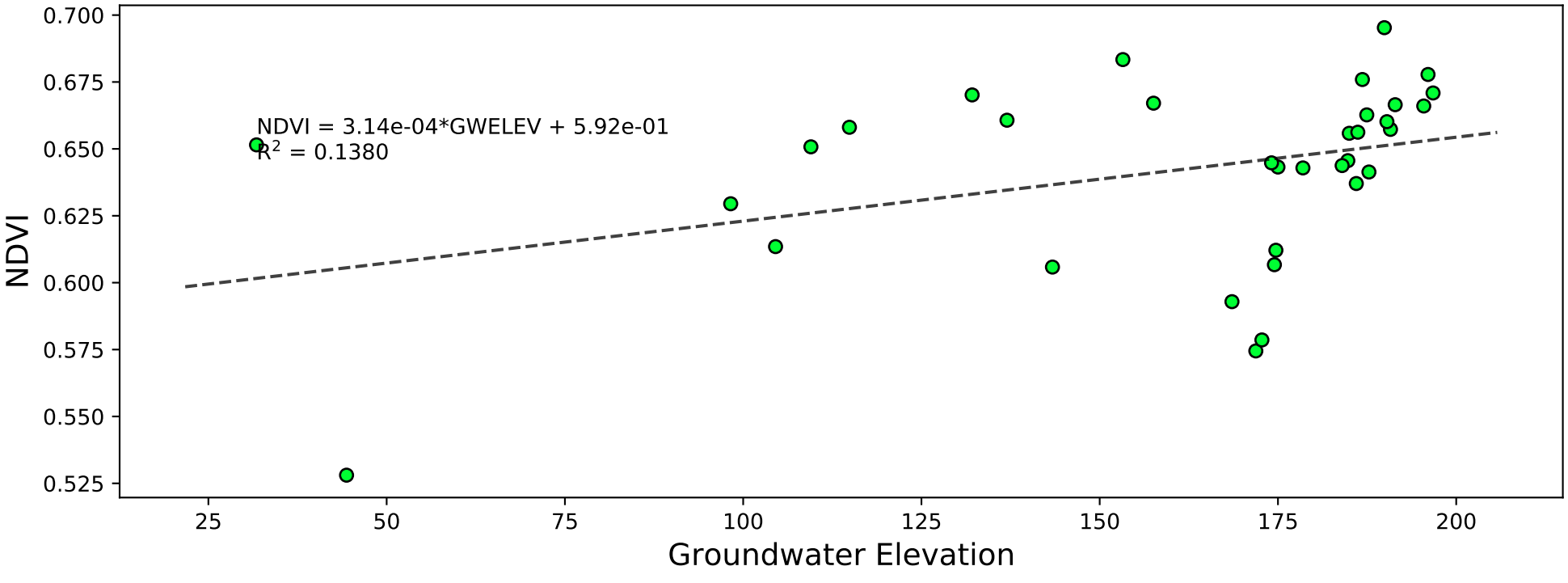

GDE Unit :: 49395
Well 1-19
NDMI
NDVI
Depth to Water
NDVI/NDMI
Date
50
100
150
200
0.0
0.2
0.4
0.6
0.8
1.0
1984
1988
1992
1996
2000
2004
2008
2012
2016
2020

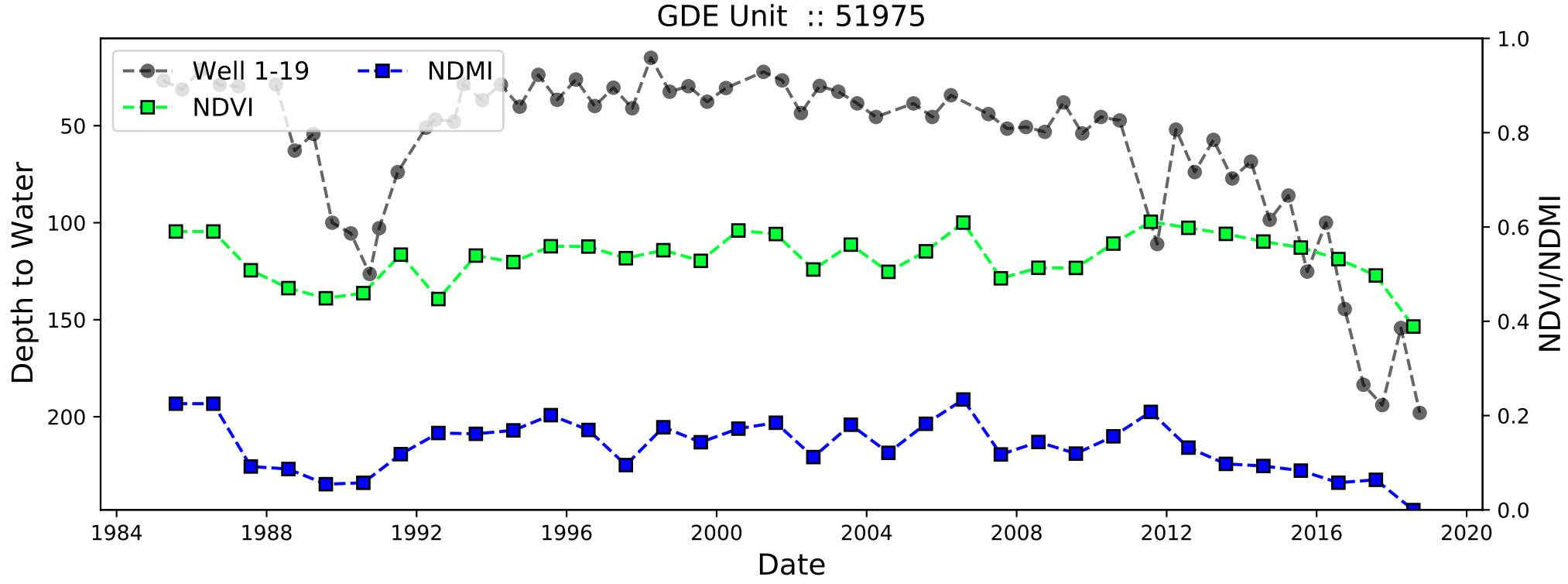

NDMI
Groundwater Elevation
NDMI = -4.87e-05*GWELEV + 1.31e-01
R2 = 0.0068
0.08
0.10
0.12
0.14
0.16
0.18
0.20
25
50
75
100
125
150
175
200

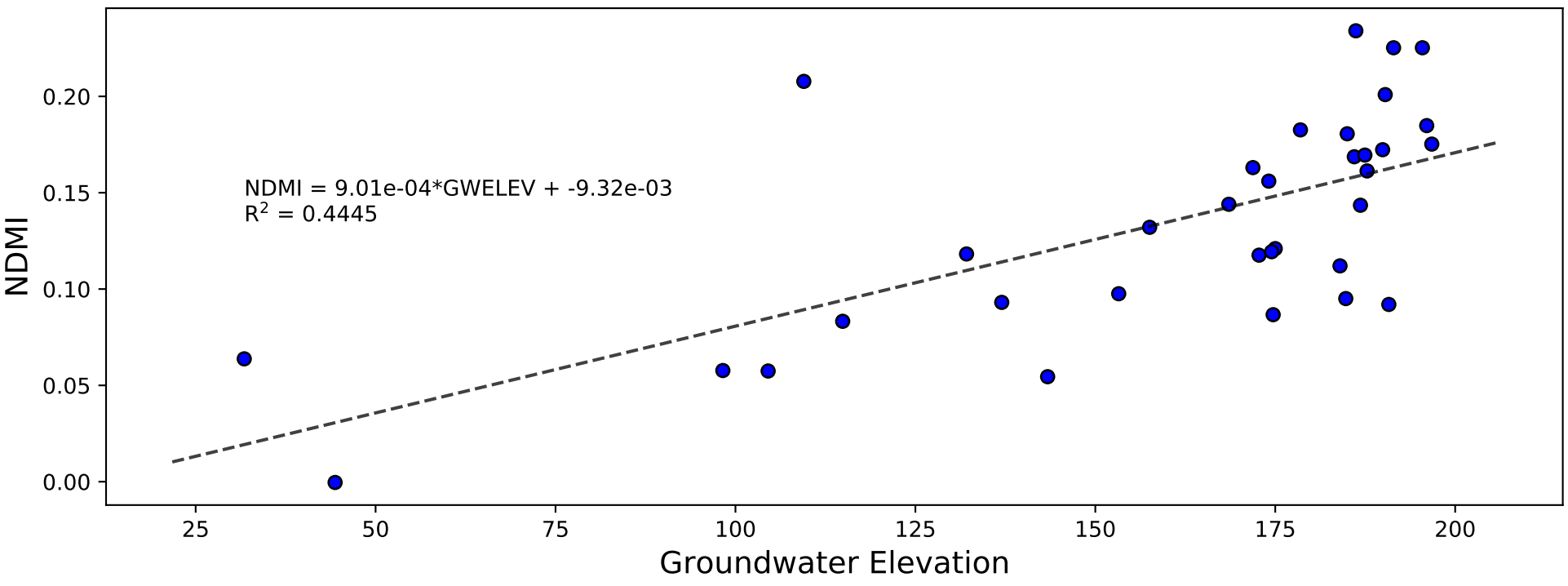

NDVI
Groundwater Elevation
NDVI = 2.09e-05*GWELEV + 5.09e-01
R2 = 0.0009
0.46
0.48
0.50
0.52
0.54
0.56
25
50
75
100
125
150
175
200

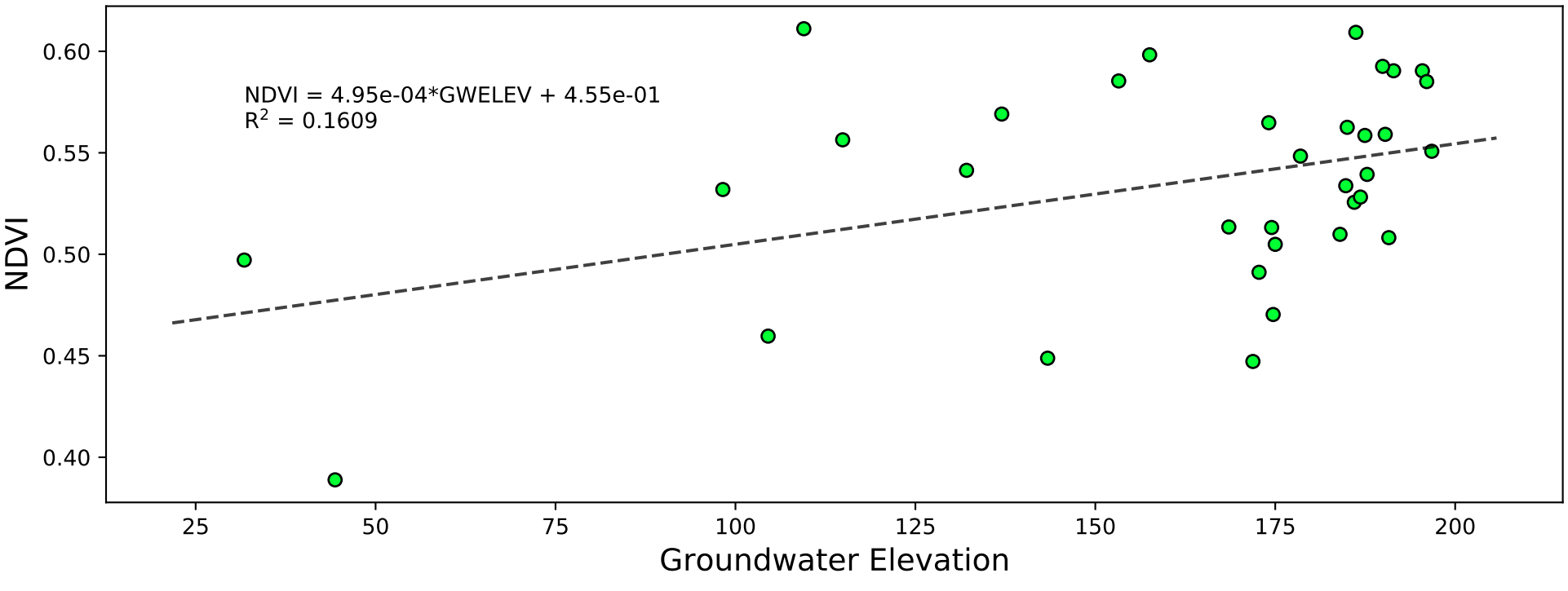

GDE Unit :: 49403
Well 1-19
NDMI
NDVI
Depth to Water
NDVI/NDMI
Date
50
100
150
200
0.0
0.2
0.4
0.6
0.8
1.0
1984
1988
1992
1996
2000
2004
2008
2012
2016
2020

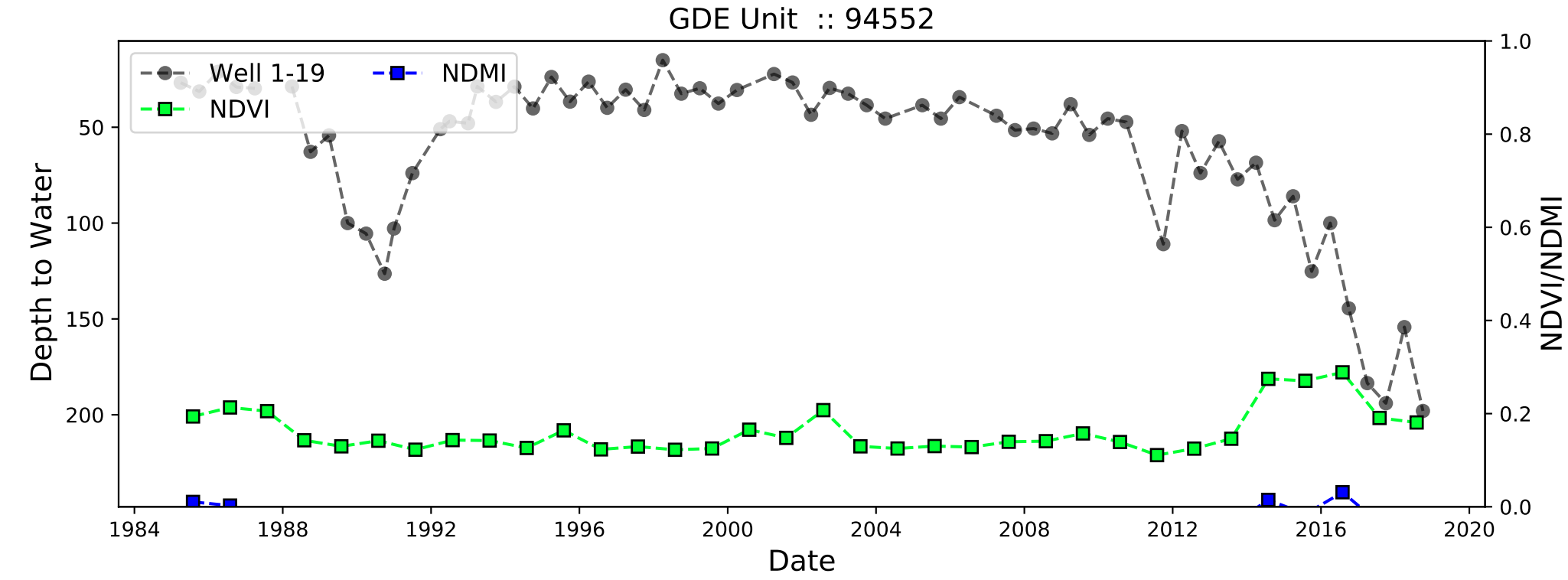

NDMI = 7.31e-04*GWELEV + 1.34e-01
R2 = 0.5433
NDMI
Groundwater Elevation
0.10
0.15
0.20
0.25
0.30
25
50
75
100
125
150
175
200

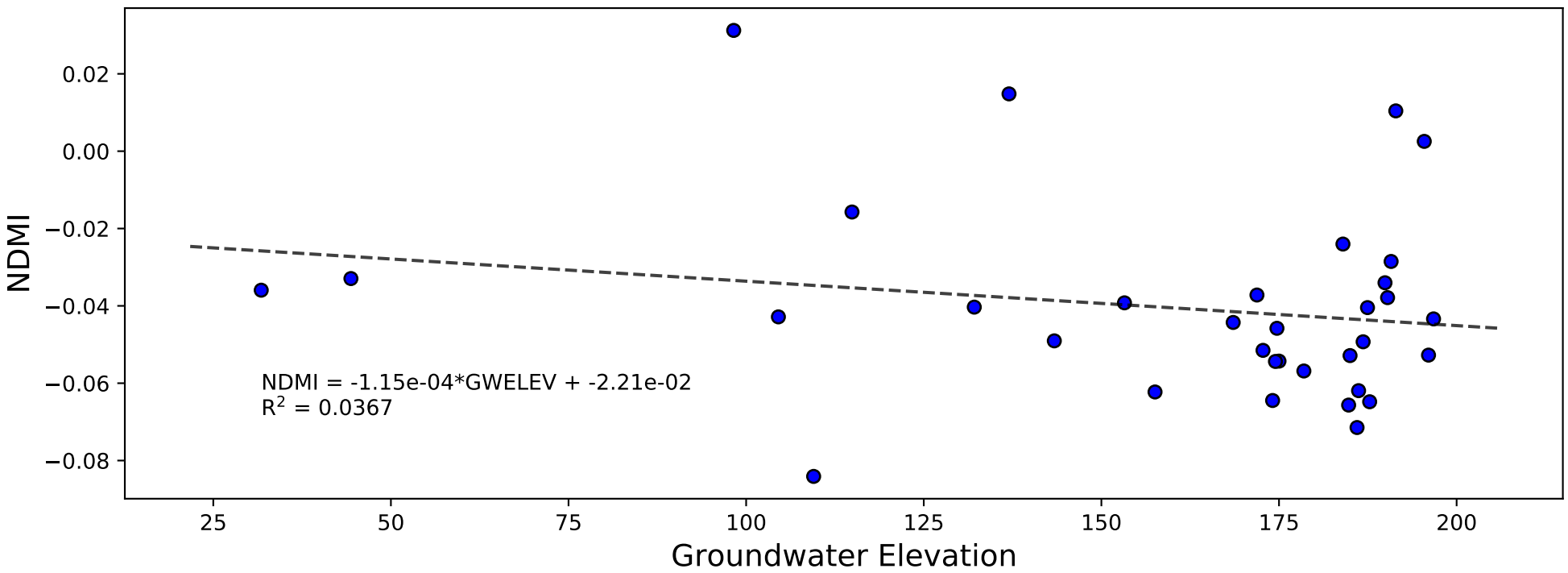

NDVI = 3.14e-04*GWELEV + 5.92e-01
R2 = 0.1380
NDVI
Groundwater Elevation
0.525
0.550
0.575
0.600
0.625
0.650
0.675
0.700
25
50
75
100
125
150
175
200

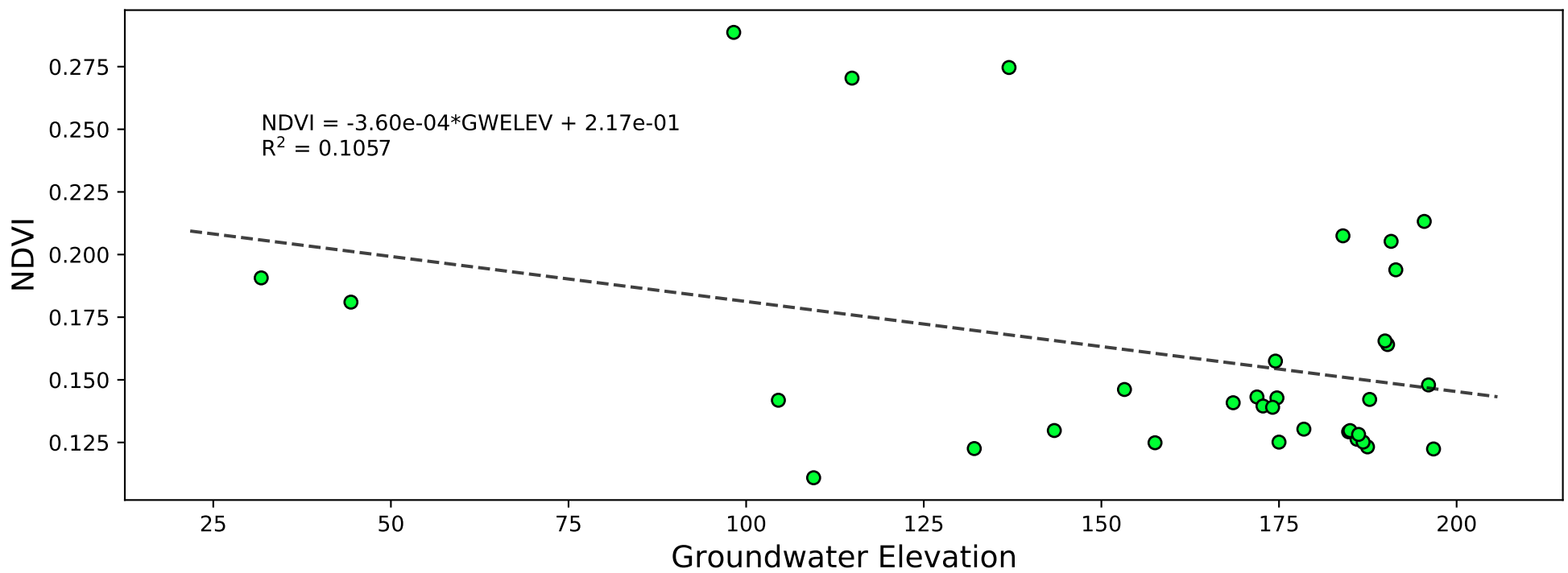

GDE Unit :: 51975
Well 1-19
NDMI
NDVI
Depth to Water
NDVI/NDMI
Date
50
100
150
200
0.0
0.2
0.4
0.6
0.8
1.0
1984
1988
1992
1996
2000
2004
2008
2012
2016
2020

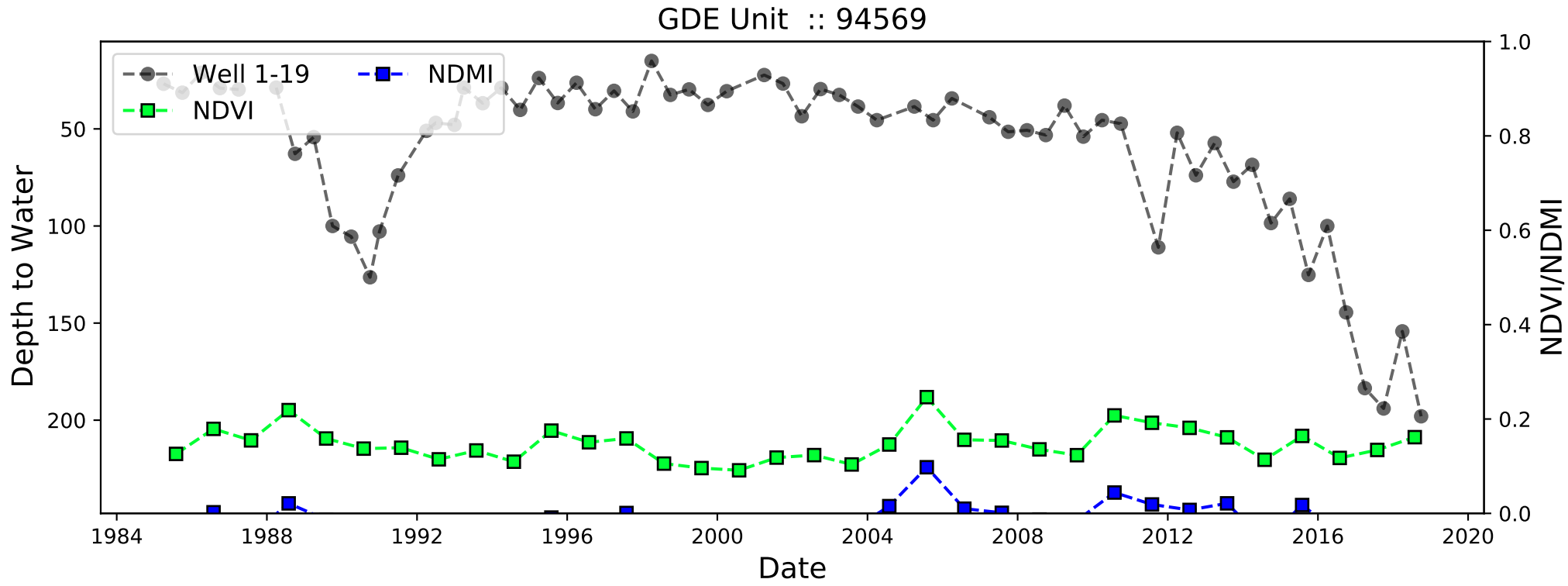

NDMI = 9.01e-04*GWELEV + -9.32e-03
R2 = 0.4445
NDMI
Groundwater Elevation
0.00
0.05
0.10
0.15
0.20
25
50
75
100
125
150
175
200

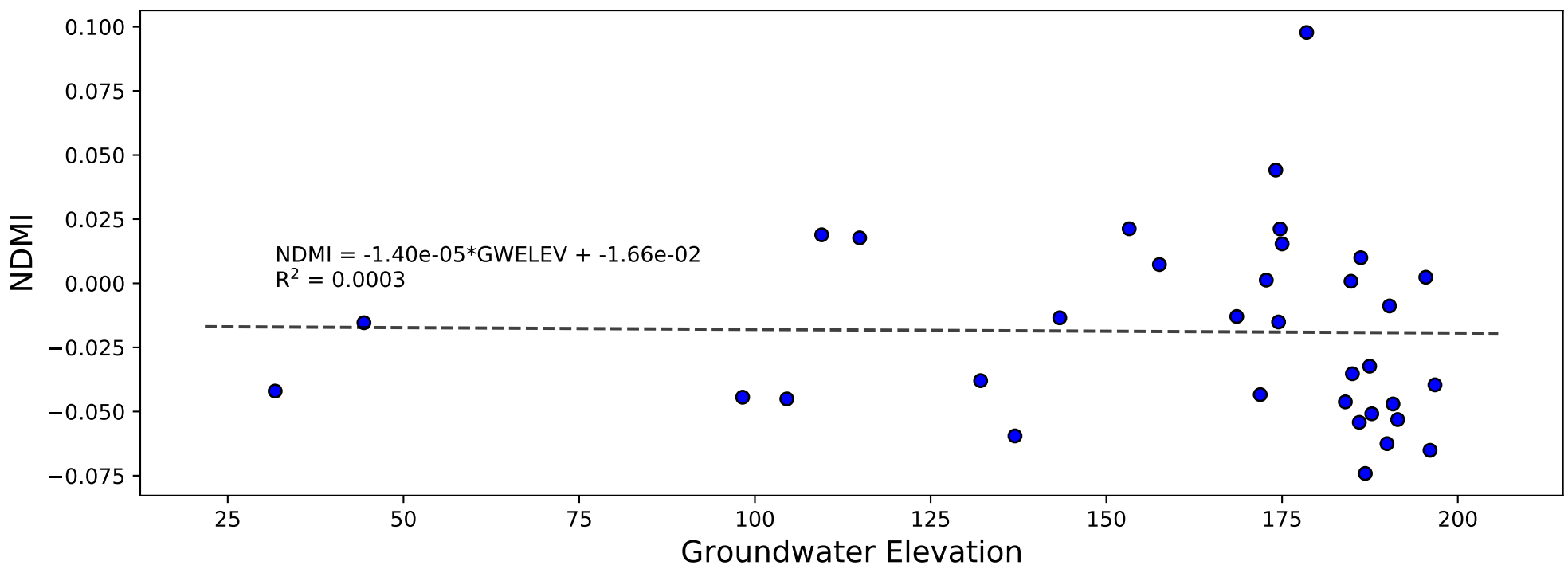

NDVI = 4.95e-04*GWELEV + 4.55e-01
R2 = 0.1609
NDVI
Groundwater Elevation
0.40
0.45
0.50
0.55
0.60
25
50
75
100
125
150
175
200

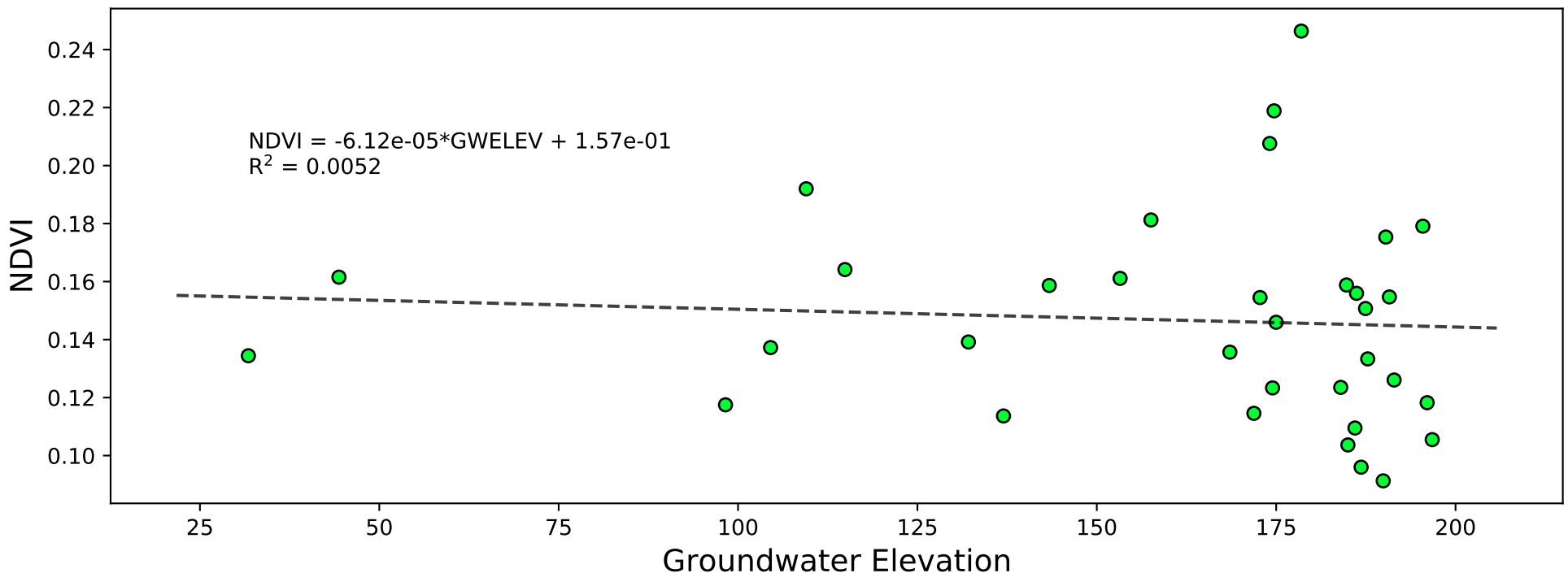

GDE Unit :: 94552
Well 1-19
NDMI
NDVI
Depth to Water
NDVI/NDMI
Date
1984
1988
1992
1996
2000
2004
2008
2012
2016
2020
50
100
150
200
1.0
0.8
0.6
0.4
0.2
0.0


NDMI
Groundwater Elevation
NDMI = -1.15e-04*GWELEV + -2.21e-02
R2 = 0.0367
0.02
0.00
−0.02
−0.04
−0.06
−0.08
25
50
75
100
125
150
175
200


NDVI
Groundwater Elevation
NDVI = -3.60e-04*GWELEV + 2.17e-01
R2 = 0.1057
0.275
0.250
0.225
0.200
0.175
0.150
0.125
25
50
75
100
125
150
175
200

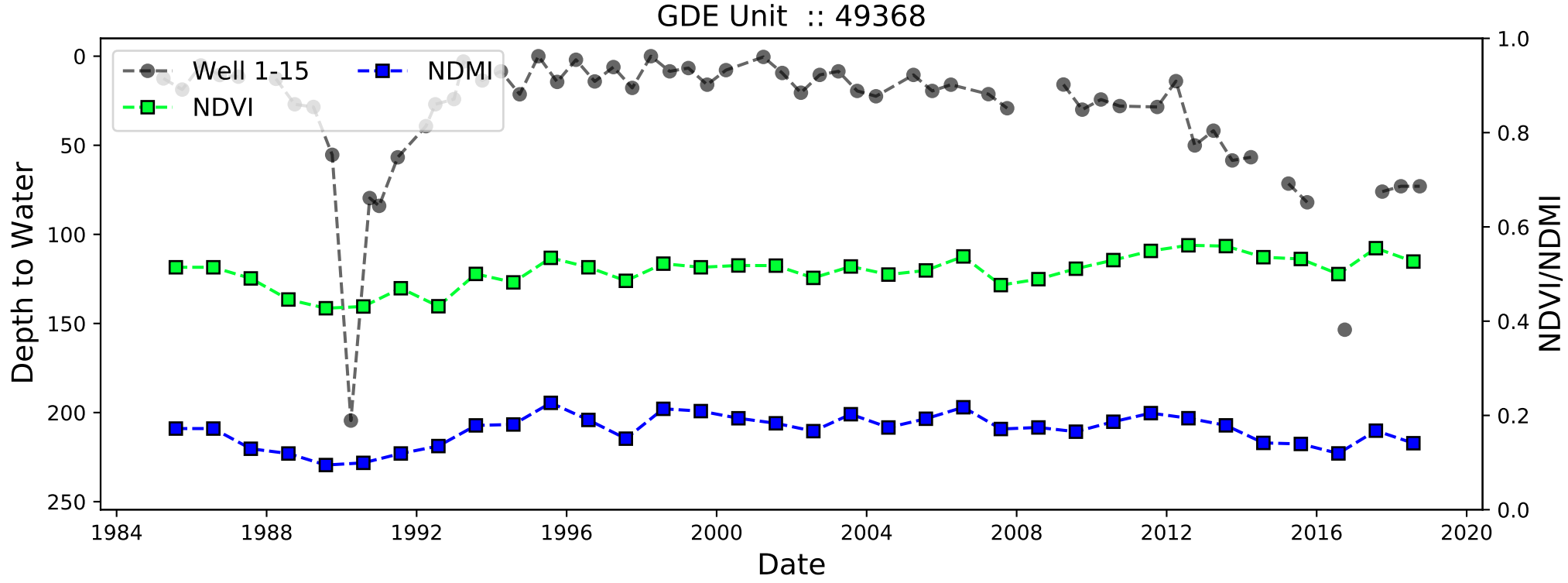

GDE Unit :: 94569
Well 1-19
NDMI
NDVI
Depth to Water
NDVI/NDMI
Date
1984
1988
1992
1996
2000
2004
2008
2012
2016
2020
50
100
150
200
1.0
0.8
0.6
0.4
0.2
0.0

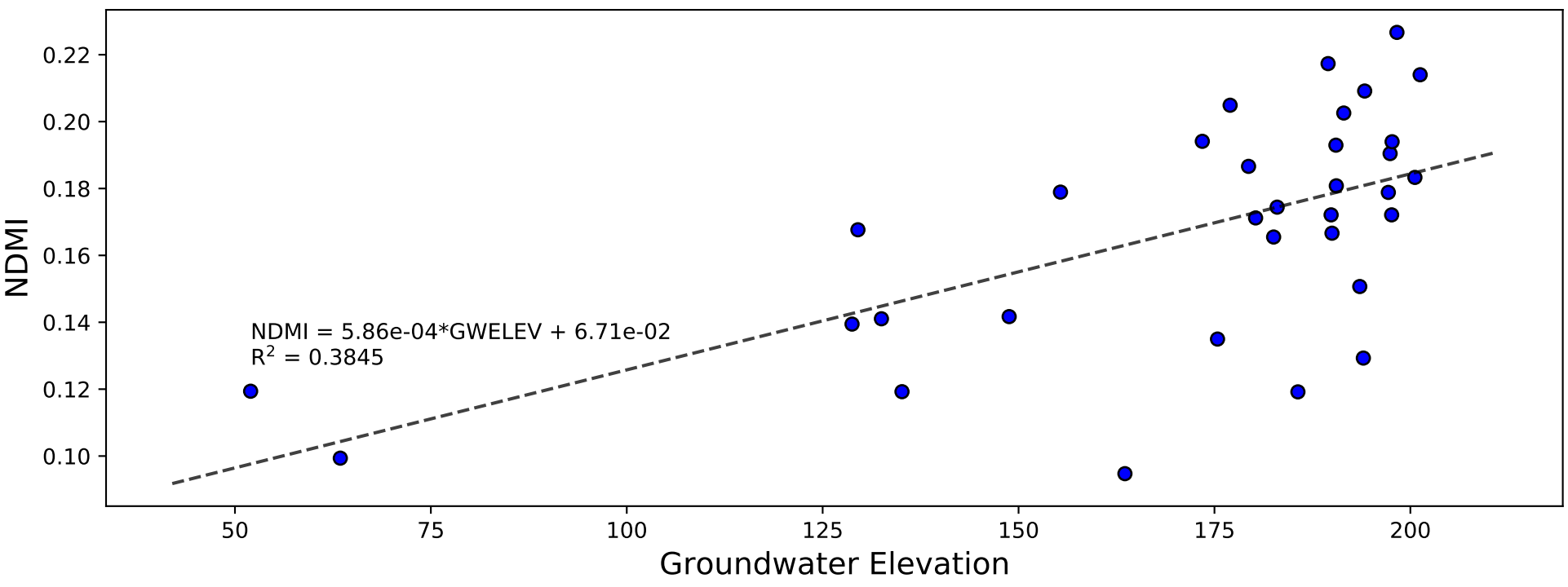

NDMI = -1.40e-05*GWELEV + -1.66e-02
R^2 = 0.0003
NDMI
Groundwater Elevation
0.100
0.075
0.050
0.025
0.000
−0.025
−0.050
−0.075
25
50
75
100
125
150
175
200

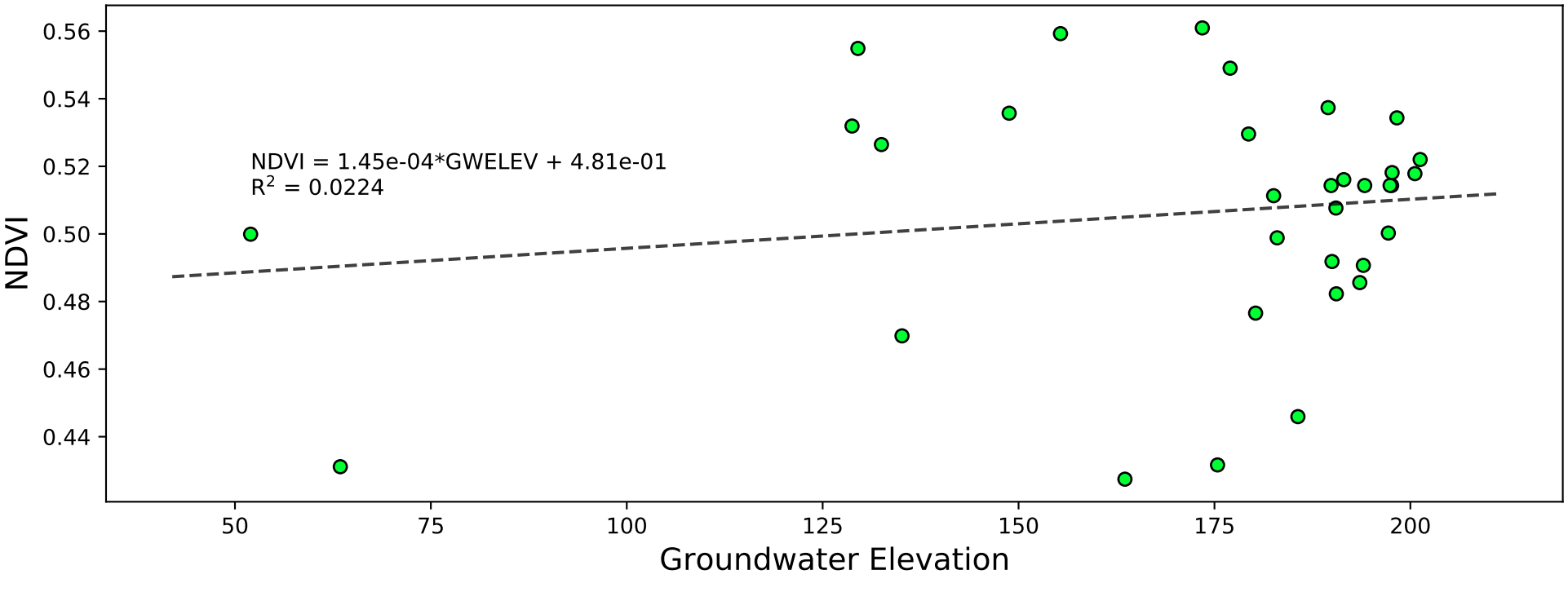

NDVI = -6.12e-05*GWELEV + 1.57e-01
R^2 = 0.0052
NDVI
Groundwater Elevation
0.24
0.22
0.20
0.18
0.16
0.14
0.12
0.10
25
50
75
100
125
150
175
200

Oak Creek GDE Evaluation Unit

Groundwater Level and Habitat Health Correlations

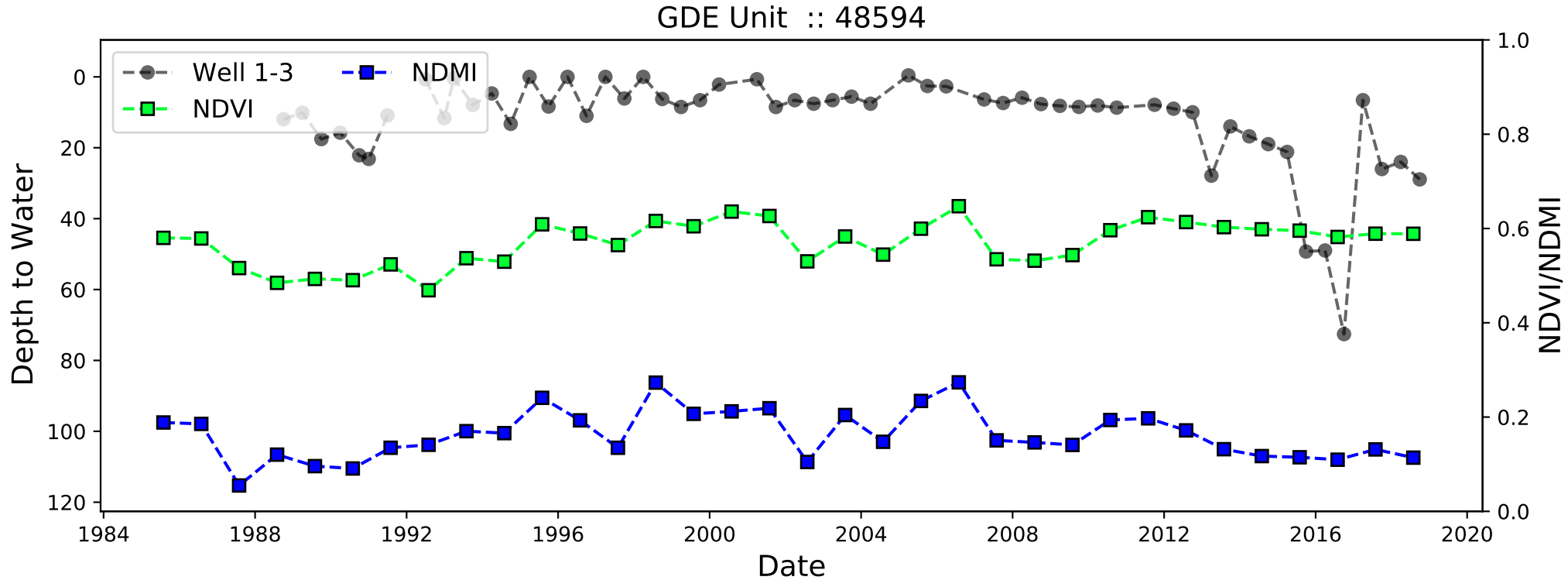

GDE Unit :: 49368
Well 1-15
NDMI
NDVI
Depth to Water
NDVI/NDMI
Date
0
50
100
150
200
250
0.0
0.2
0.4
0.6
0.8
1.0
1984
1988
1992
1996
2000
2004
2008
2012
2016
2020

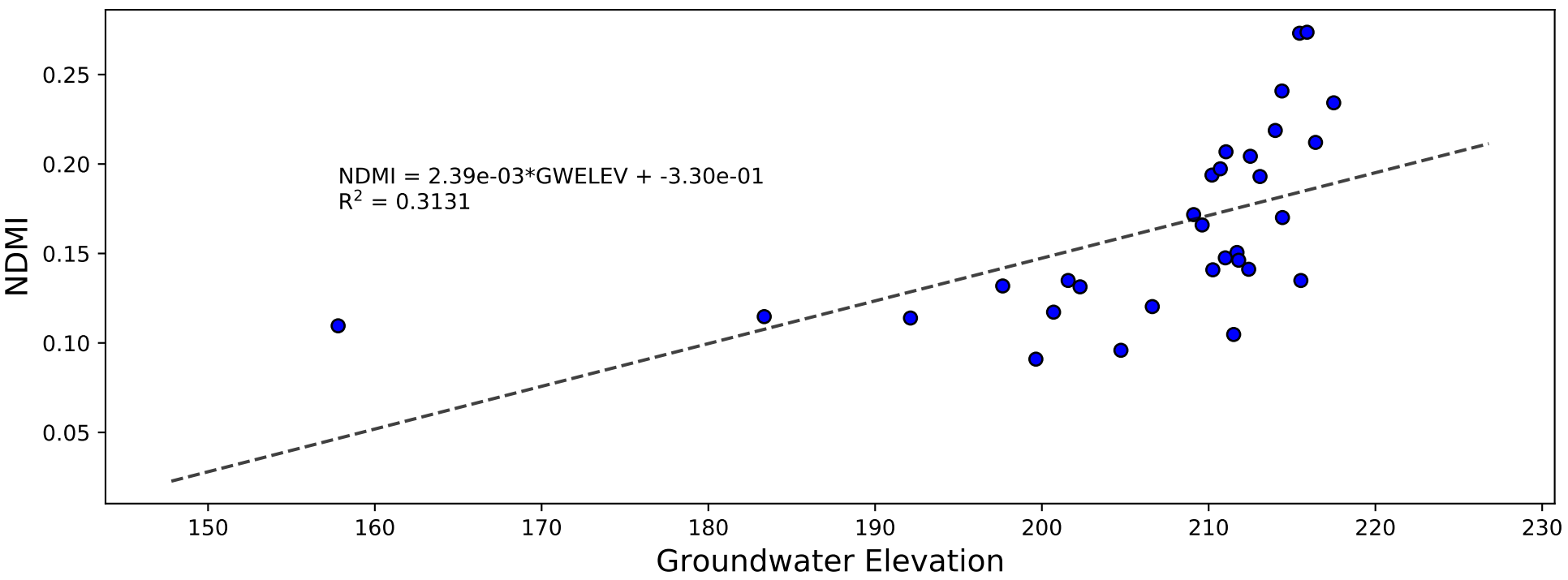

NDMI
NDMI = 5.86e-04*GWELEV + 6.71e-02
R2 = 0.3845
Groundwater Elevation
0.10
0.12
0.14
0.16
0.18
0.20
0.22
50
75
100
125
150
175
200

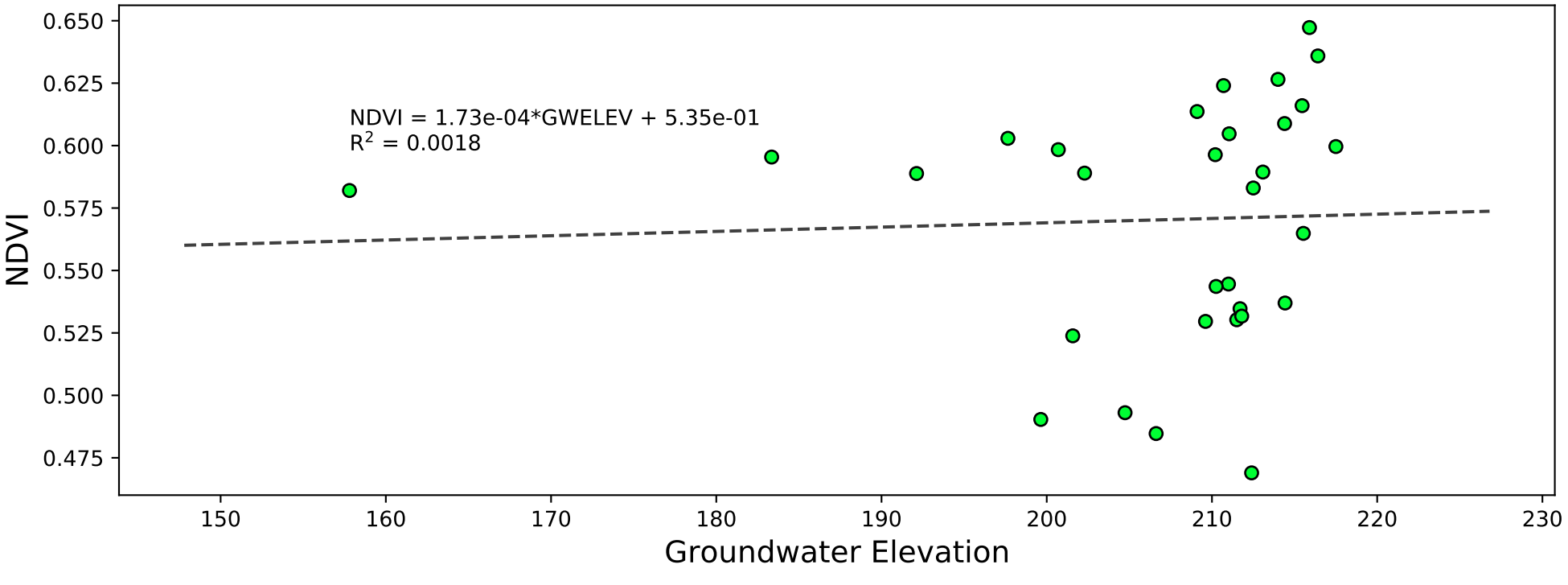

NDVI
NDVI = 1.45e-04*GWELEV + 4.81e-01
R2 = 0.0224
Groundwater Elevation
0.44
0.46
0.48
0.50
0.52
0.54
0.56
50
75
100
125
150
175
200

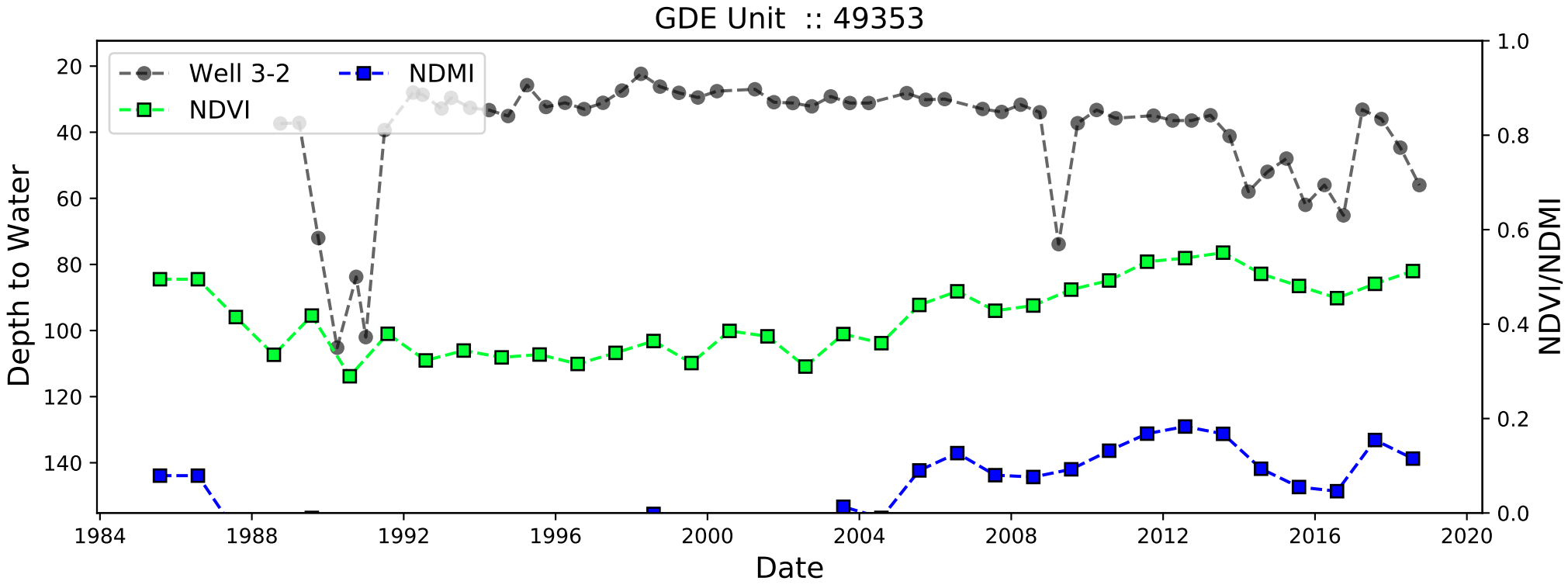
Romero Creek GDE Evaluation Unit

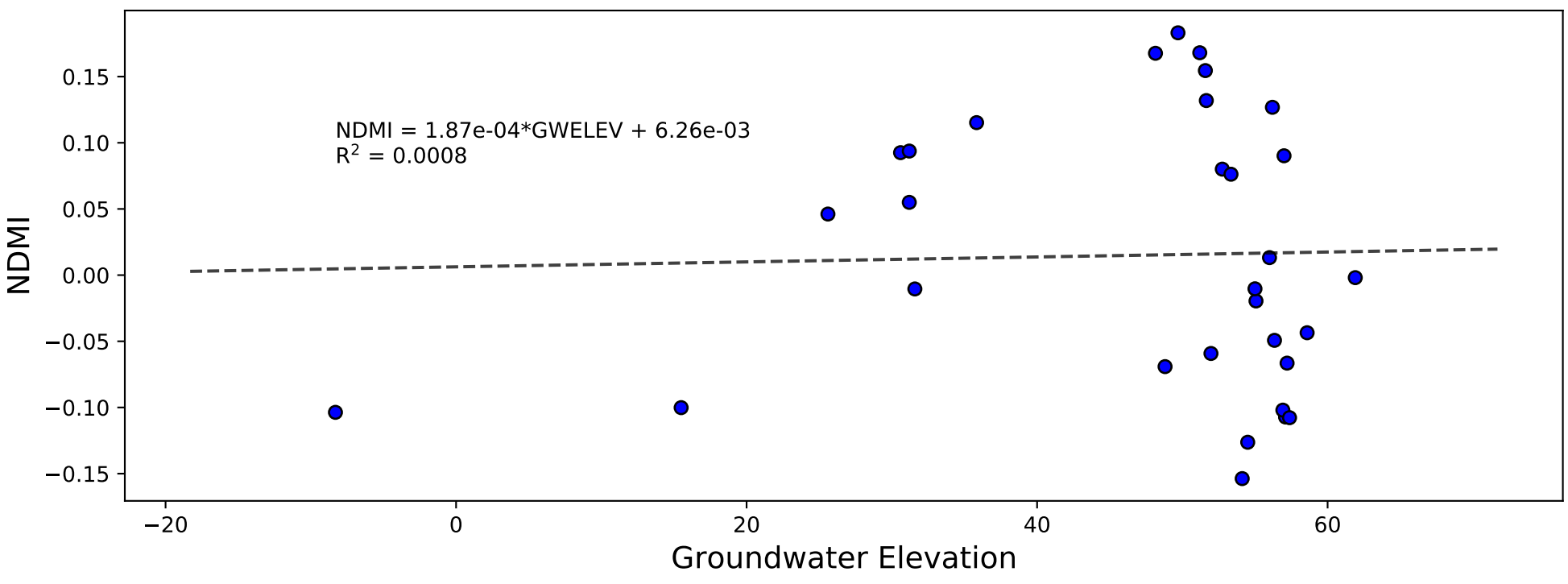
Groundwater Level and Habitat Health Correlations

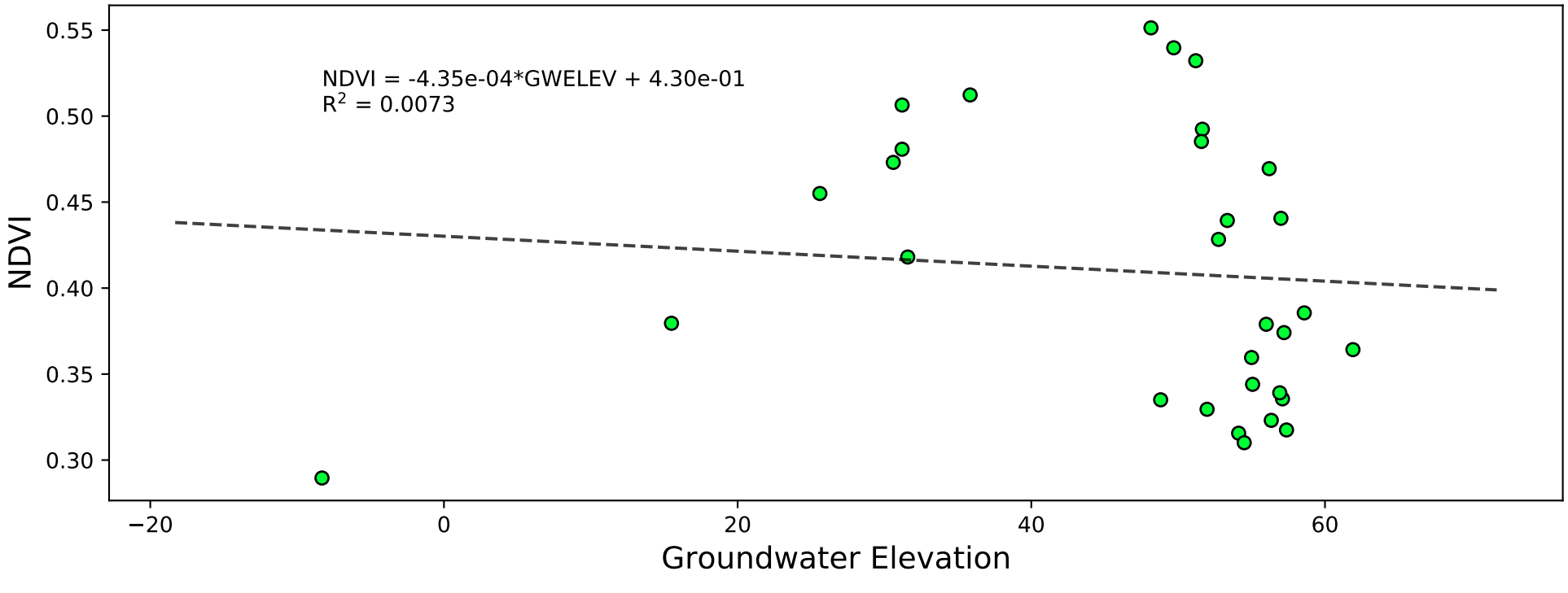

GDE Unit :: 48594
Well 1-3
NDMI
NDVI
Depth to Water
NDVI/NDMI
Date
0
20
40
60
80
100
120
1.0
0.8
0.6
0.4
0.2
0.0
1984
1988
1992
1996
2000
2004
2008
2012
2016
2020

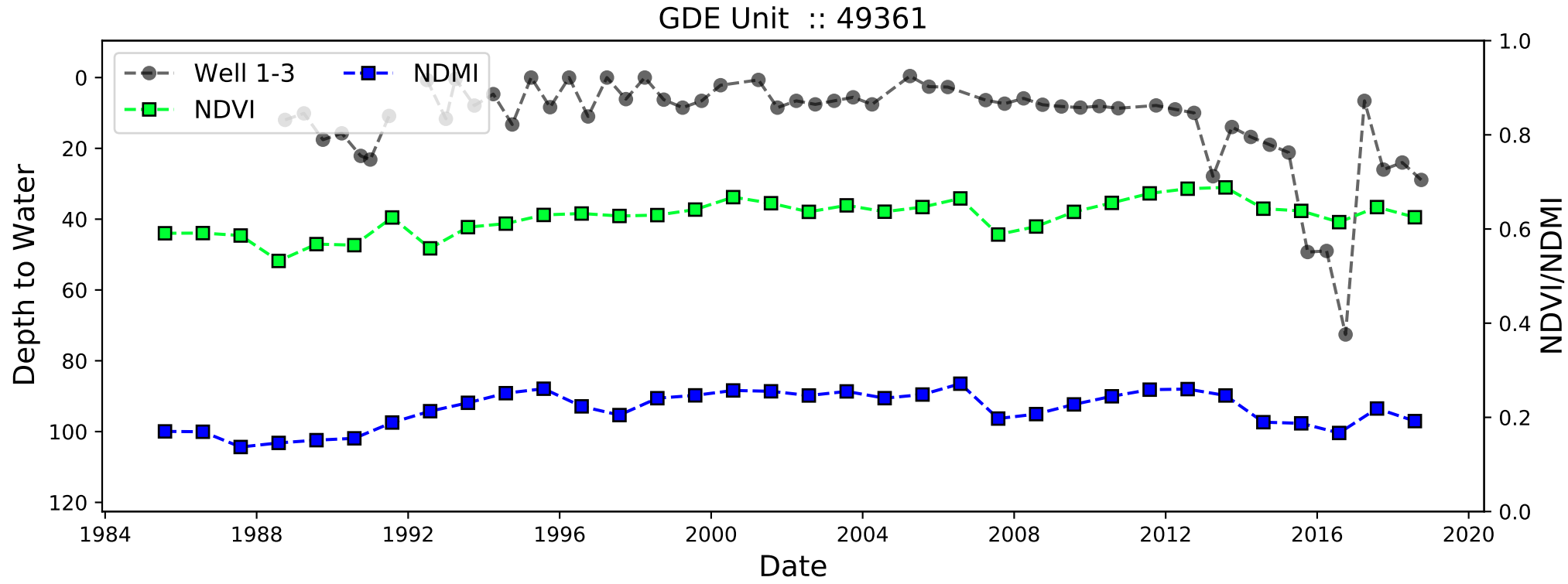

NDMI = 2.39e-03*GWELEV + -3.30e-01
R^2 = 0.3131
NDMI
Groundwater Elevation
0.25
0.20
0.15
0.10
0.05
150
160
170
180
190
200
210
220
230

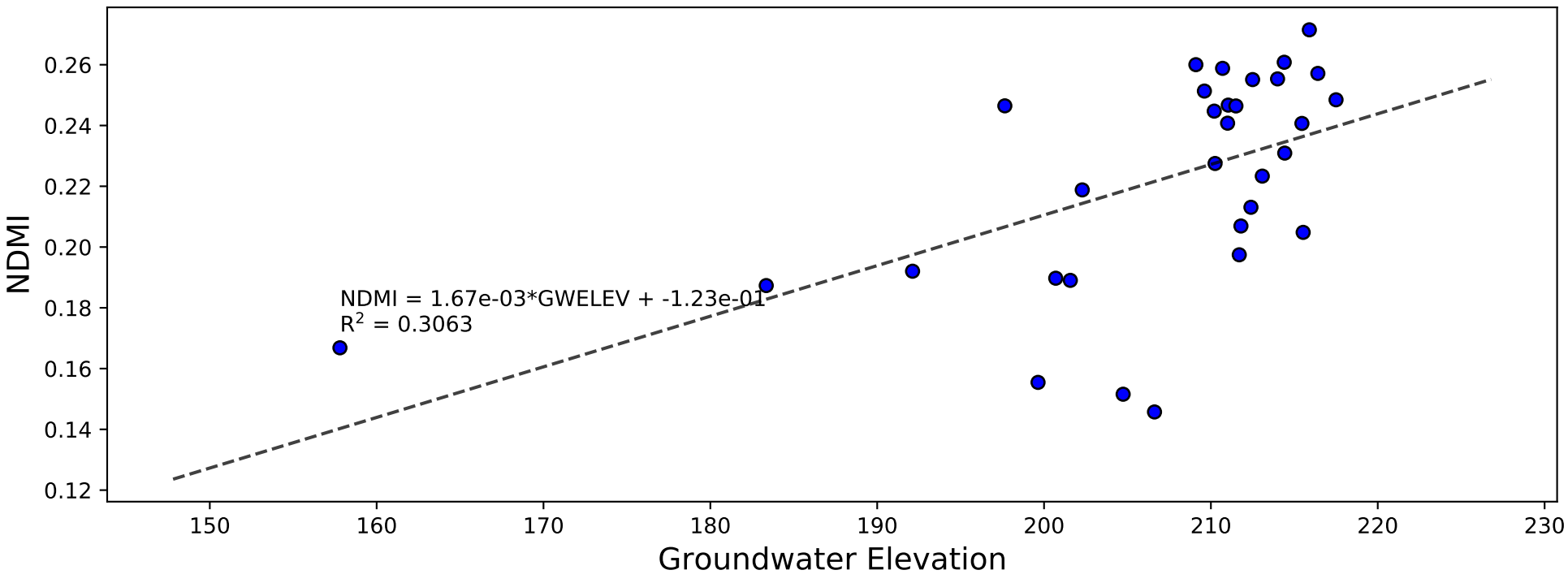

NDVI = 1.73e-04*GWELEV + 5.35e-01
R^2 = 0.0018
NDVI
Groundwater Elevation
0.650
0.625
0.600
0.575
0.550
0.525
0.500
0.475
150
160
170
180
190
200
210
220
230

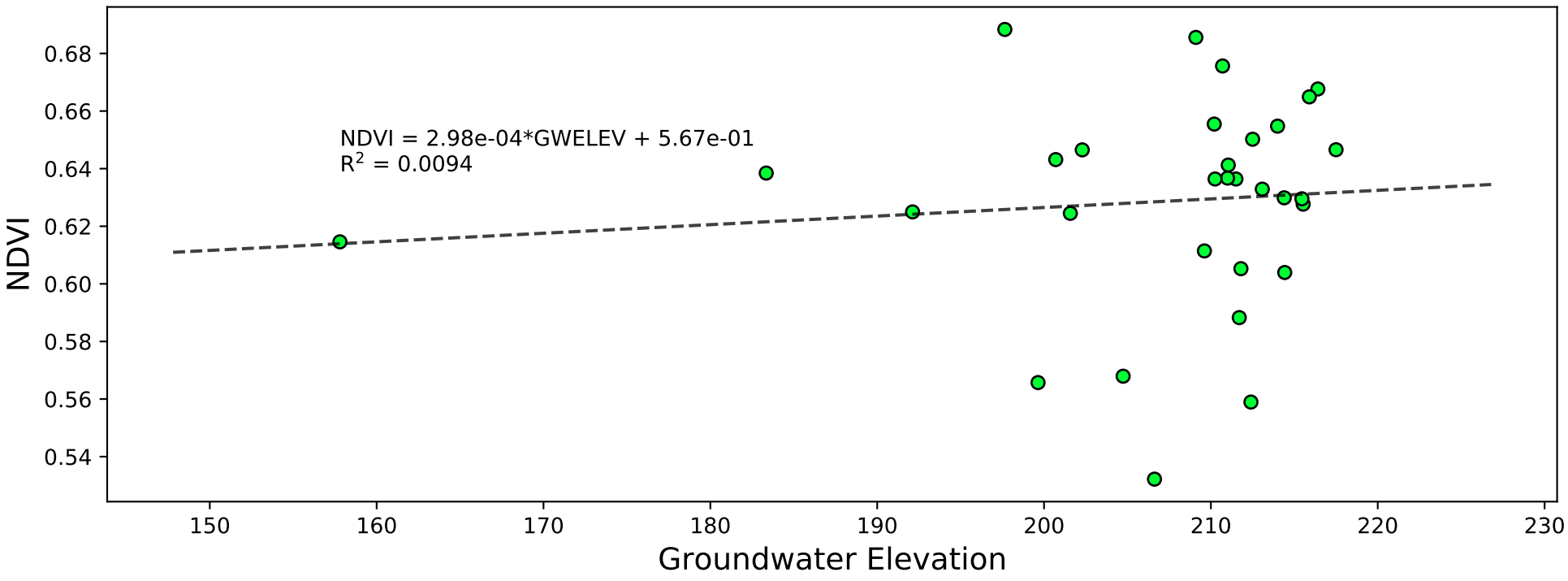

GDE Unit :: 49353
Well 3-2
NDMI
NDVI
Depth to Water
NDVI/NDMI
Date
20
40
60
80
100
120
140
1.0
0.8
0.6
0.4
0.2
0.0
1984
1988
1992
1996
2000
2004
2008
2012
2016
2020

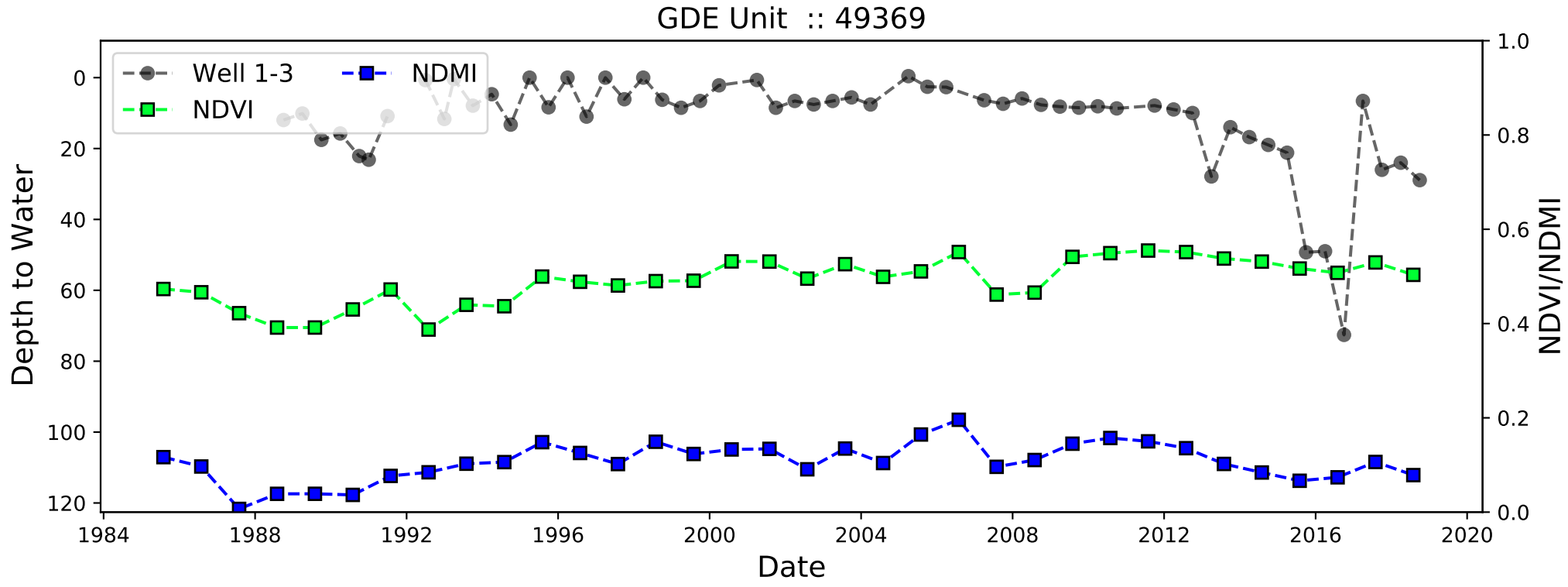

NDMI = 1.87e-04*GWELEV + 6.26e-03
R^2 = 0.0008
NDMI
Groundwater Elevation
0.15
0.10
0.05
0.00
−0.05
−0.10
−0.15
−20
0
20
40
60

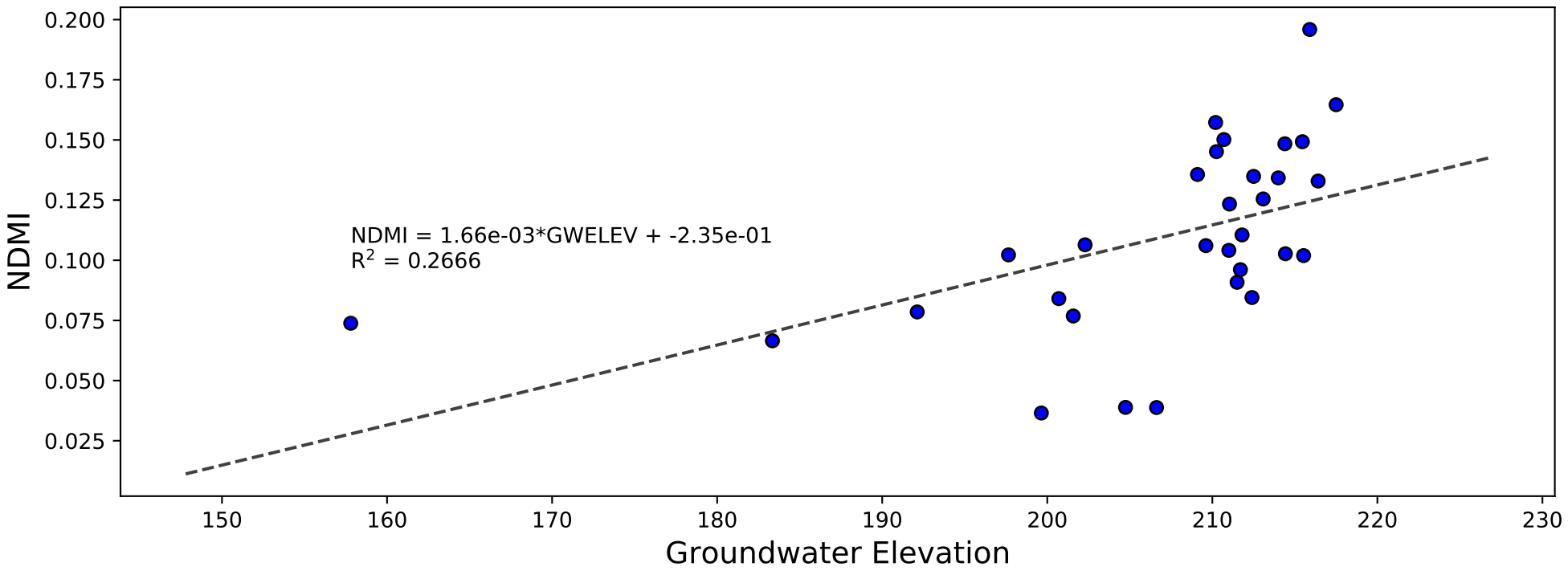

NDVI = -4.35e-04*GWELEV + 4.30e-01
R^2 = 0.0073
NDVI
Groundwater Elevation
0.55
0.50
0.45
0.40
0.35
0.30
−20
0
20
40
60

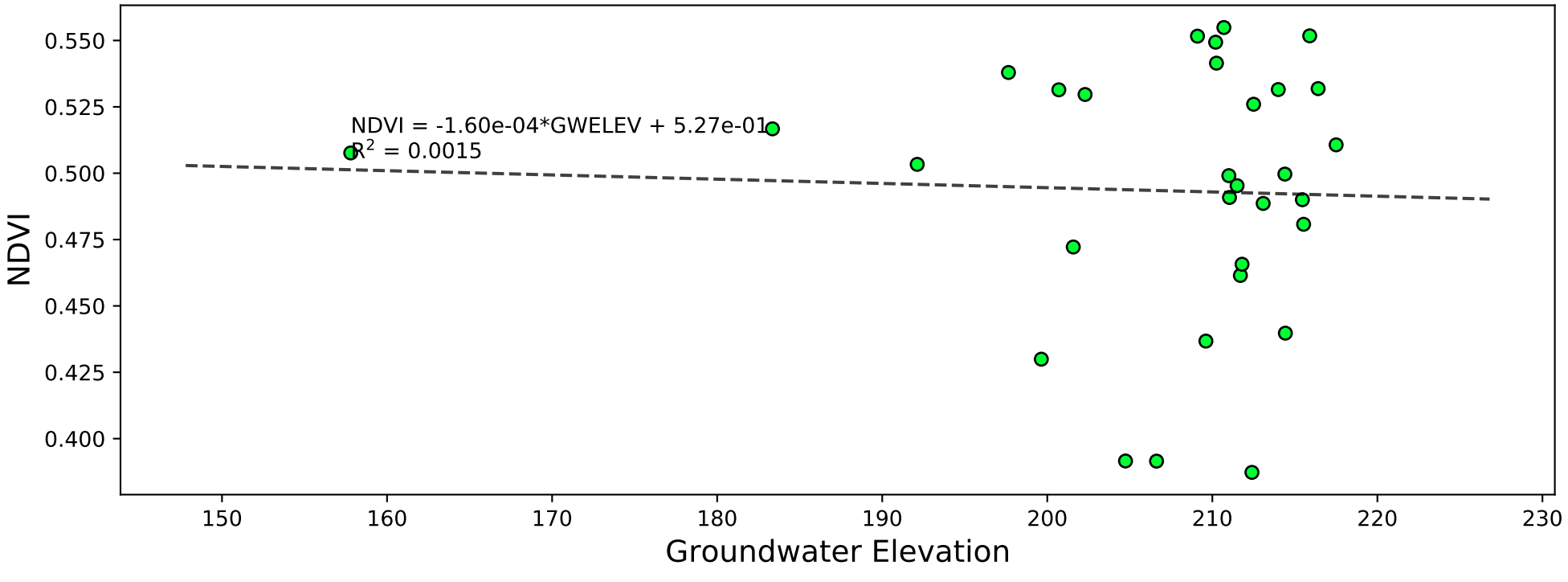

GDE Unit :: 49361
Well 1-3
NDMI
NDVI
Depth to Water
NDVI/NDMI
Date
0
20
40
60
80
100
120
1.0
0.8
0.6
0.4
0.2
0.0
1984
1988
1992
1996
2000
2004
2008
2012
2016
2020

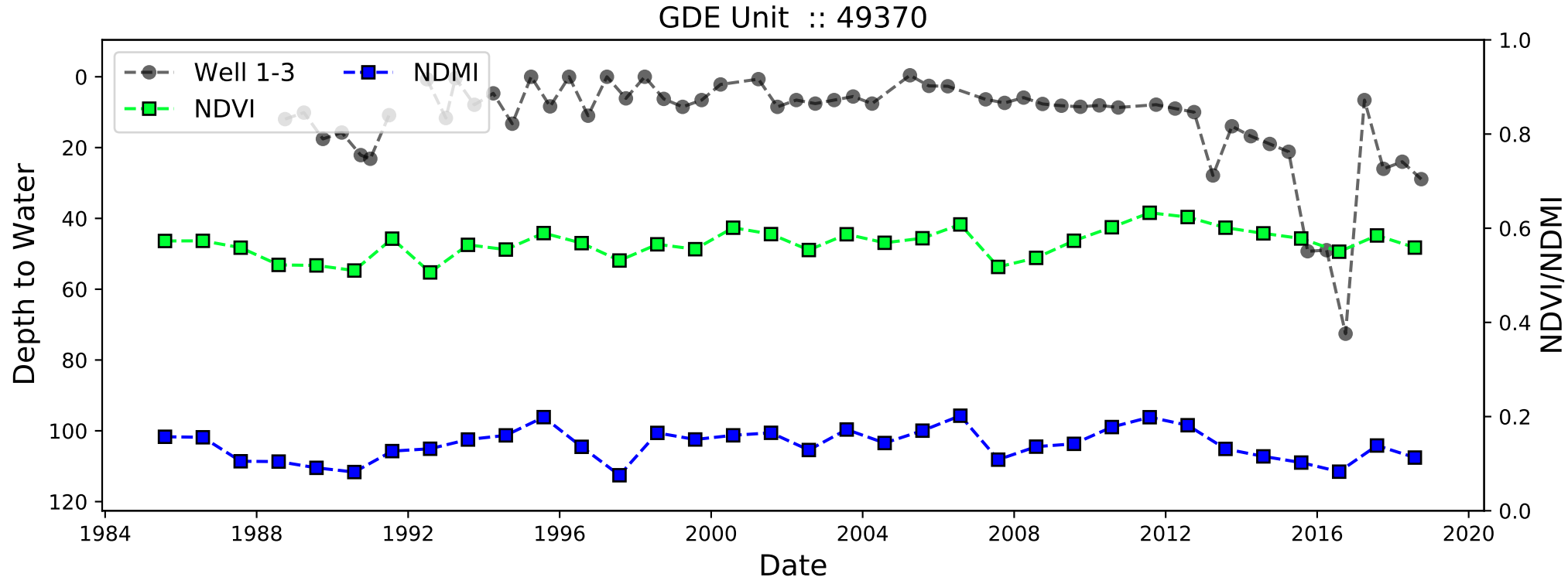

NDMI = 1.67e-03*GWELEV + -1.23e-01
R^2 = 0.3063
NDMI
Groundwater Elevation
0.26
0.24
0.22
0.20
0.18
0.16
0.14
0.12
150
160
170
180
190
200
210
220
230

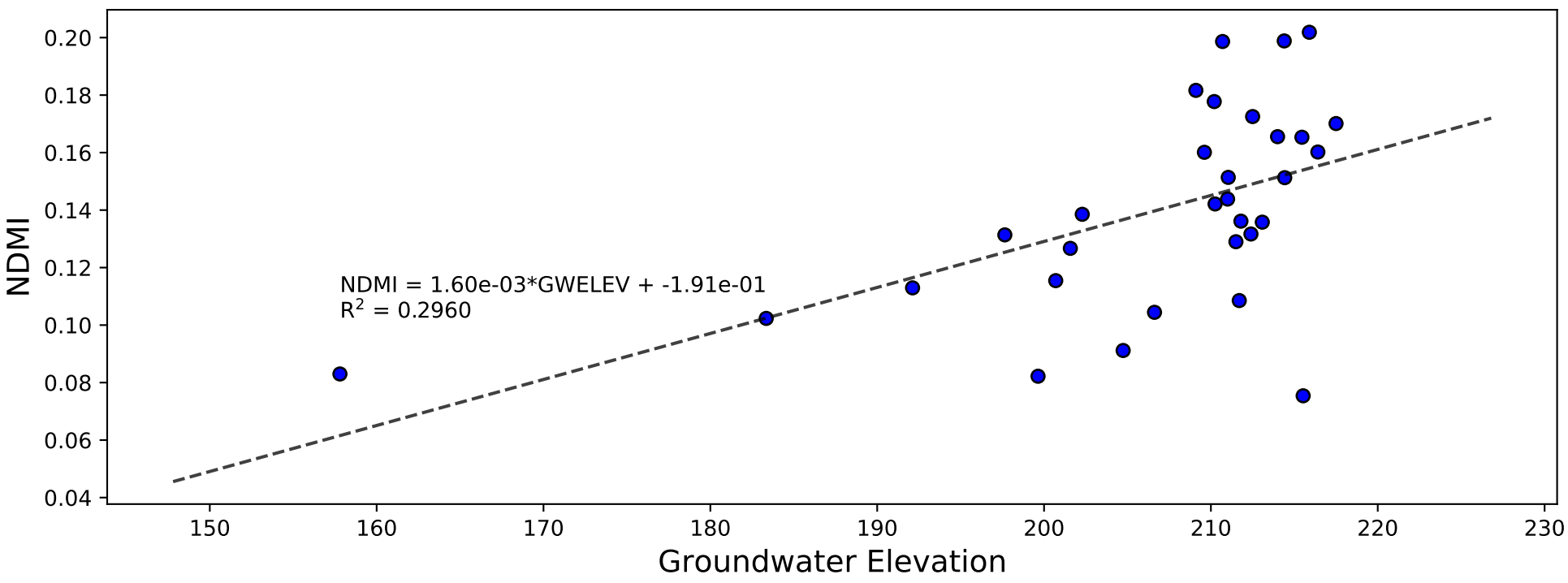

NDVI = 2.98e-04*GWELEV + 5.67e-01
R^2 = 0.0094
NDVI
Groundwater Elevation
0.68
0.66
0.64
0.62
0.60
0.58
0.56
0.54
150
160
170
180
190
200
210
220
230

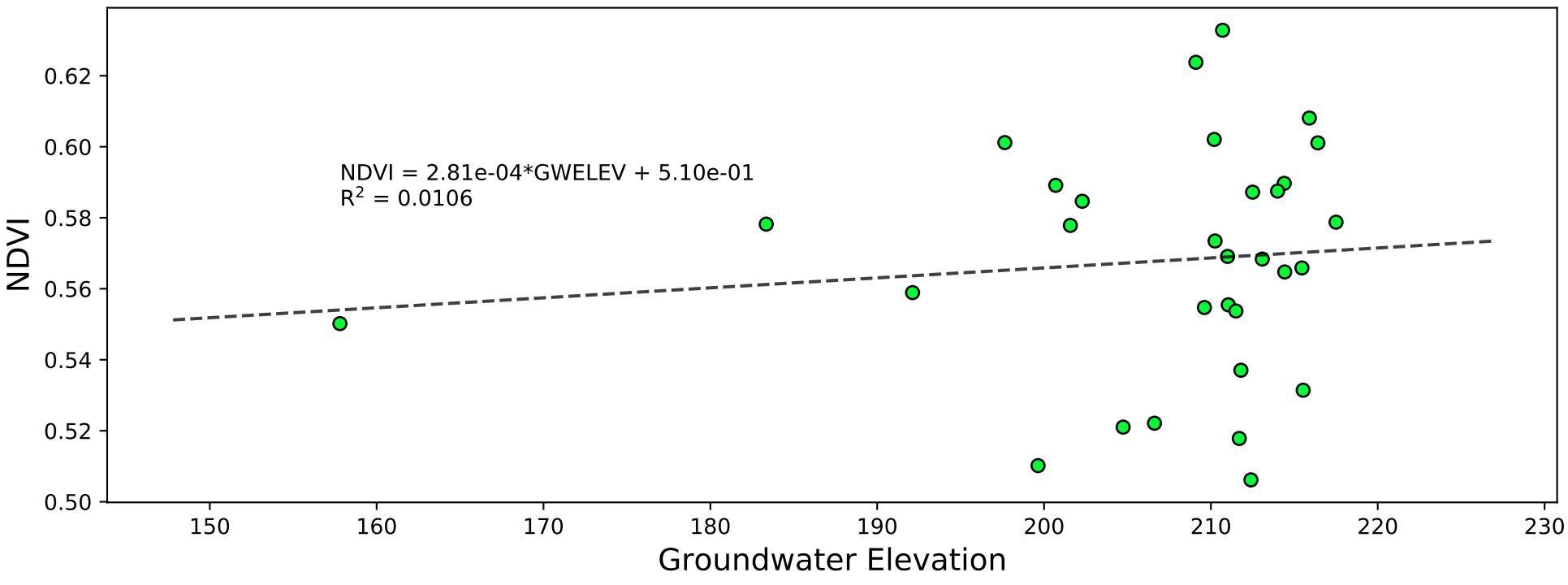

GDE Unit :: 49369
Well 1-3
NDMI
NDVI
Depth to Water
NDVI/NDMI
Date
0
20
40
60
80
100
120
1.0
0.8
0.6
0.4
0.2
0.0
1984
1988
1992
1996
2000
2004
2008
2012
2016
2020

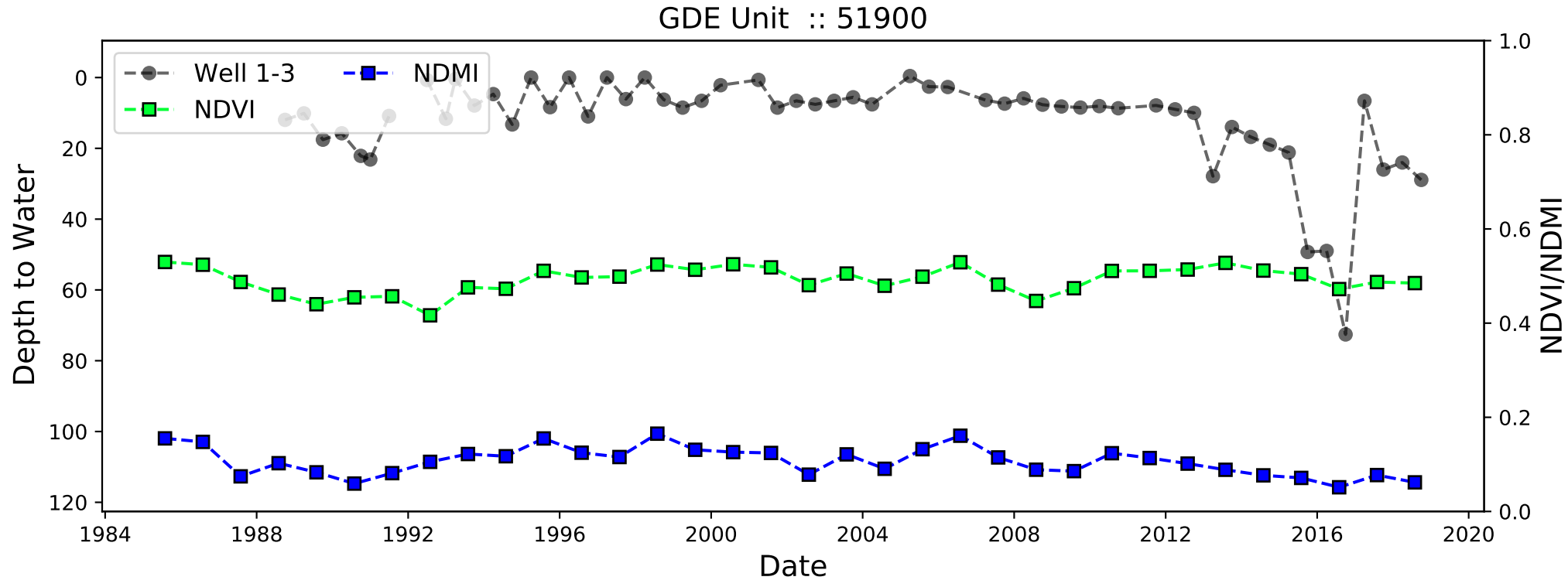

NDMI = 1.66e-03*GWELEV + -2.35e-01
R2 = 0.2666
NDMI
Groundwater Elevation
0.200
0.175
0.150
0.125
0.100
0.075
0.050
0.025
150
160
170
180
190
200
210
220
230

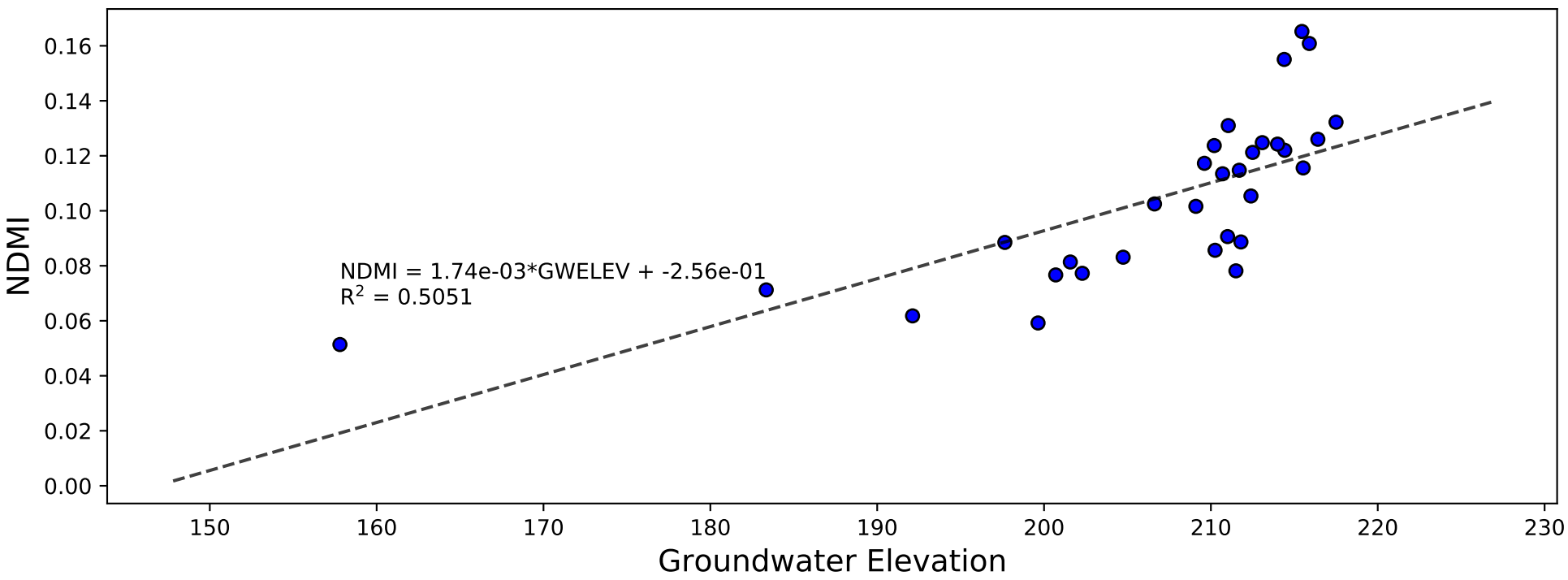

NDVI = -1.60e-04*GWELEV + 5.27e-01
R2 = 0.0015
NDVI
Groundwater Elevation
0.550
0.525
0.500
0.475
0.450
0.425
0.400
150
160
170
180
190
200
210
220
230

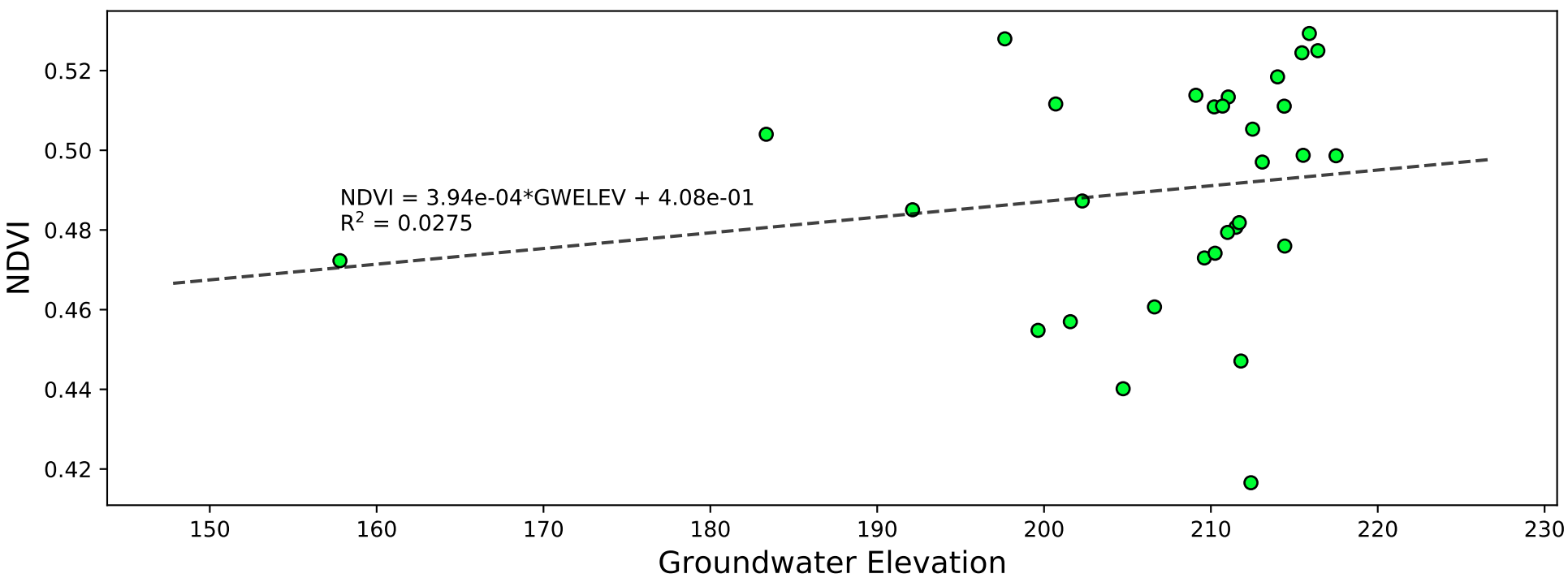

GDE Unit :: 49370
Well 1-3
NDMI
NDVI
Depth to Water
NDVI/NDMI
Date

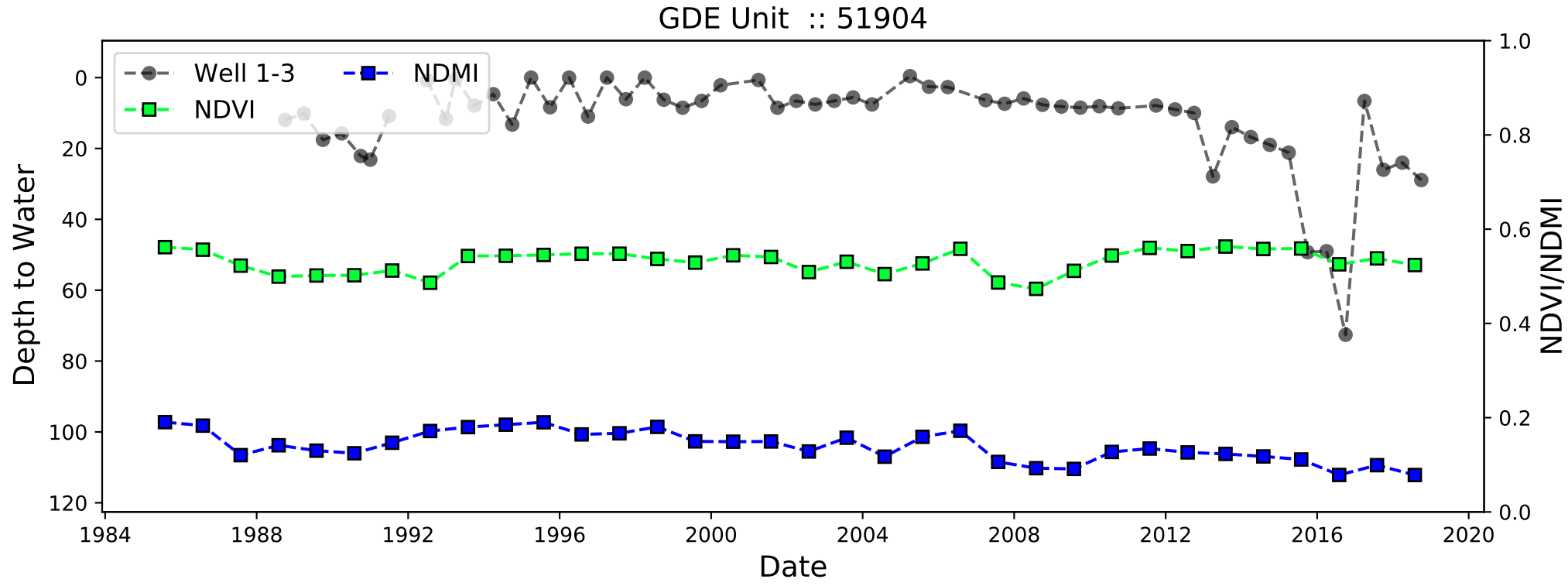

NDMI = 1.60e-03*GWELEV + -1.91e-01
R2 = 0.2960
NDMI
Groundwater Elevation

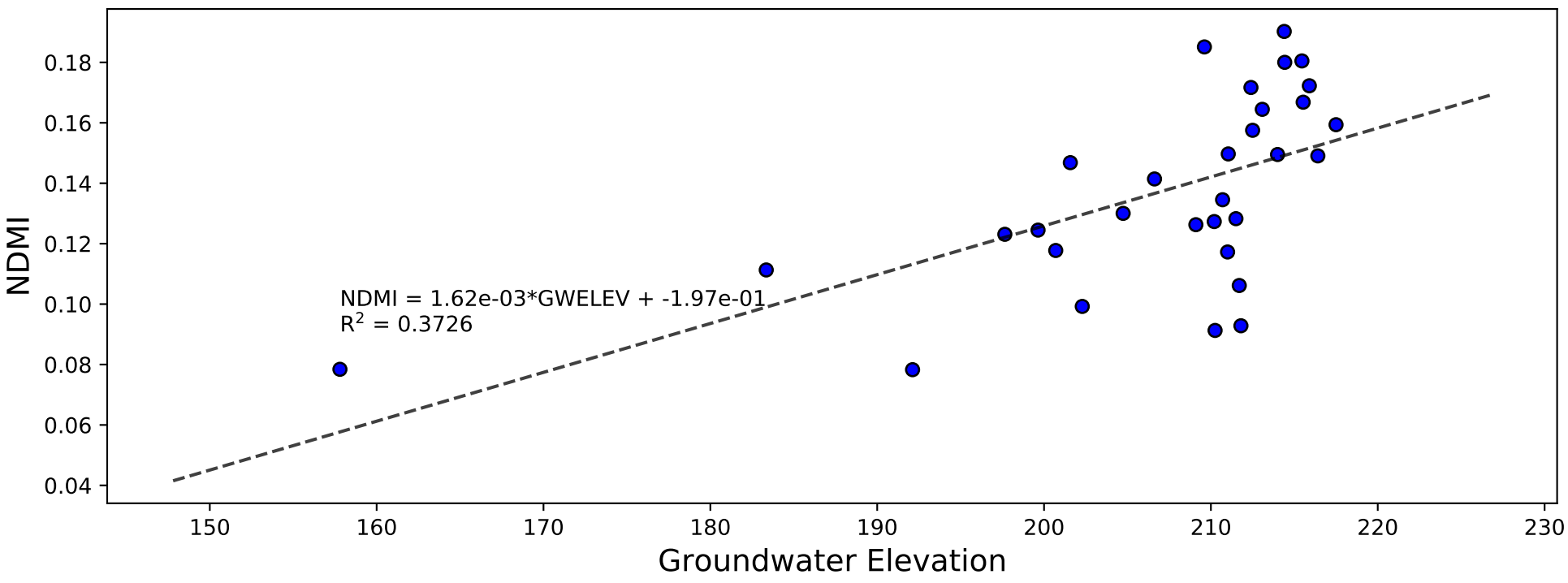

NDVI = 2.81e-04*GWELEV + 5.10e-01
R2 = 0.0106
NDVI
Groundwater Elevation

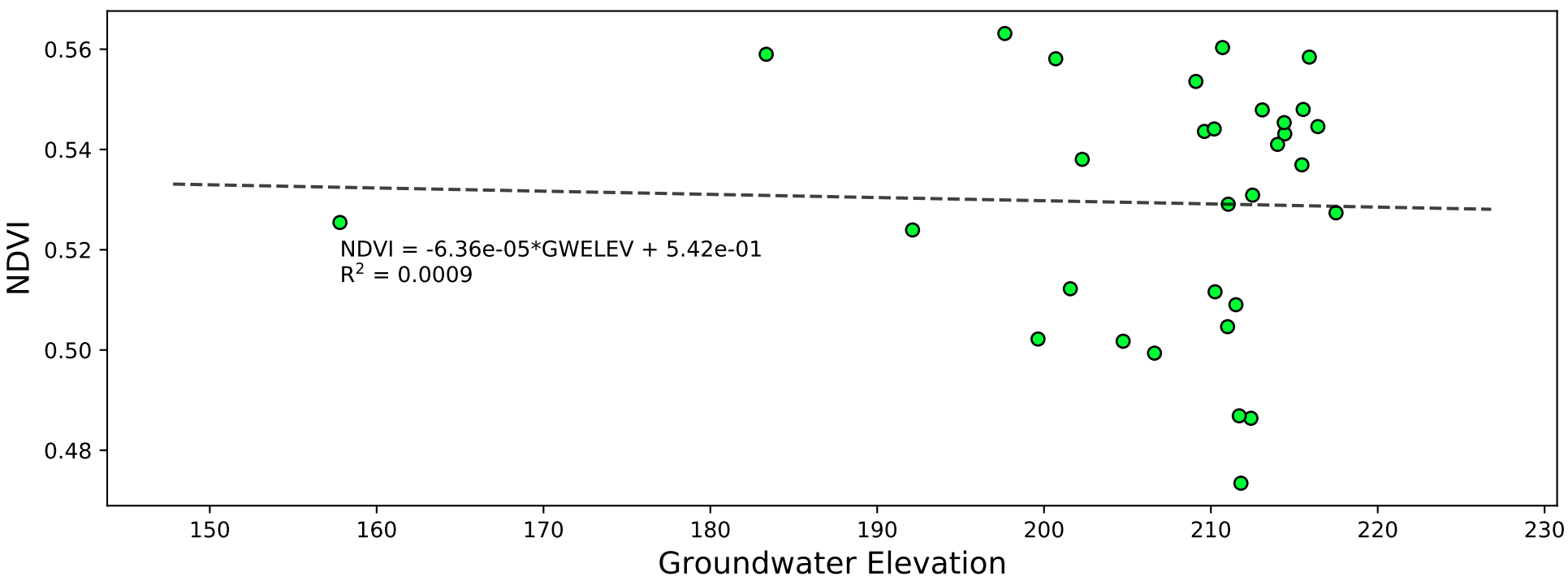

GDE Unit :: 51900
Well 1-3
NDMI
NDVI
Depth to Water
NDVI/NDMI
Date
0
20
40
60
80
100
120
1.0
0.8
0.6
0.4
0.2
0.0
1984
1988
1992
1996
2000
2004
2008
2012
2016
2020

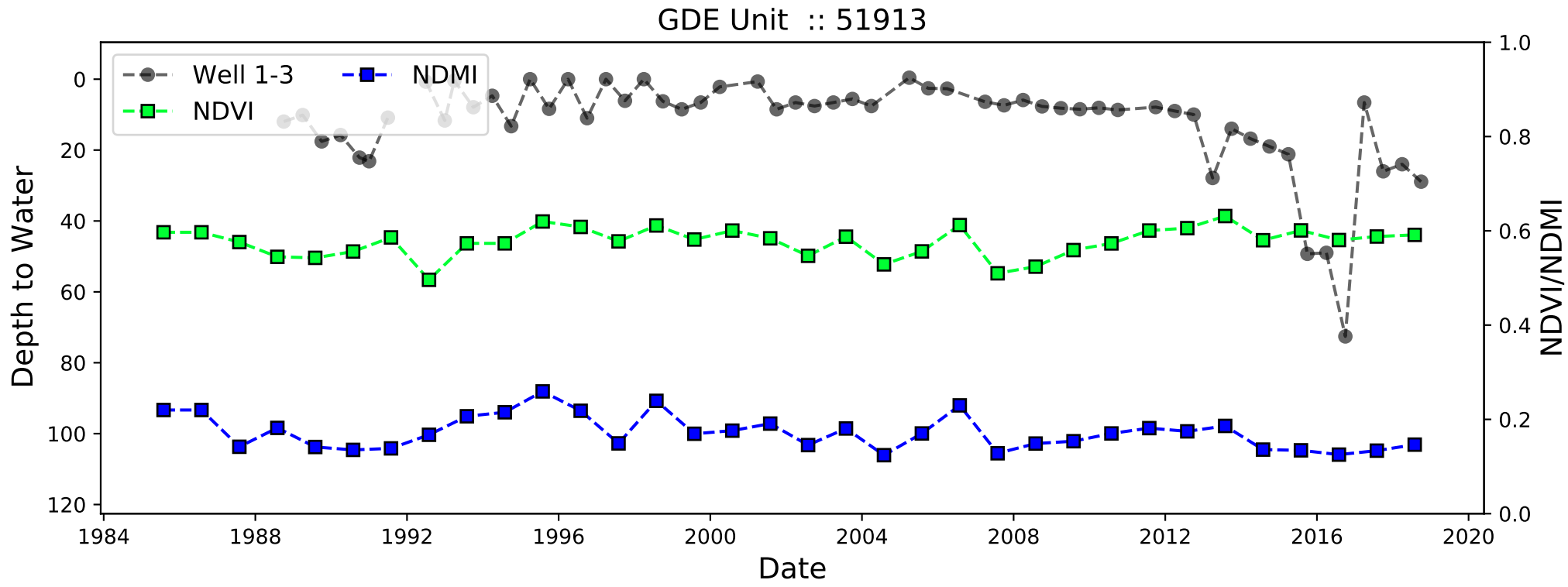

NDMI
NDMI = 1.74e-03*GWELEV + -2.56e-01
R2 = 0.5051
Groundwater Elevation
0.16
0.14
0.12
0.10
0.08
0.06
0.04
0.02
0.00
150
160
170
180
190
200
210
220
230

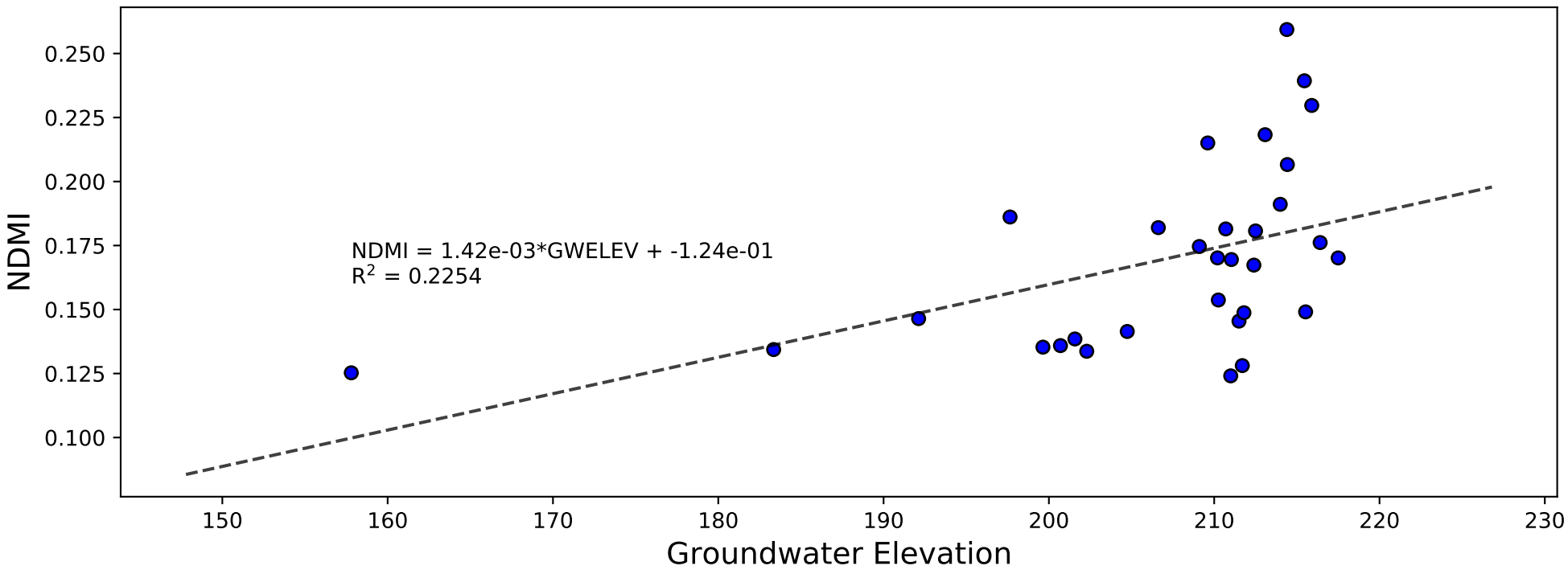

NDVI
NDVI = 3.94e-04*GWELEV + 4.08e-01
R2 = 0.0275
Groundwater Elevation
0.52
0.50
0.48
0.46
0.44
0.42
150
160
170
180
190
200
210
220
230

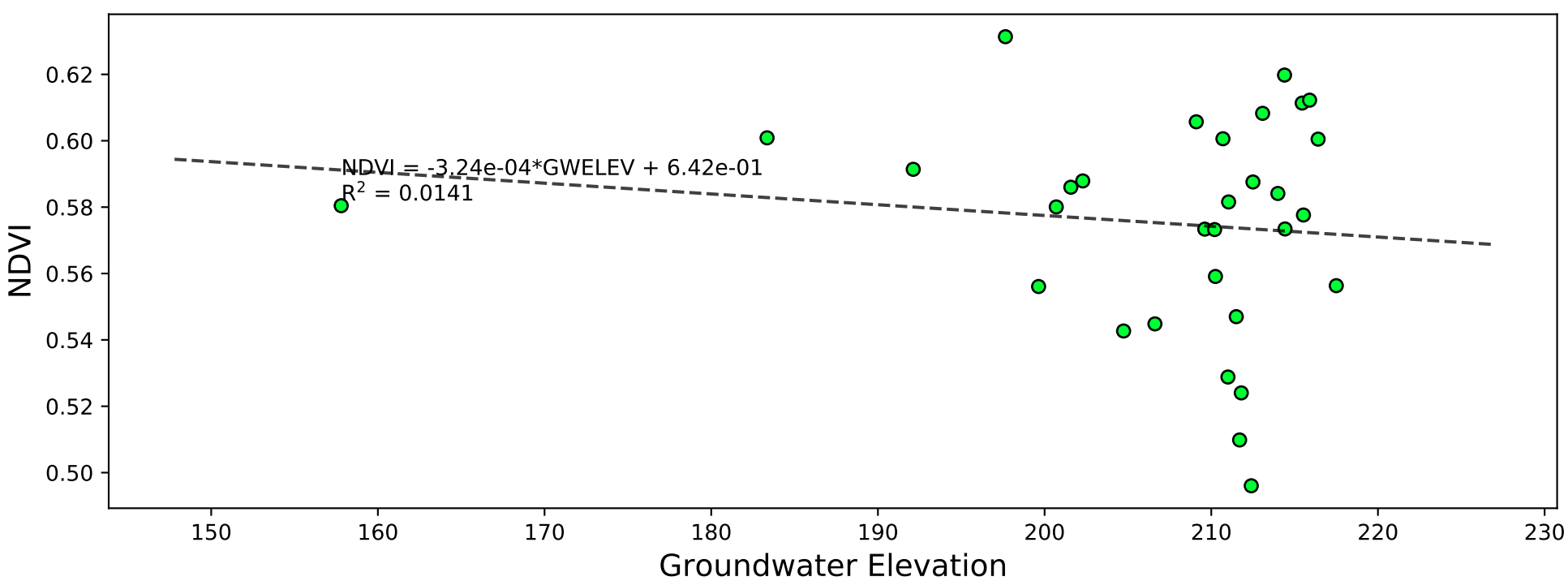

GDE Unit :: 51904
Well 1-3
NDMI
NDVI
Depth to Water
NDVI/NDMI
Date

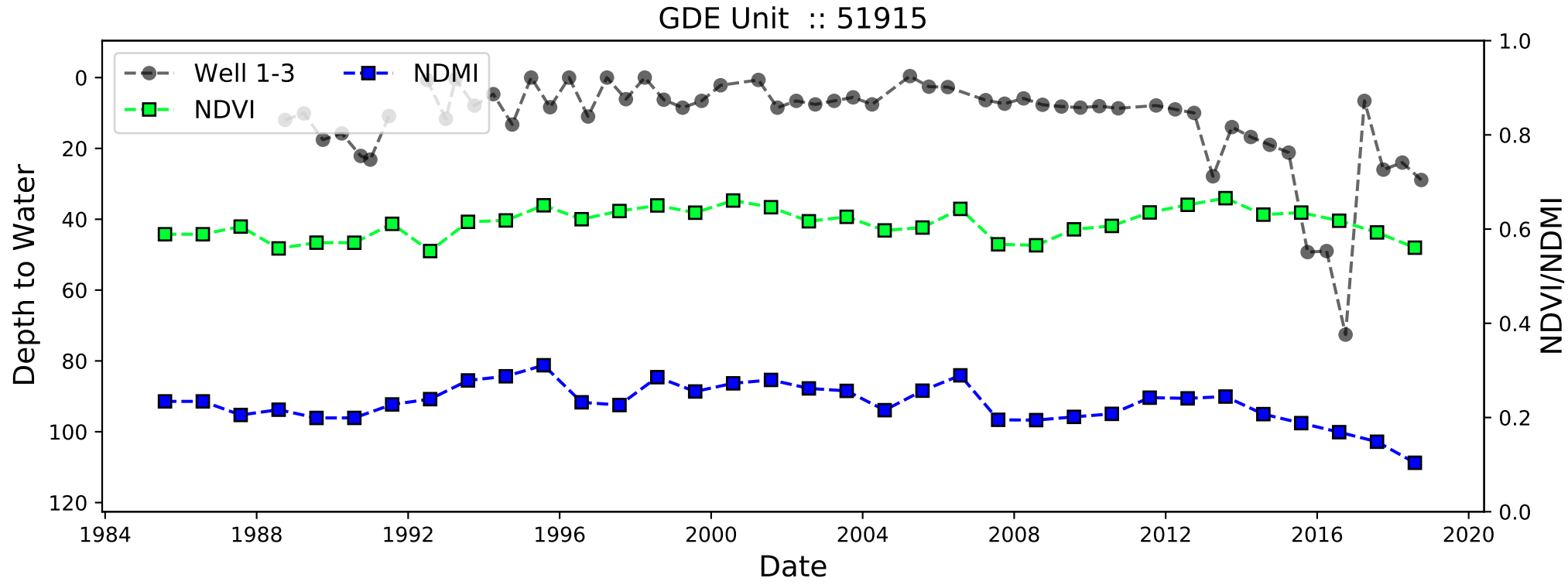

NDMI = 1.62e-03*GWELEV + -1.97e-01
R2 = 0.3726
NDMI
Groundwater Elevation

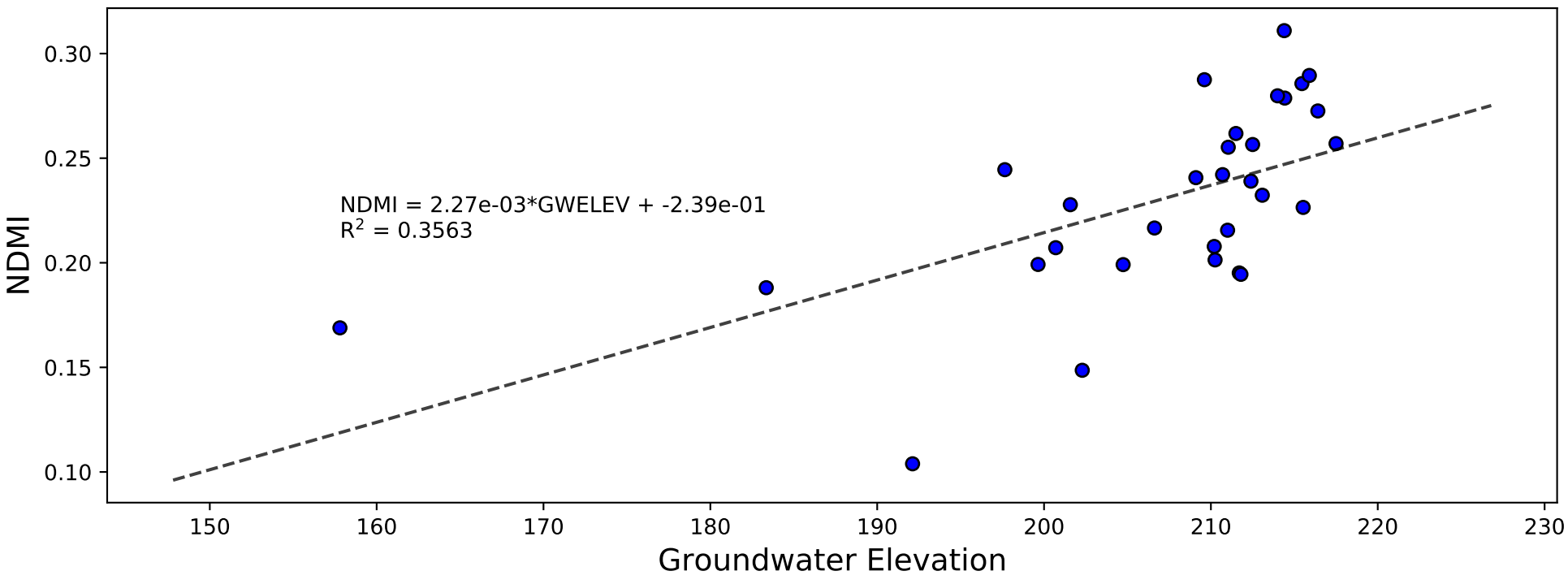

NDVI = -6.36e-05*GWELEV + 5.42e-01
R2 = 0.0009
NDVI
Groundwater Elevation

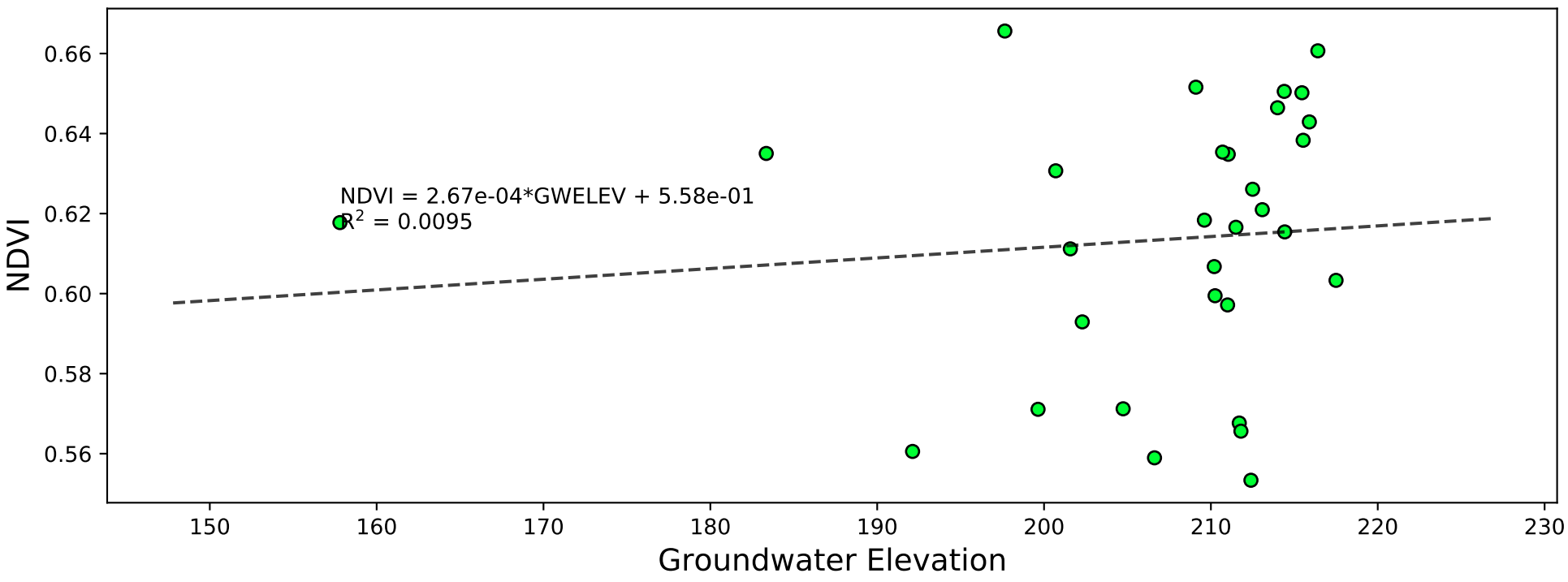

GDE Unit :: 51913
Well 1-3
NDMI
NDVI
Depth to Water
NDVI/NDMI
Date

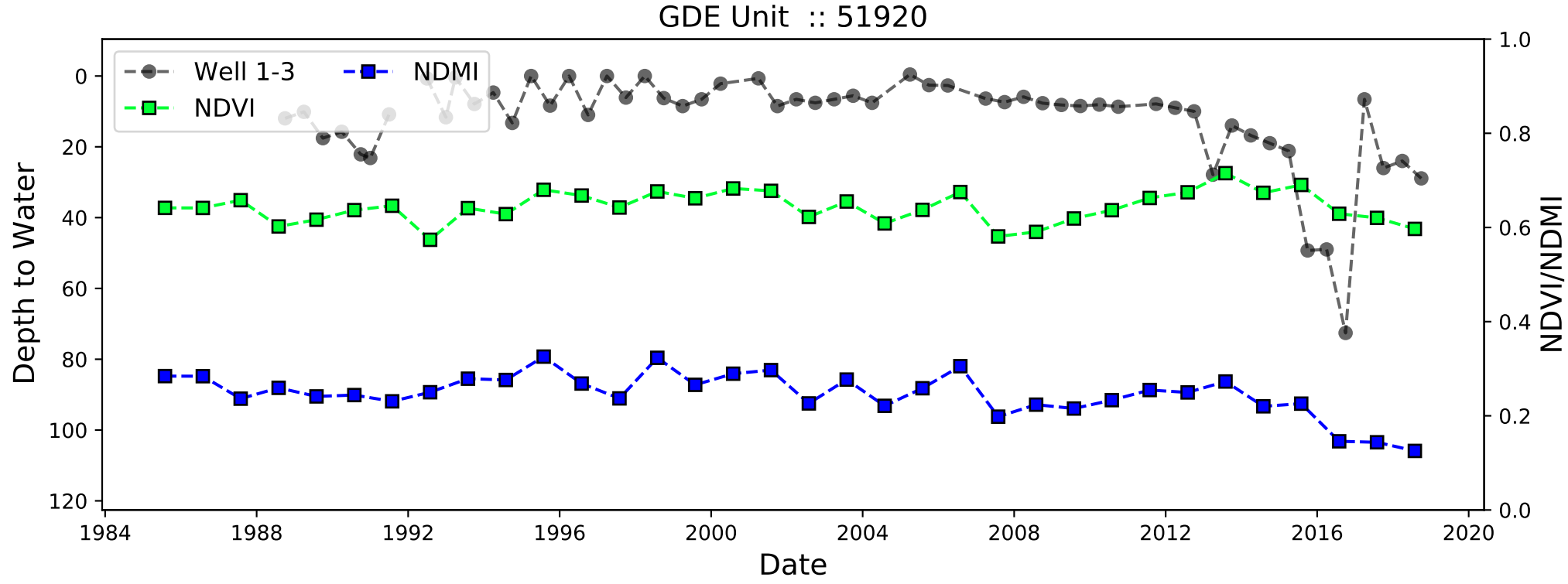

NDMI = 1.42e-03*GWELEV + -1.24e-01
R2 = 0.2254
NDMI
Groundwater Elevation

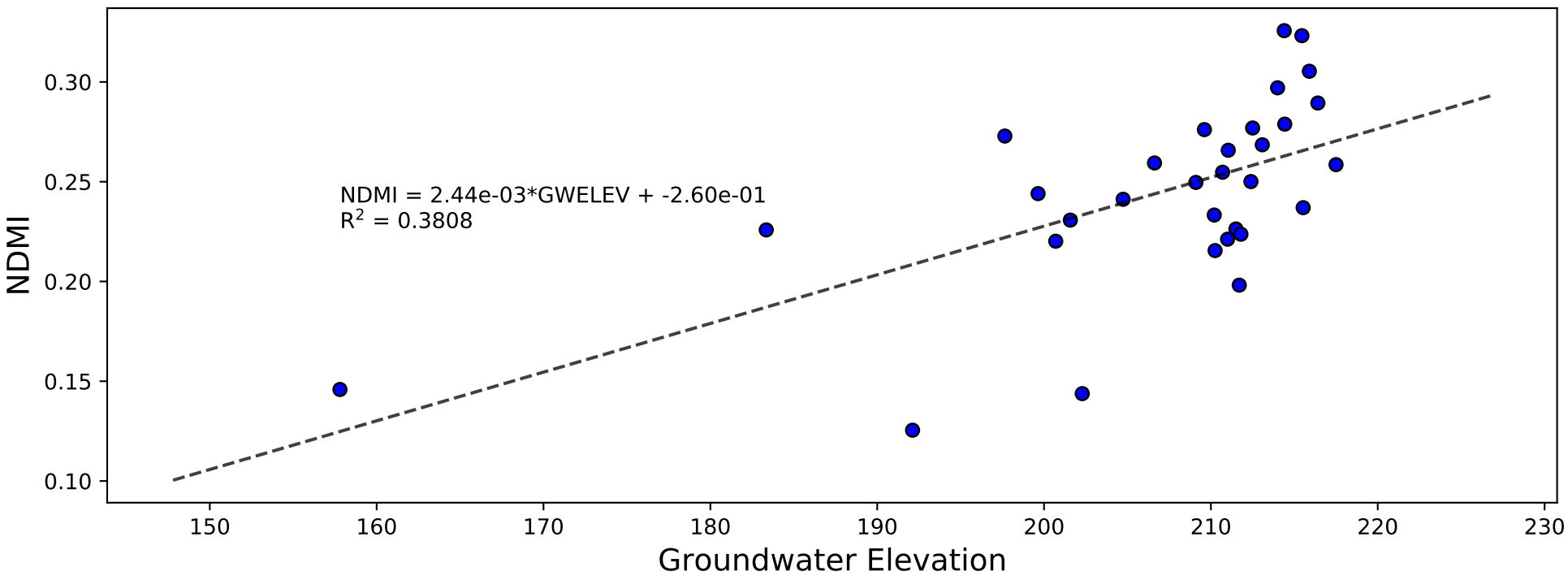

NDVI = -3.24e-04*GWELEV + 6.42e-01
R2 = 0.0141
NDVI
Groundwater Elevation

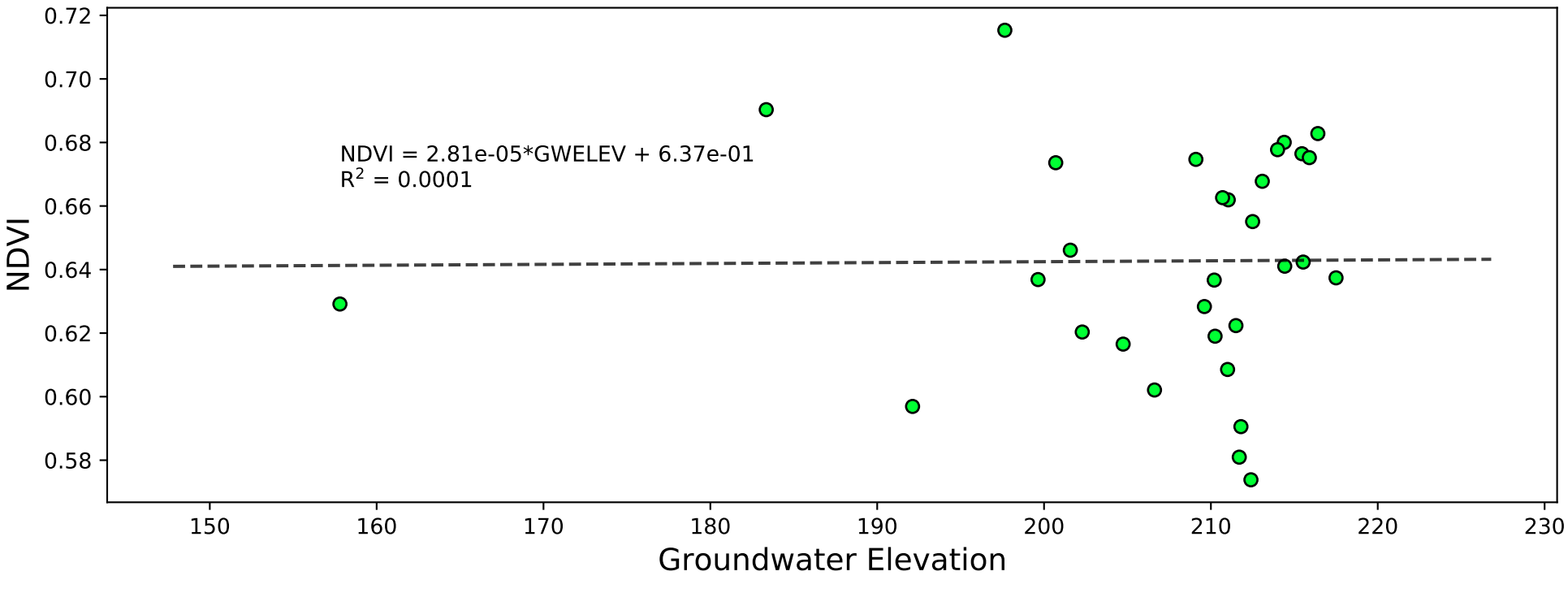

GDE Unit :: 51915
Well 1-3
NDMI
NDVI
Depth to Water
NDVI/NDMI
Date
0
20
40
60
80
100
120
1.0
0.8
0.6
0.4
0.2
0.0
1984
1988
1992
1996
2000
2004
2008
2012
2016
2020

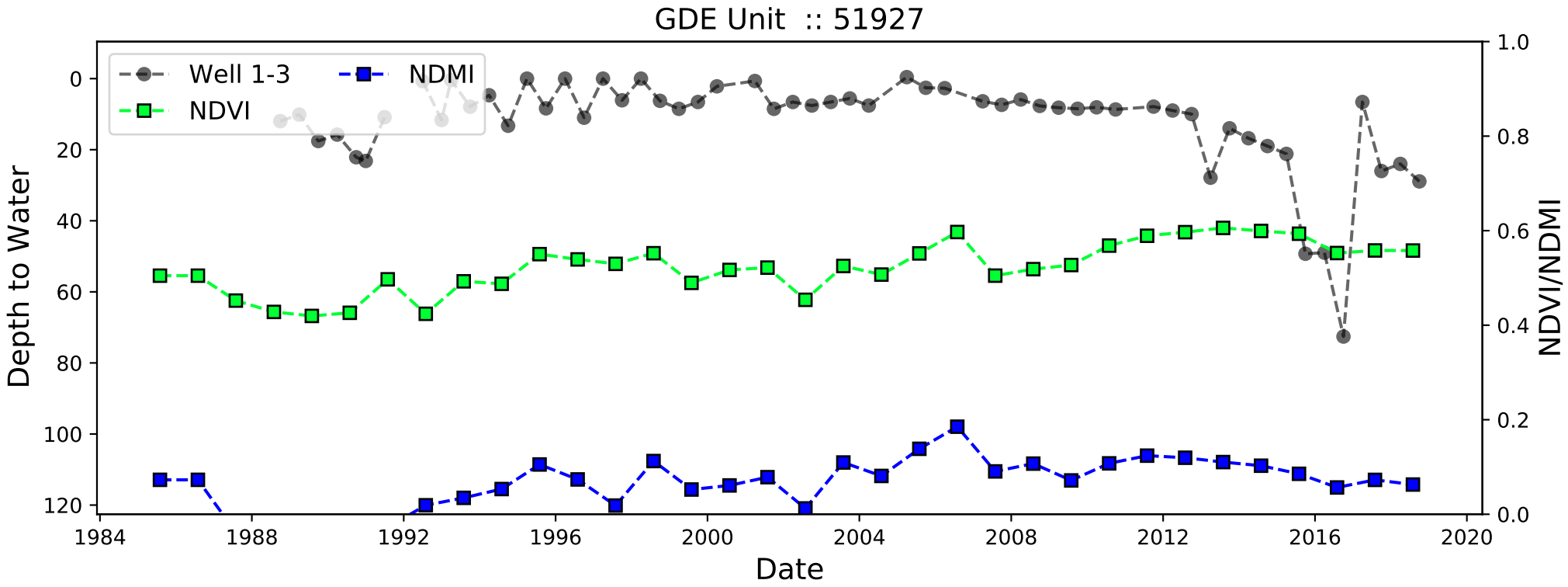

NDMI = 2.27e-03*GWELEV + -2.39e-01
R2 = 0.3563
NDMI
Groundwater Elevation
0.30
0.25
0.20
0.15
0.10
150
160
170
180
190
200
210
220
230

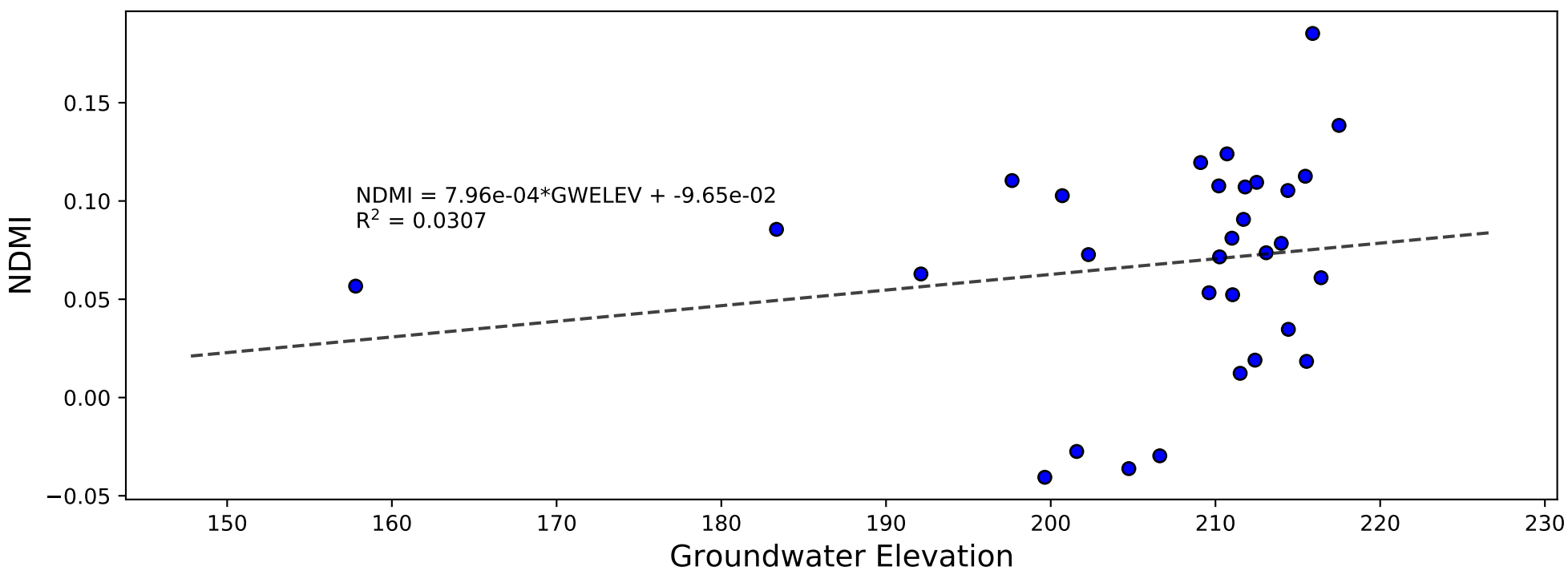

NDVI = 2.67e-04*GWELEV + 5.58e-01
R2 = 0.0095
NDVI
Groundwater Elevation
0.66
0.64
0.62
0.60
0.58
0.56
150
160
170
180
190
200
210
220
230

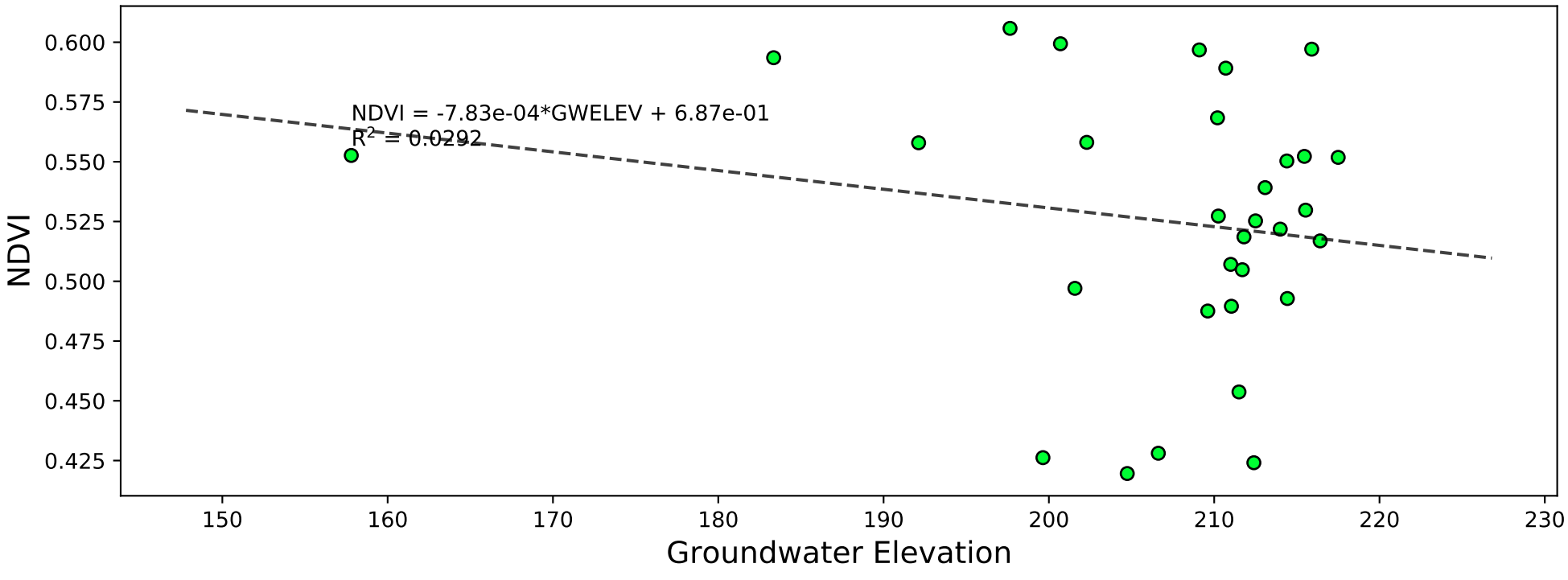

GDE Unit :: 51920
Well 1-3
NDMI
NDVI
Depth to Water
NDVI/NDMI
Date
0
20
40
60
80
100
120
1.0
0.8
0.6
0.4
0.2
0.0
1984
1988
1992
1996
2000
2004
2008
2012
2016
2020

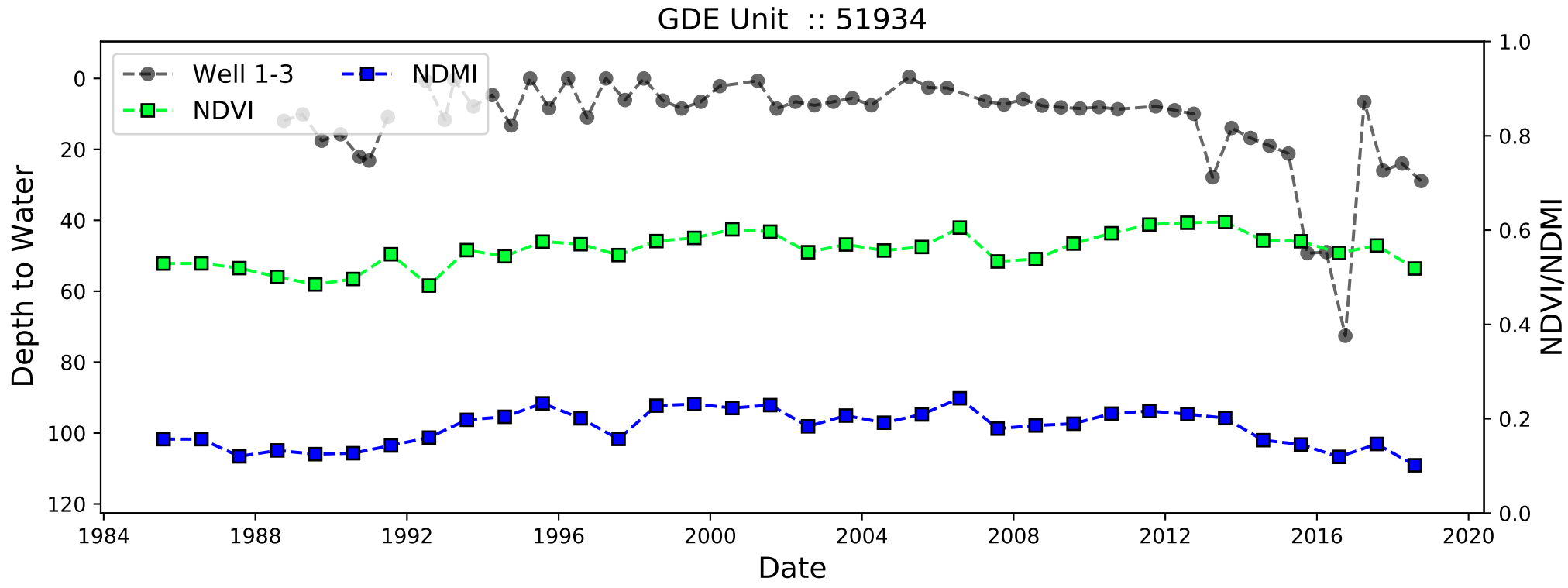

NDMI = 2.44e-03*GWELEV + -2.60e-01
R^2 = 0.3808
NDMI
Groundwater Elevation
0.30
0.25
0.20
0.15
0.10
150
160
170
180
190
200
210
220
230

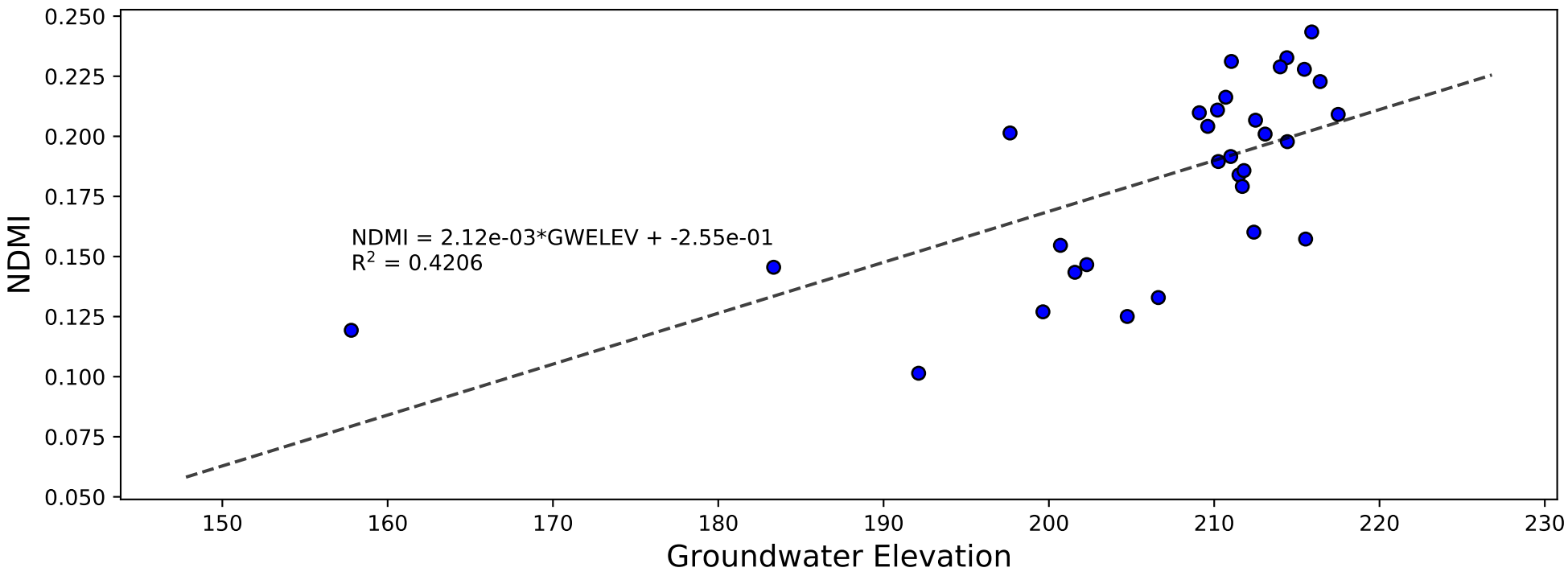

NDVI = 2.81e-05*GWELEV + 6.37e-01
R^2 = 0.0001
NDVI
Groundwater Elevation
0.72
0.70
0.68
0.66
0.64
0.62
0.60
0.58
150
160
170
180
190
200
210
220
230

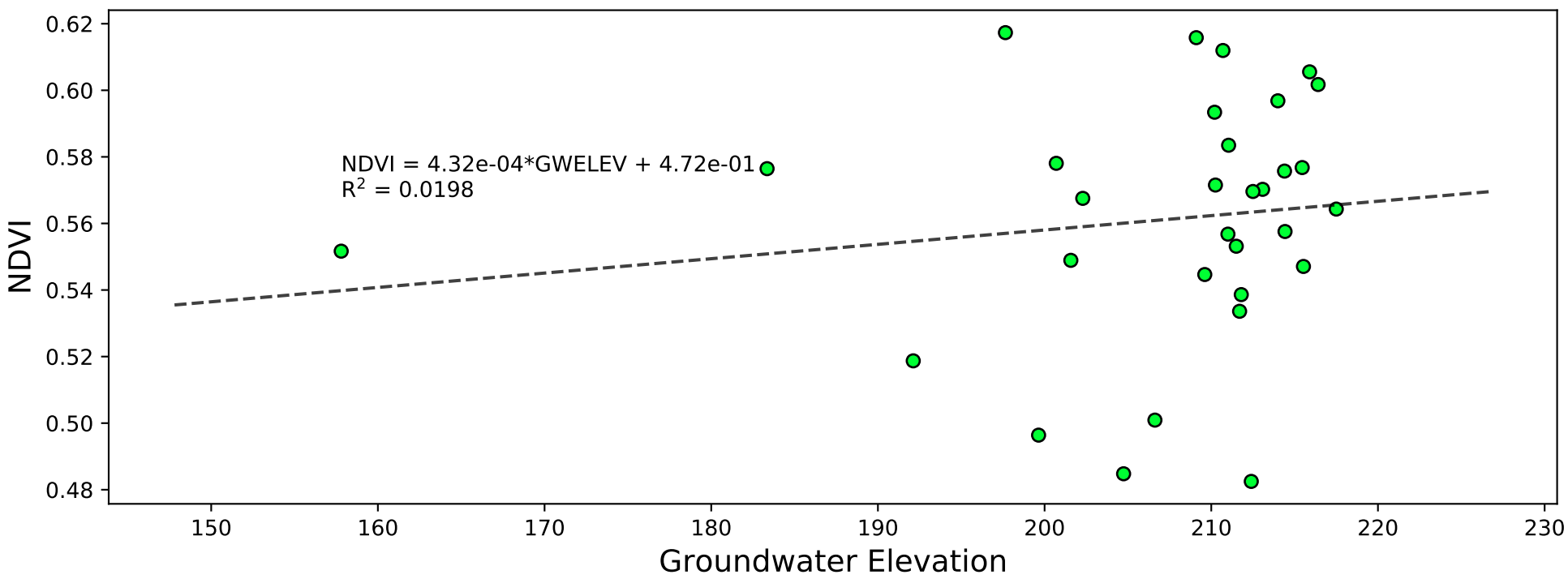

GDE Unit :: 51927
Well 1-3
NDMI
NDVI
Depth to Water
NDVI/NDMI
Date
0
20
40
60
80
100
120
1.0
0.8
0.6
0.4
0.2
0.0
1984
1988
1992
1996
2000
2004
2008
2012
2016
2020

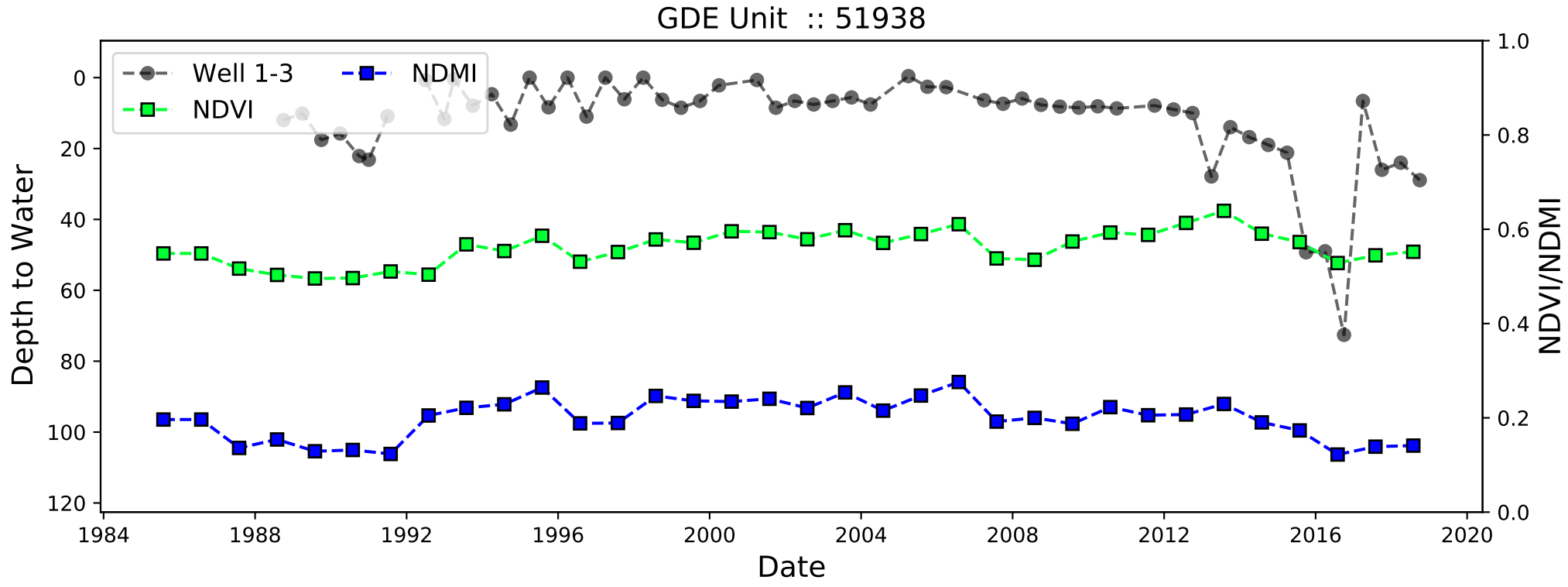

NDMI = 7.96e-04*GWELEV + -9.65e-02
R2 = 0.0307
NDMI
Groundwater Elevation
0.15
0.10
0.05
0.00
−0.05
150
160
170
180
190
200
210
220
230

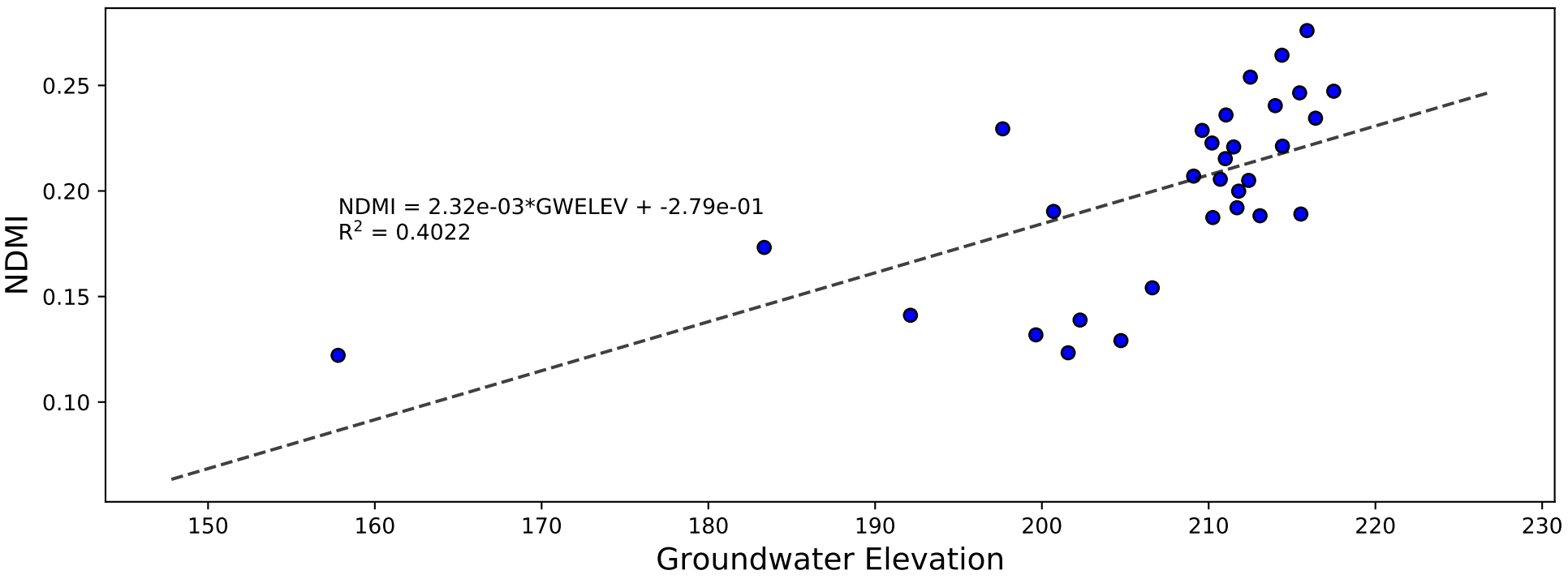

NDVI = -7.83e-04*GWELEV + 6.87e-01
R2 = 0.0292
NDVI
Groundwater Elevation
0.600
0.575
0.550
0.525
0.500
0.475
0.450
0.425
150
160
170
180
190
200
210
220
230

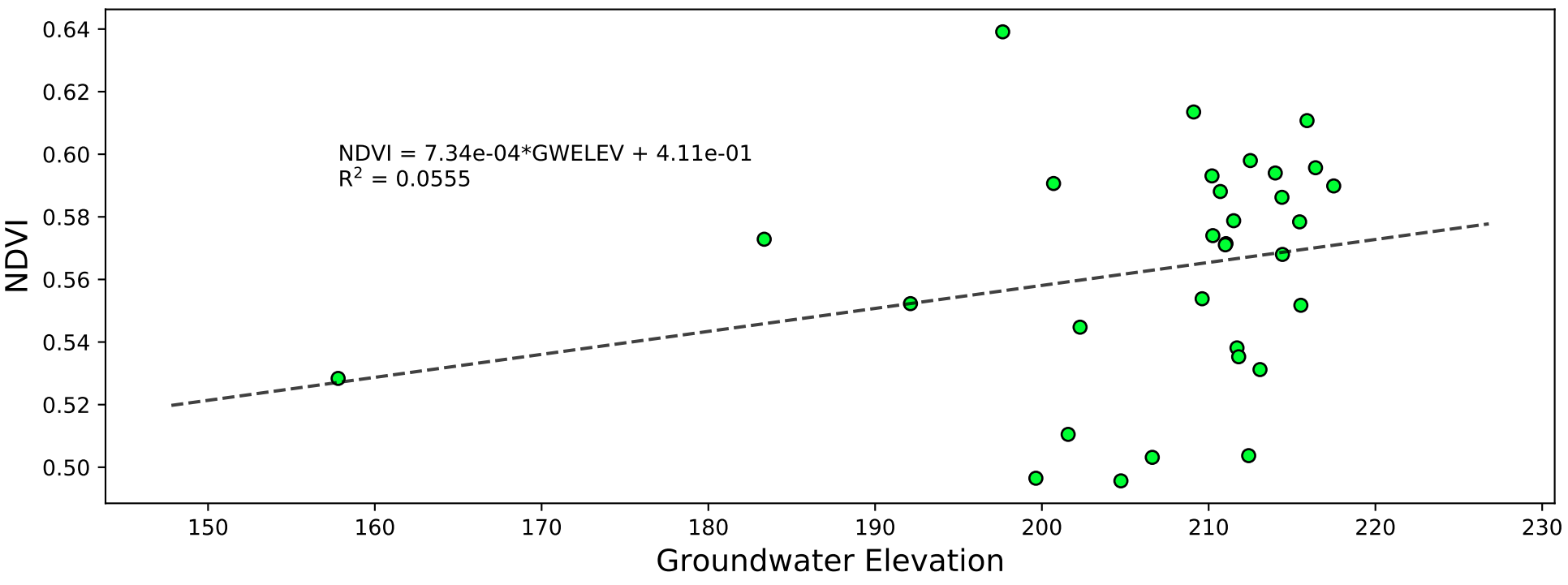

GDE Unit :: 51934
Well 1-3
NDMI
NDVI
Depth to Water
NDVI/NDMI
Date
0
20
40
60
80
100
120
1.0
0.8
0.6
0.4
0.2
0.0
1984
1988
1992
1996
2000
2004
2008
2012
2016
2020

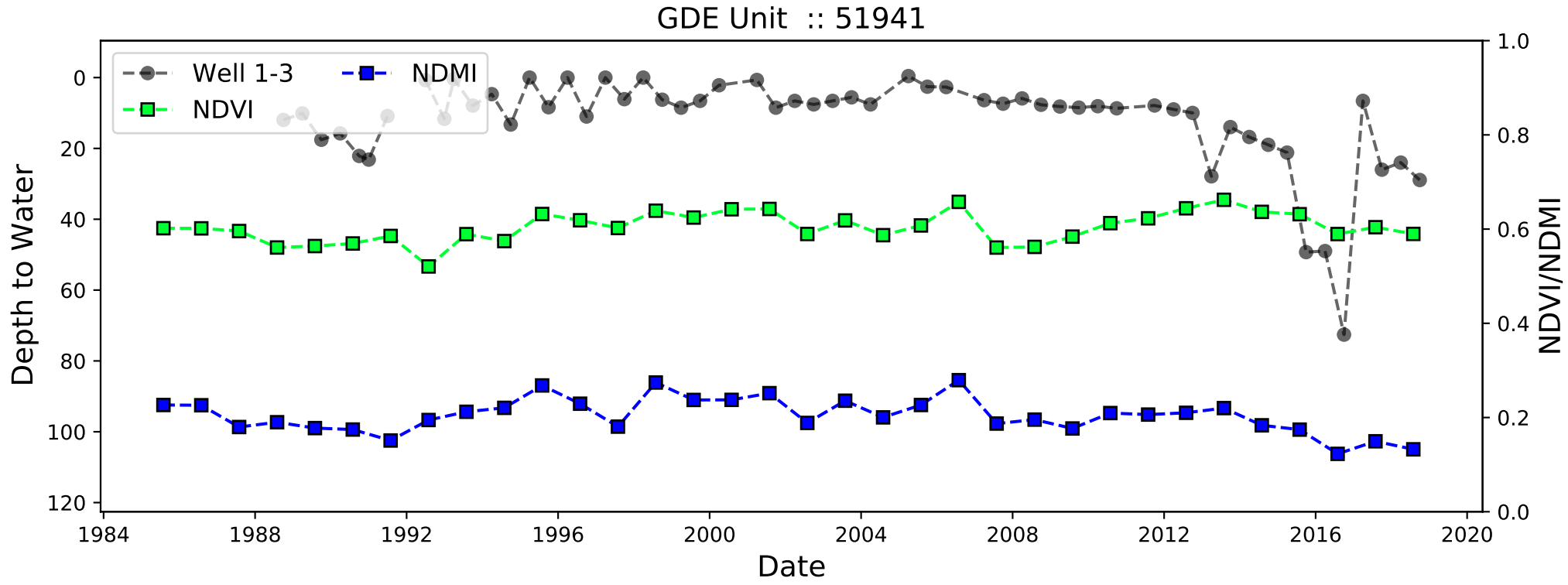

NDMI = 2.12e-03*GWELEV + -2.55e-01
R2 = 0.4206
NDMI
Groundwater Elevation
0.250
0.225
0.200
0.175
0.150
0.125
0.100
0.075
0.050
150
160
170
180
190
200
210
220
230

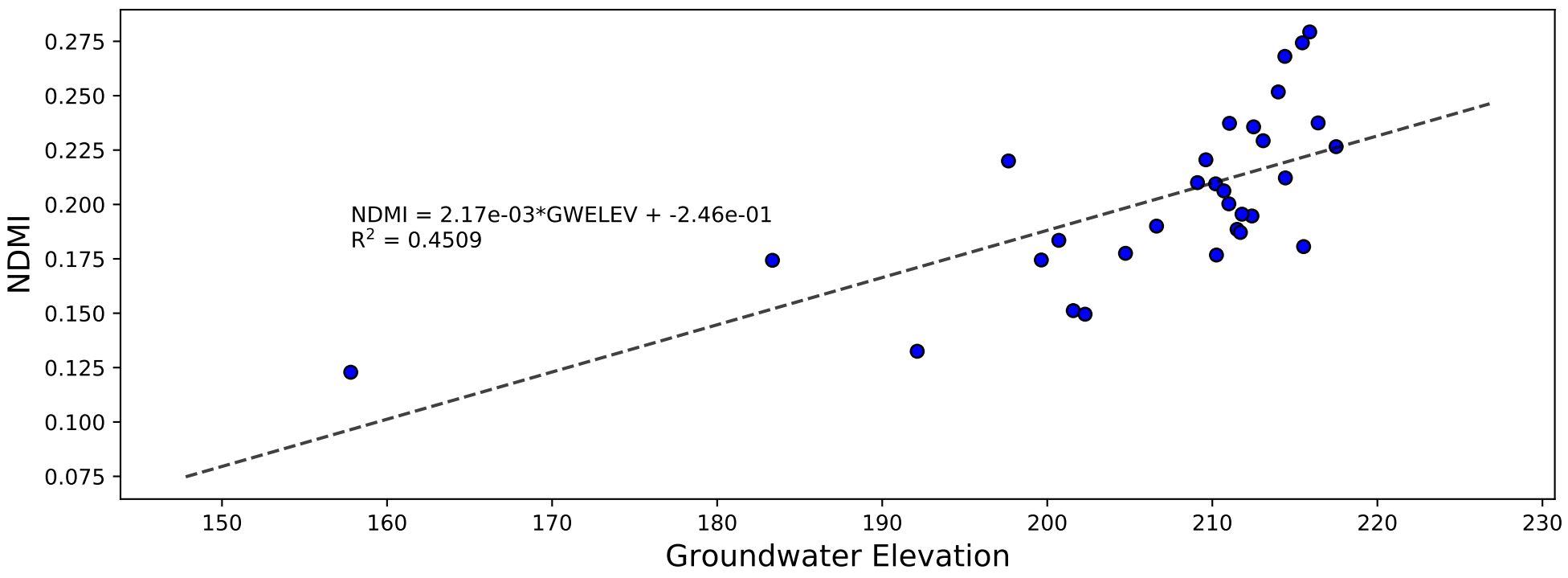

NDVI = 4.32e-04*GWELEV + 4.72e-01
R2 = 0.0198
NDVI
Groundwater Elevation
0.62
0.60
0.58
0.56
0.54
0.52
0.50
0.48
150
160
170
180
190
200
210
220
230

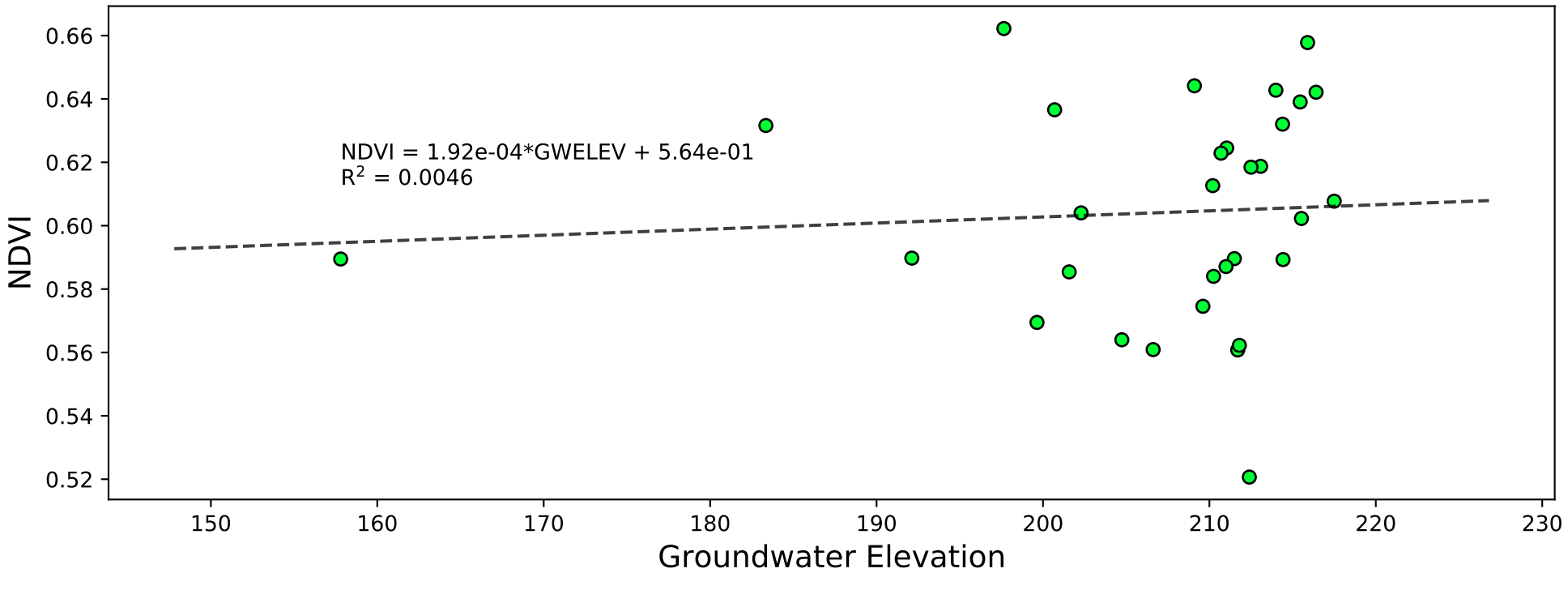

GDE Unit :: 51938
Well 1-3
NDMI
NDVI
Depth to Water
NDVI/NDMI
Date
0
20
40
60
80
100
120
1.0
0.8
0.6
0.4
0.2
0.0
1984
1988
1992
1996
2000
2004
2008
2012
2016
2020

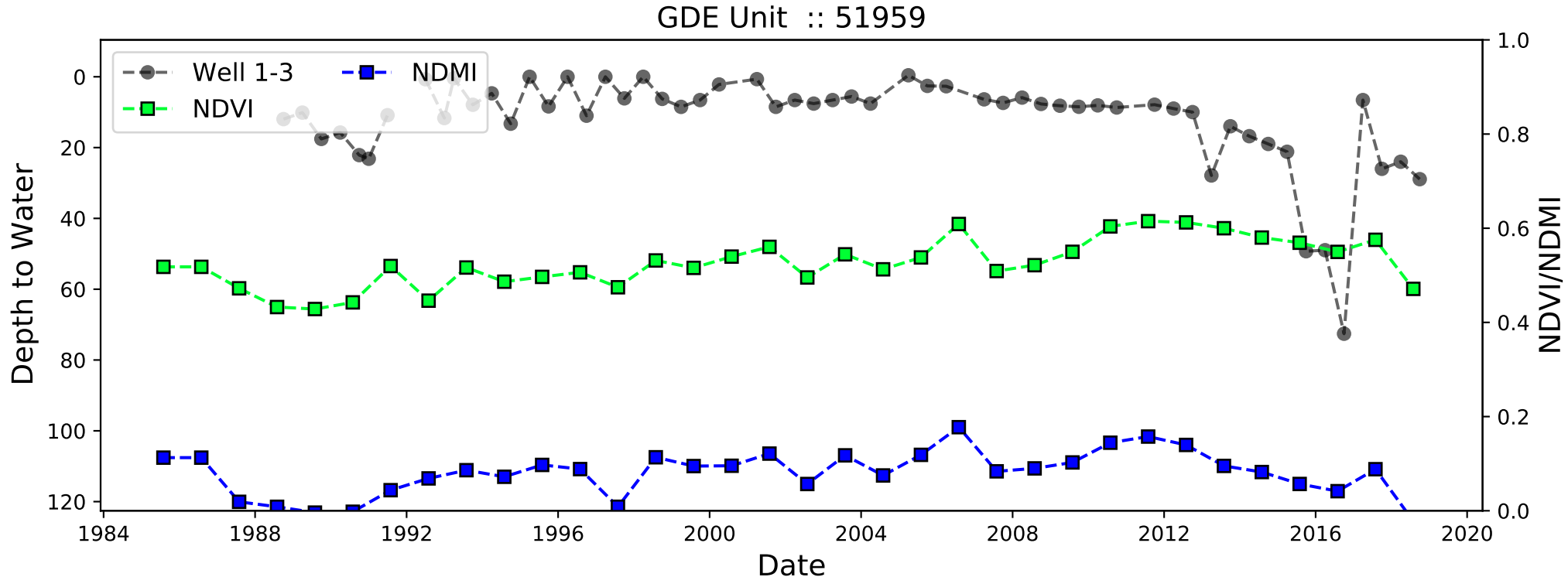

NDMI = 2.32e-03*GWELEV + -2.79e-01
R^2 = 0.4022
NDMI
Groundwater Elevation
0.25
0.20
0.15
0.10
150
160
170
180
190
200
210
220
230

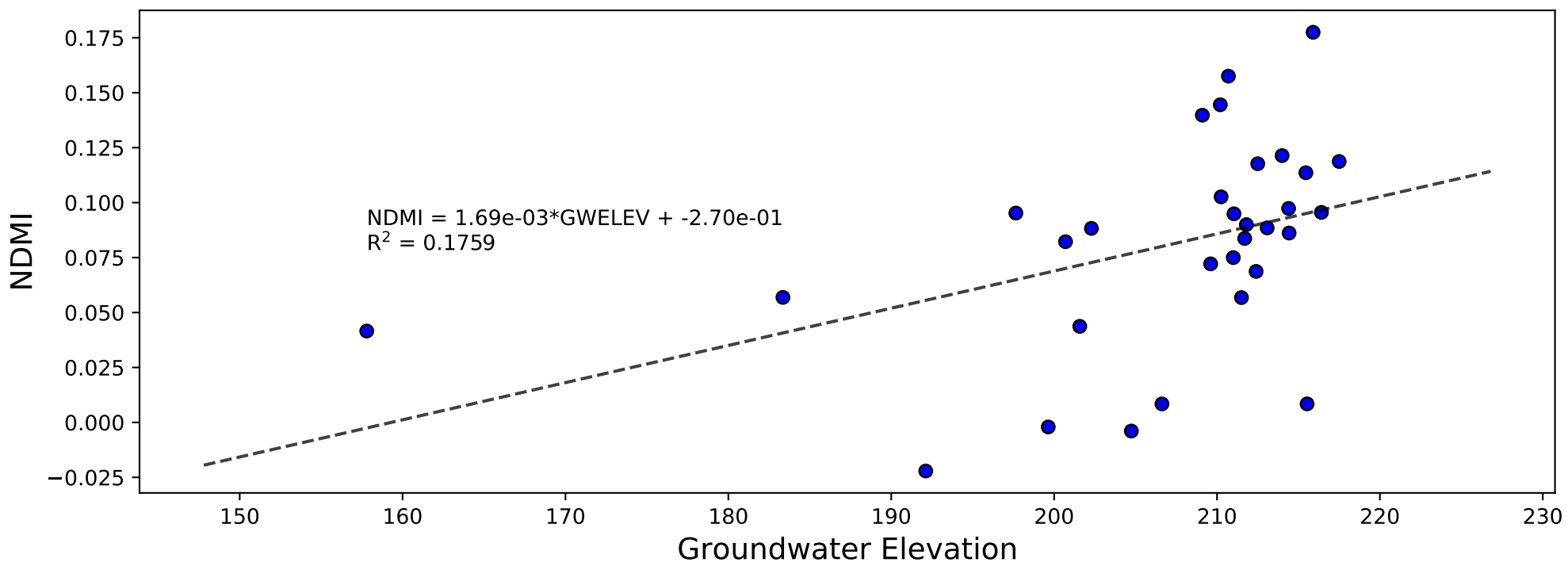

NDVI = 7.34e-04*GWELEV + 4.11e-01
R^2 = 0.0555
NDVI
Groundwater Elevation
0.64
0.62
0.60
0.58
0.56
0.54
0.52
0.50
150
160
170
180
190
200
210
220
230

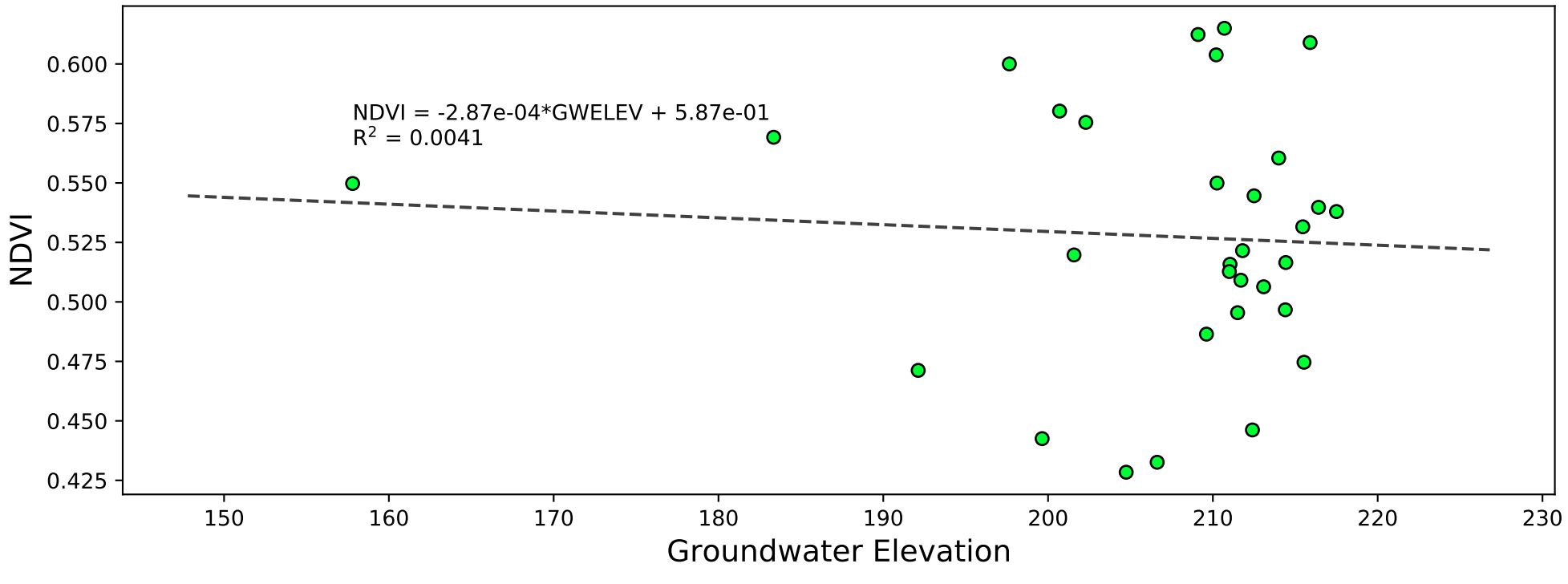

GDE Unit :: 51941
Well 1-3
NDMI
NDVI
Depth to Water
NDVI/NDMI
Date
0
20
40
60
80
100
120
1.0
0.8
0.6
0.4
0.2
0.0
1984
1988
1992
1996
2000
2004
2008
2012
2016
2020

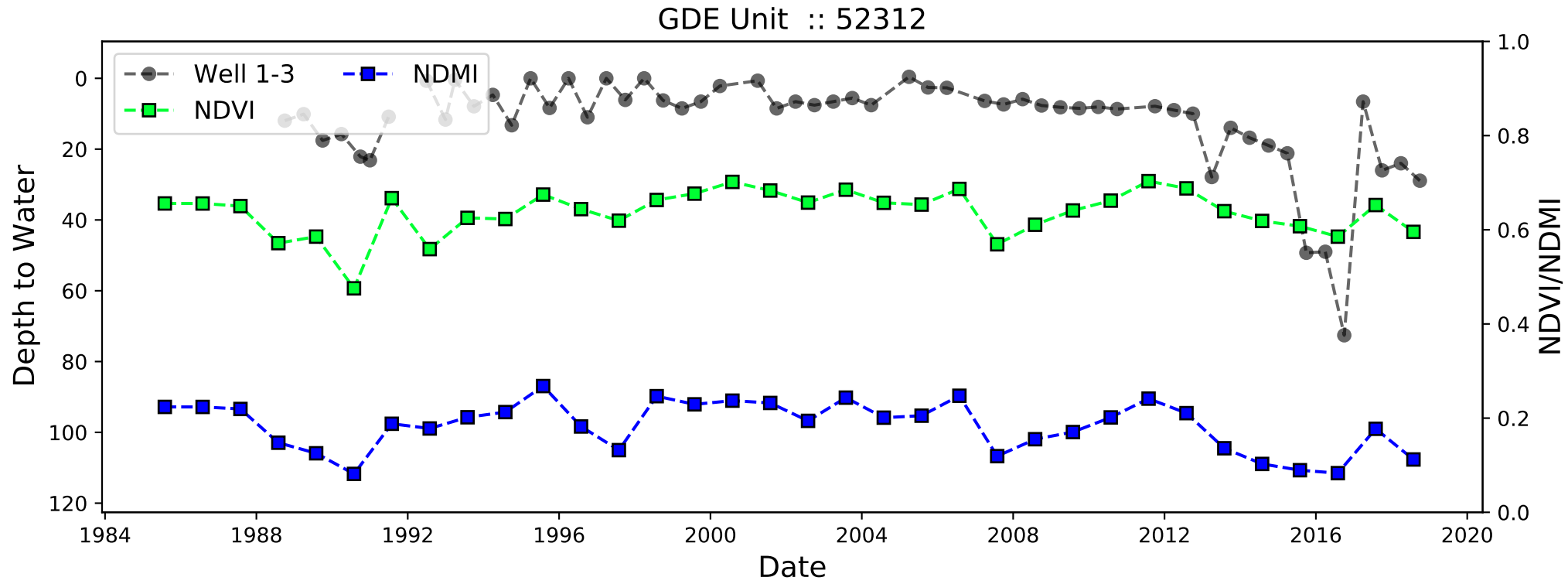

NDMI = 2.17e-03*GWELEV + -2.46e-01
R^2 = 0.4509
NDMI
Groundwater Elevation
0.275
0.250
0.225
0.200
0.175
0.150
0.125
0.100
0.075
150
160
170
180
190
200
210
220
230

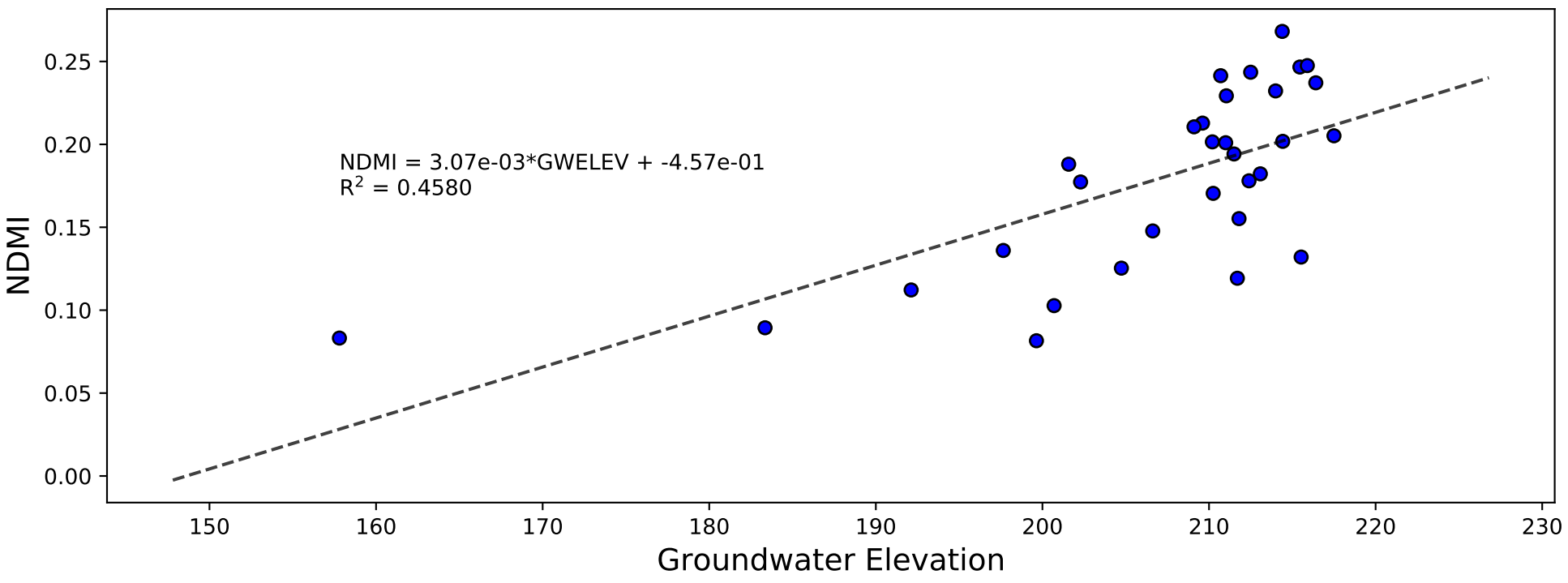

NDVI = 1.92e-04*GWELEV + 5.64e-01
R^2 = 0.0046
NDVI
Groundwater Elevation
0.66
0.64
0.62
0.60
0.58
0.56
0.54
0.52
150
160
170
180
190
200
210
220
230

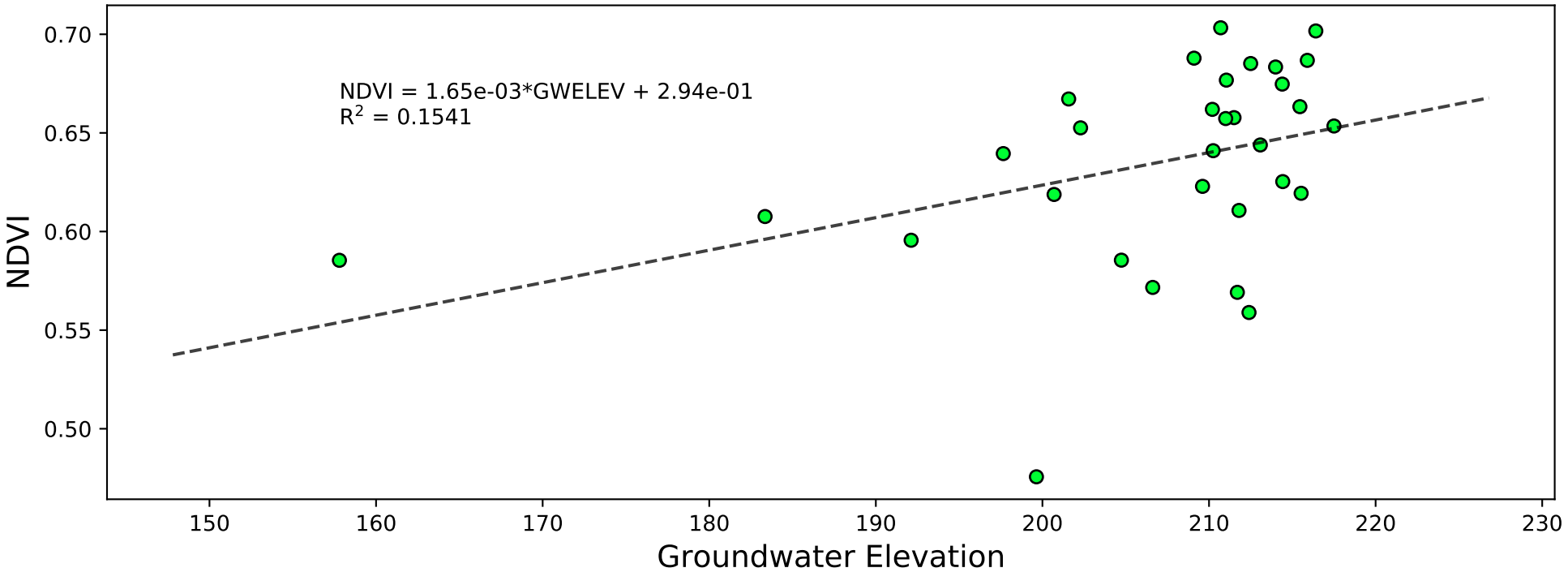

GDE Unit :: 51959
Well 1-3
NDMI
NDVI
Depth to Water
NDVI/NDMI
Date
0
20
40
60
80
100
120
1.0
0.8
0.6
0.4
0.2
0.0
1984
1988
1992
1996
2000
2004
2008
2012
2016
2020


NDMI = 1.69e-03*GWELEV + -2.70e-01
R^2 = 0.1759
NDMI
Groundwater Elevation
0.175
0.150
0.125
0.100
0.075
0.050
0.025
0.000
−0.025
150
160
170
180
190
200
210
220
230


NDVI = -2.87e-04*GWELEV + 5.87e-01
R^2 = 0.0041
NDVI
Groundwater Elevation
0.600
0.575
0.550
0.525
0.500
0.475
0.450
0.425
150
160
170
180
190
200
210
220
230

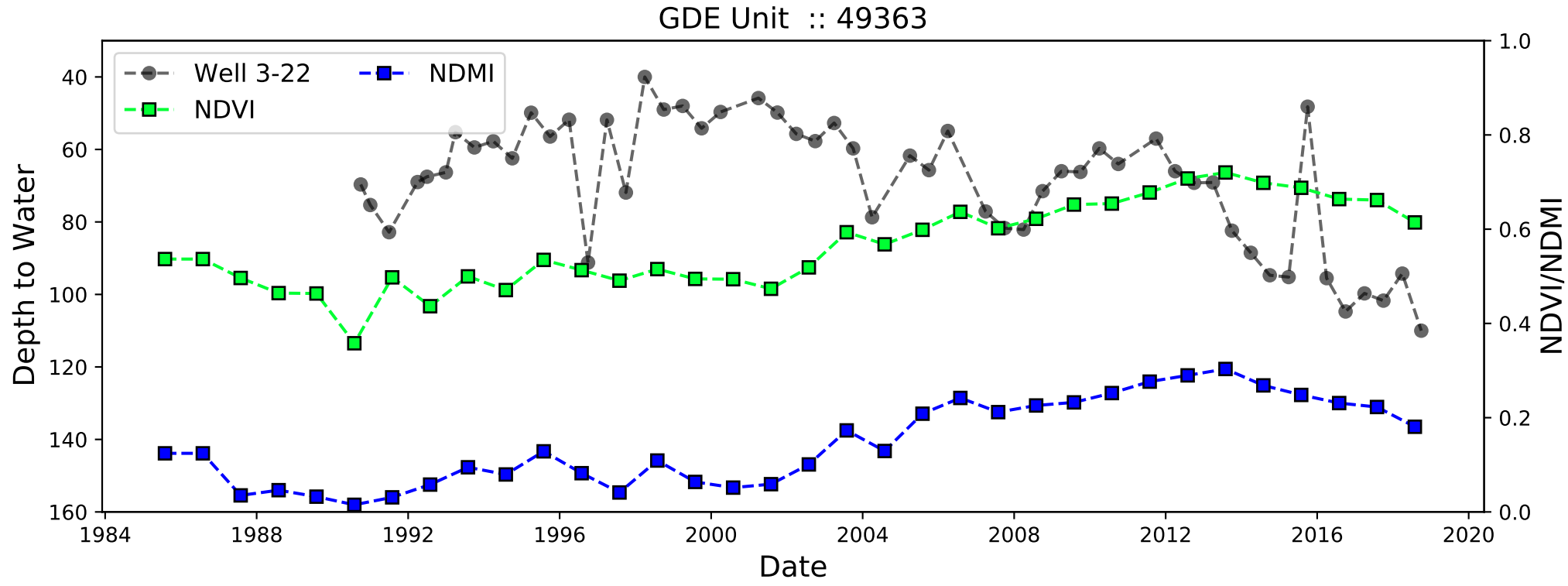

GDE Unit :: 52312
Well 1-3
NDMI
NDVI
Depth to Water
NDVI/NDMI
Date
0
20
40
60
80
100
120
1.0
0.8
0.6
0.4
0.2
0.0
1984
1988
1992
1996
2000
2004
2008
2012
2016
2020

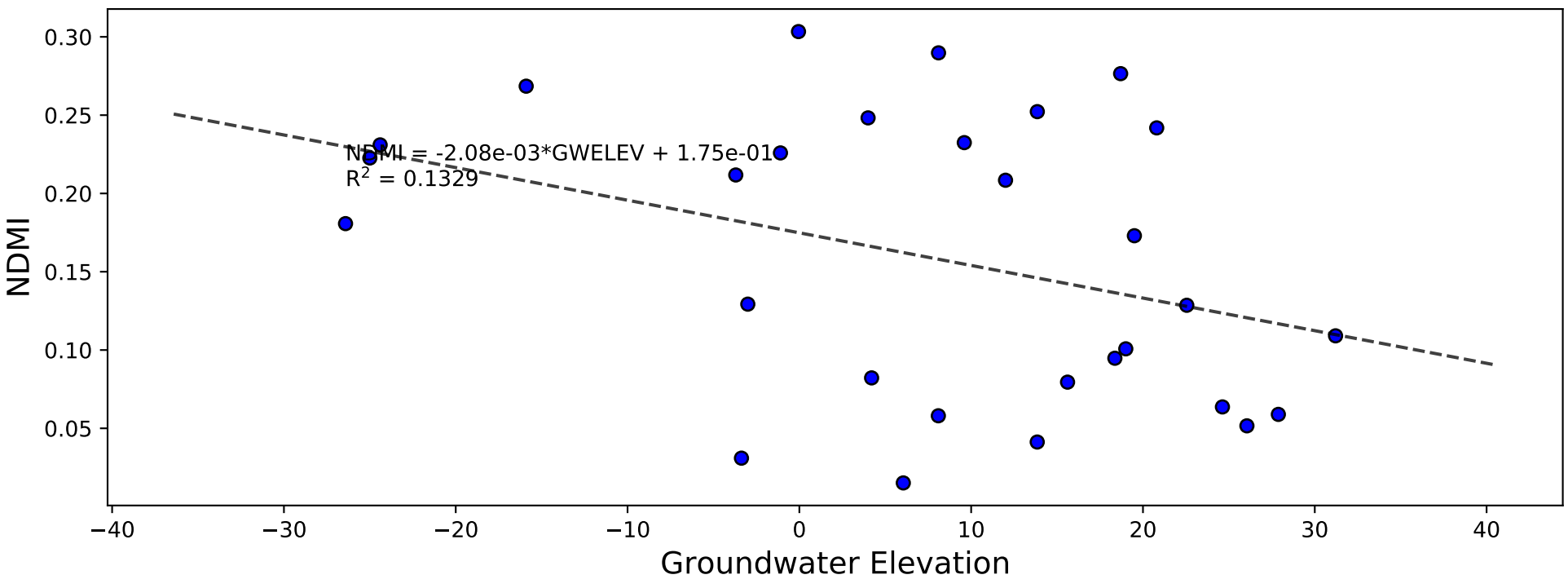

NDMI = 3.07e-03*GWELEV + -4.57e-01
R2 = 0.4580
NDMI
Groundwater Elevation
0.25
0.20
0.15
0.10
0.05
0.00
150
160
170
180
190
200
210
220
230

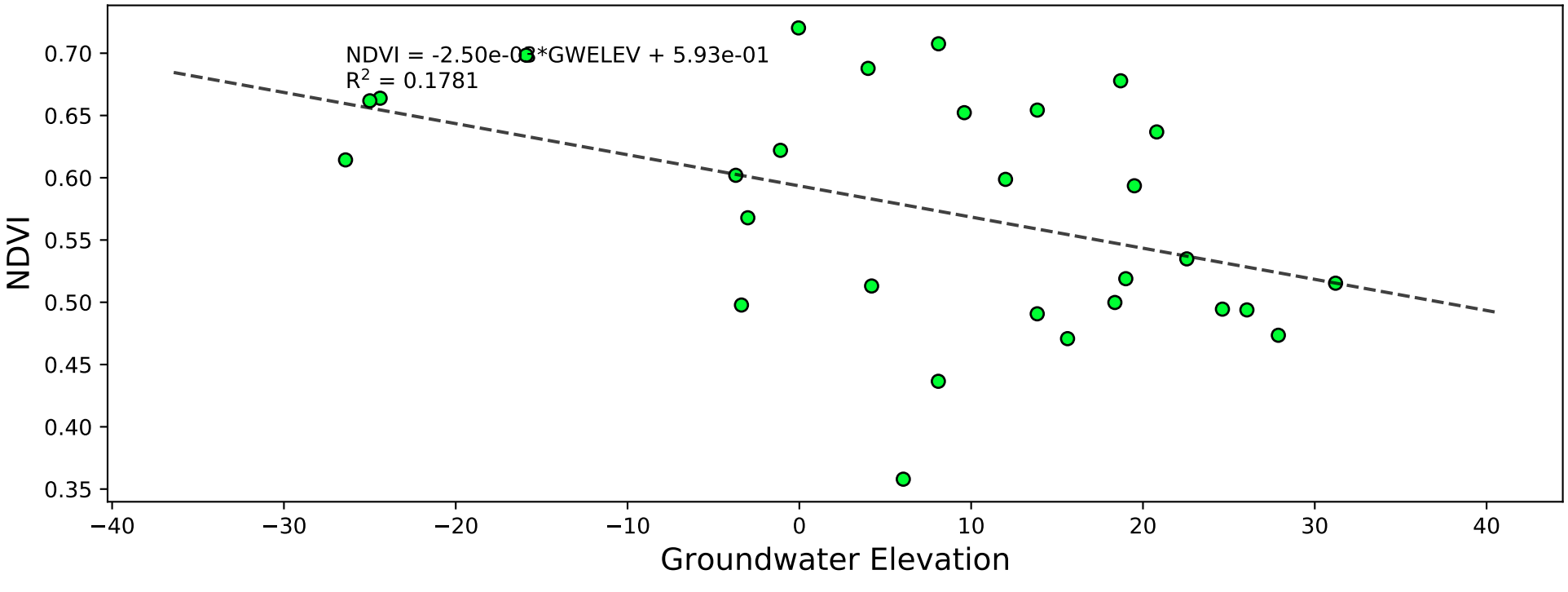

NDVI = 1.65e-03*GWELEV + 2.94e-01
R2 = 0.1541
NDVI
Groundwater Elevation
0.70
0.65
0.60
0.55
0.50
150
160
170
180
190
200
210
220
230

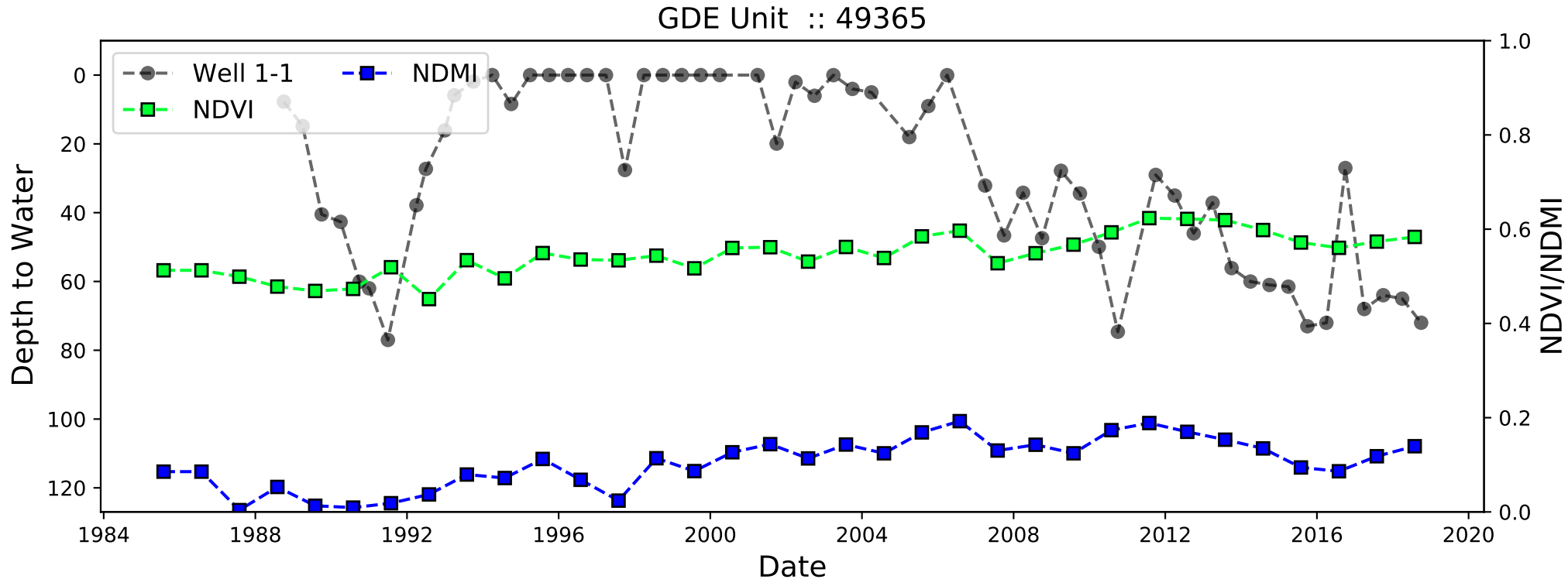
San Ysidro Creek GDE Evaluation Unit

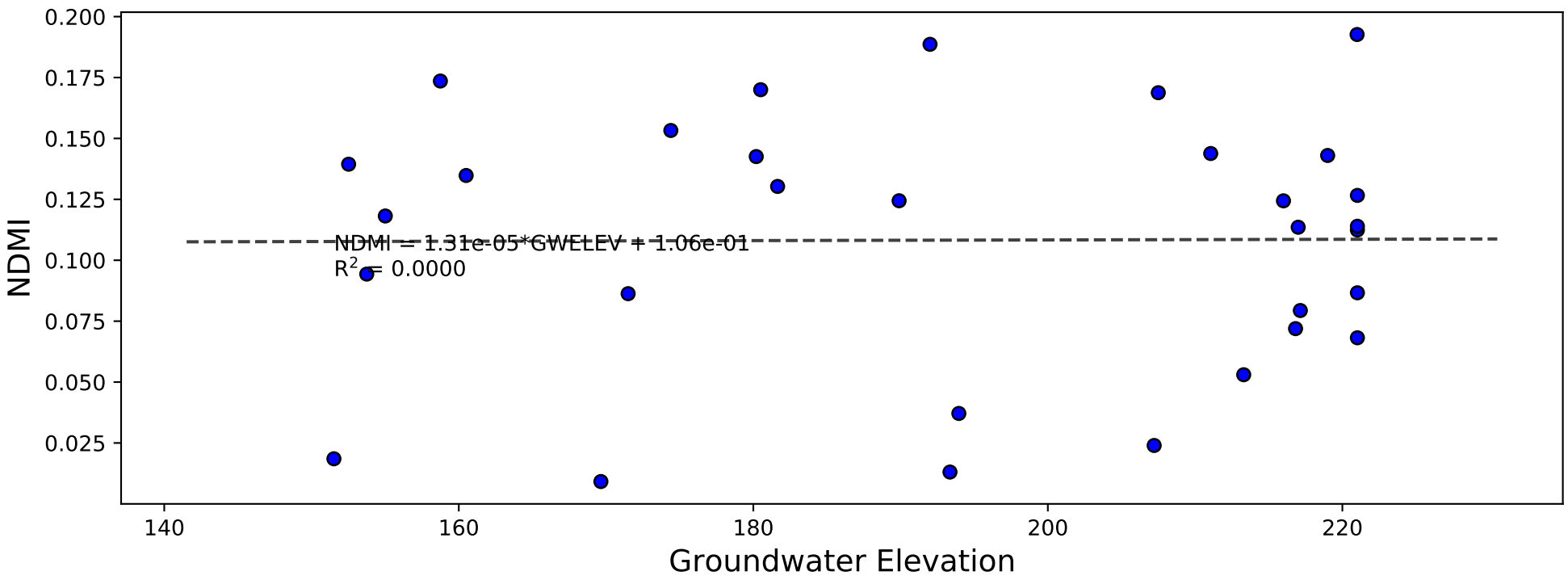
Groundwater Level and Habitat Health Correlations

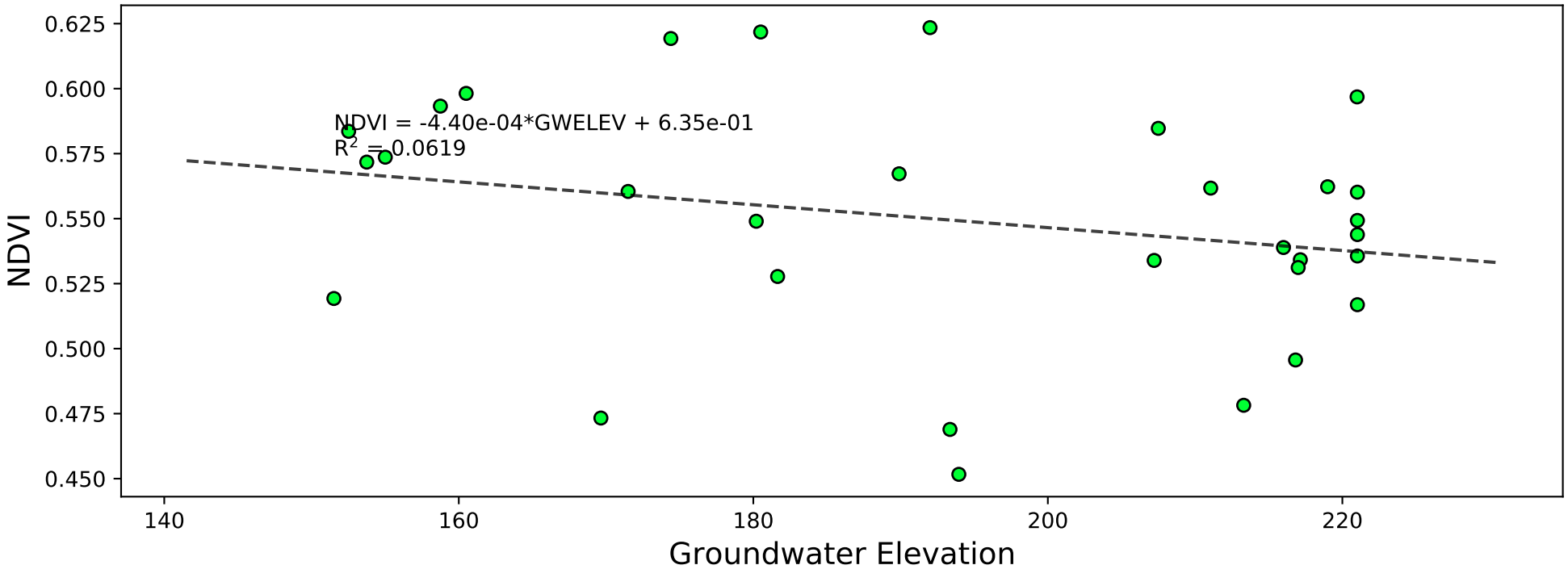

GDE Unit :: 49363
Well 3-22
NDMI
NDVI
Depth to Water
NDVI/NDMI
Date
1984
1988
1992
1996
2000
2004
2008
2012
2016
2020
40
60
80
100
120
140
160
1.0
0.8
0.6
0.4
0.2
0.0

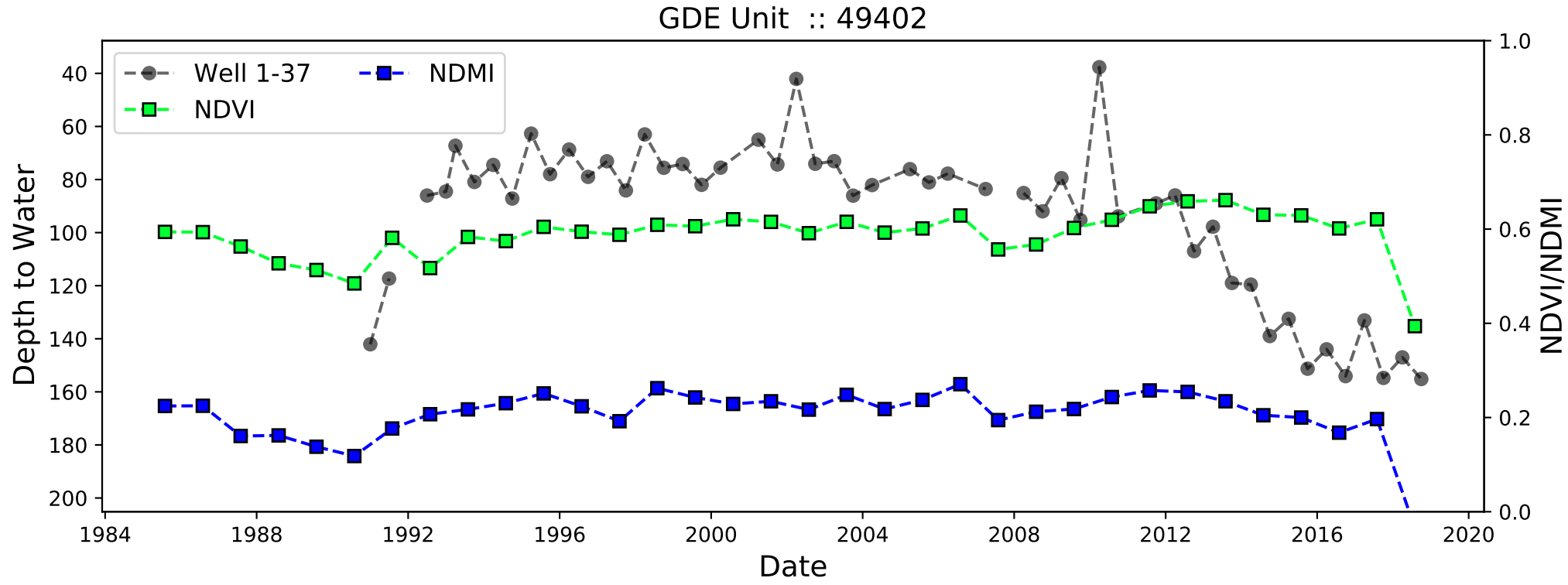

NDMI = -2.08e-03*GWELEV + 1.75e-01
R^2 = 0.1329
NDMI
Groundwater Elevation
0.30
0.25
0.20
0.15
0.10
0.05
−40
−30
−20
−10
0
10
20
30
40

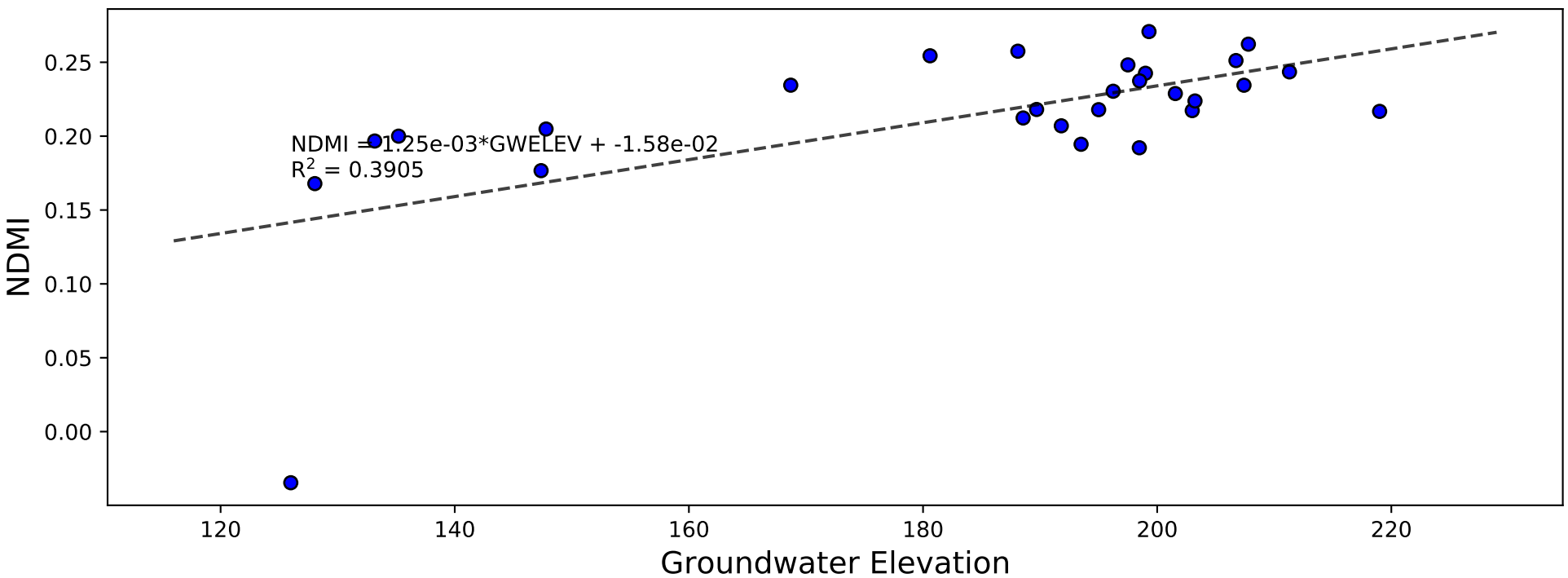

NDVI = -2.50e-03*GWELEV + 5.93e-01
R^2 = 0.1781
NDVI
Groundwater Elevation
0.70
0.65
0.60
0.55
0.50
0.45
0.40
0.35
−40
−30
−20
−10
0
10
20
30
40

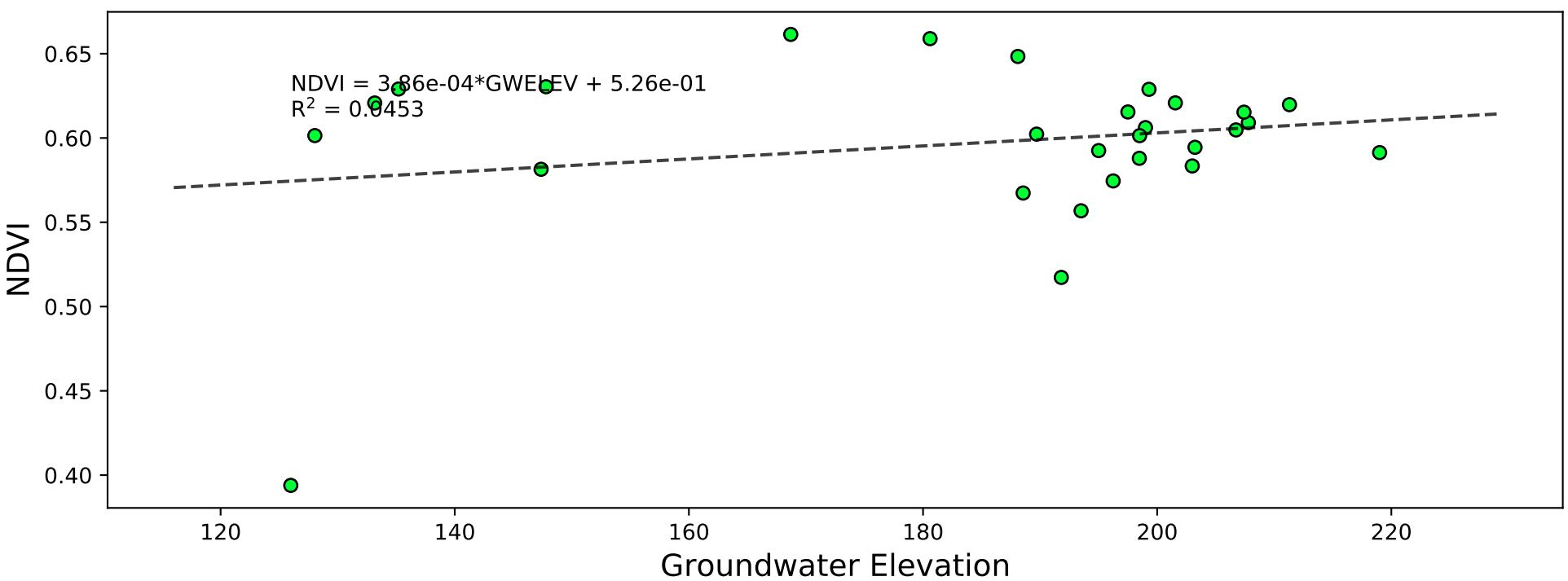

GDE Unit :: 49365
Well 1-1
NDMI
NDVI
Depth to Water
NDVI/NDMI
Date
0
20
40
60
80
100
120
1.0
0.8
0.6
0.4
0.2
0.0
1984
1988
1992
1996
2000
2004
2008
2012
2016
2020

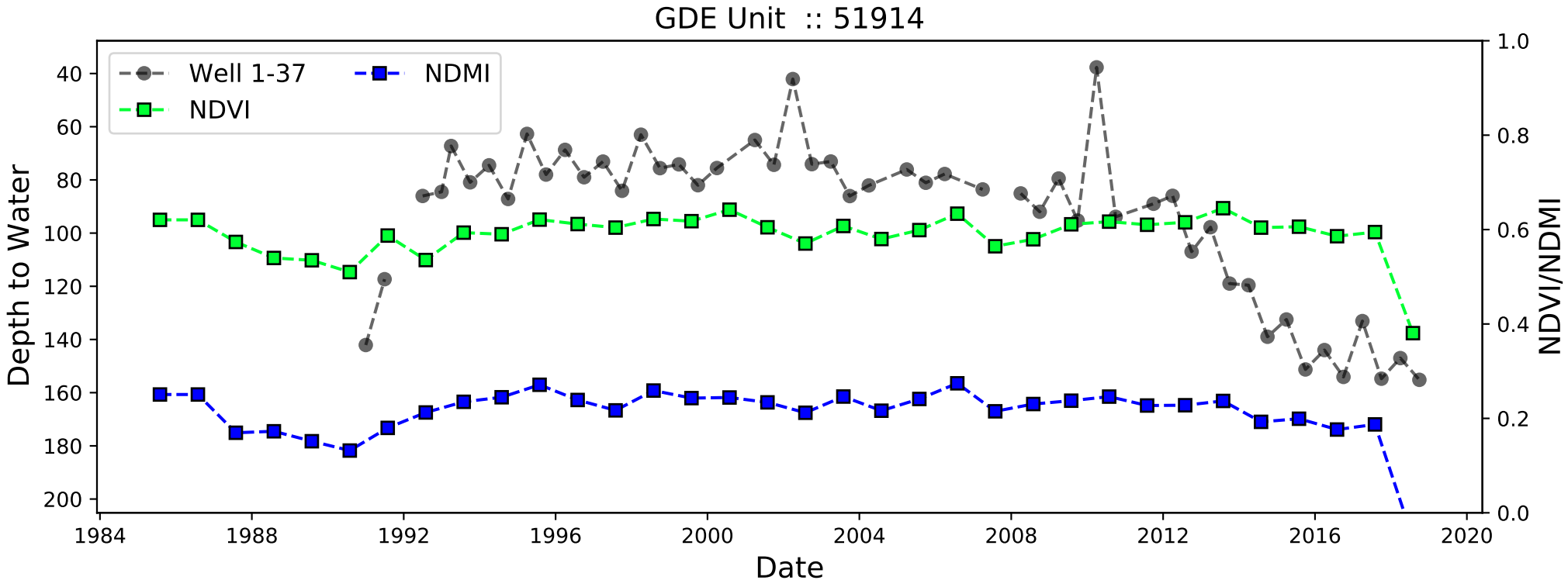

NDMI
Groundwater Elevation
NDMI = 1.31e-05*GWELEV + 1.06e-01
R2 = 0.0000
0.200
0.175
0.150
0.125
0.100
0.075
0.050
0.025
140
160
180
200
220

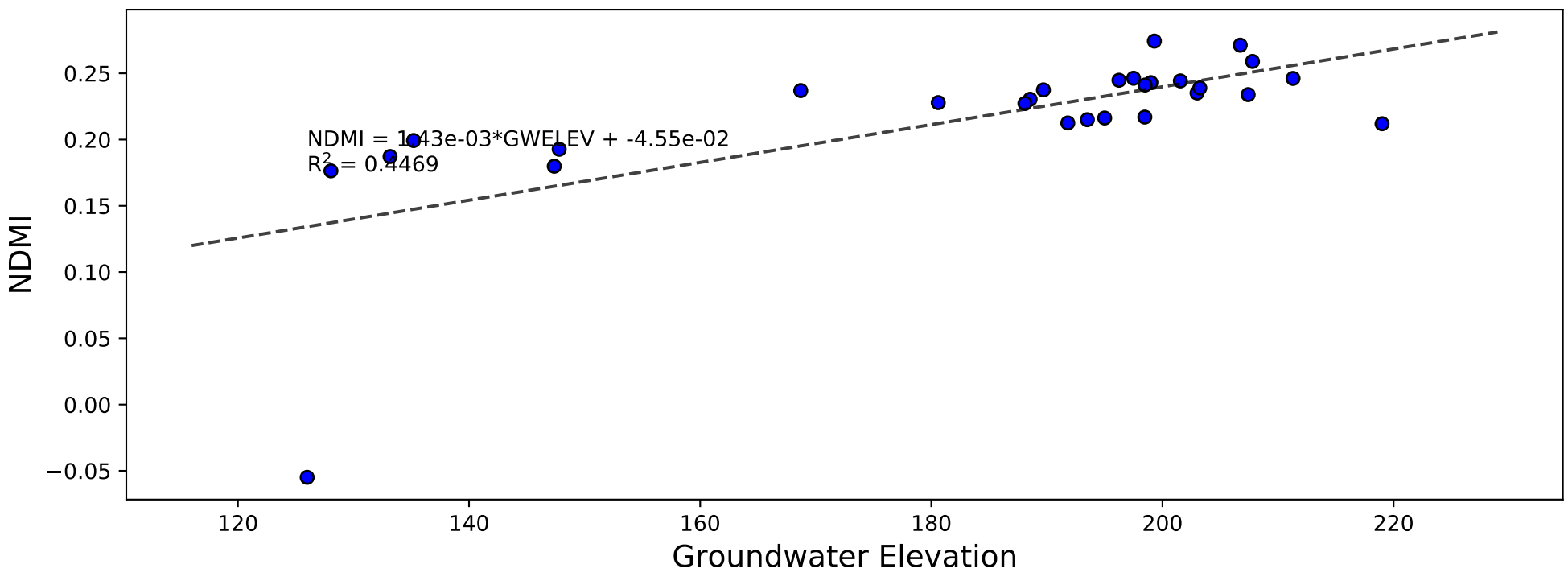

NDVI
Groundwater Elevation
NDVI = -4.40e-04*GWELEV + 6.35e-01
R2 = 0.0619
0.625
0.600
0.575
0.550
0.525
0.500
0.475
0.450
140
160
180
200
220

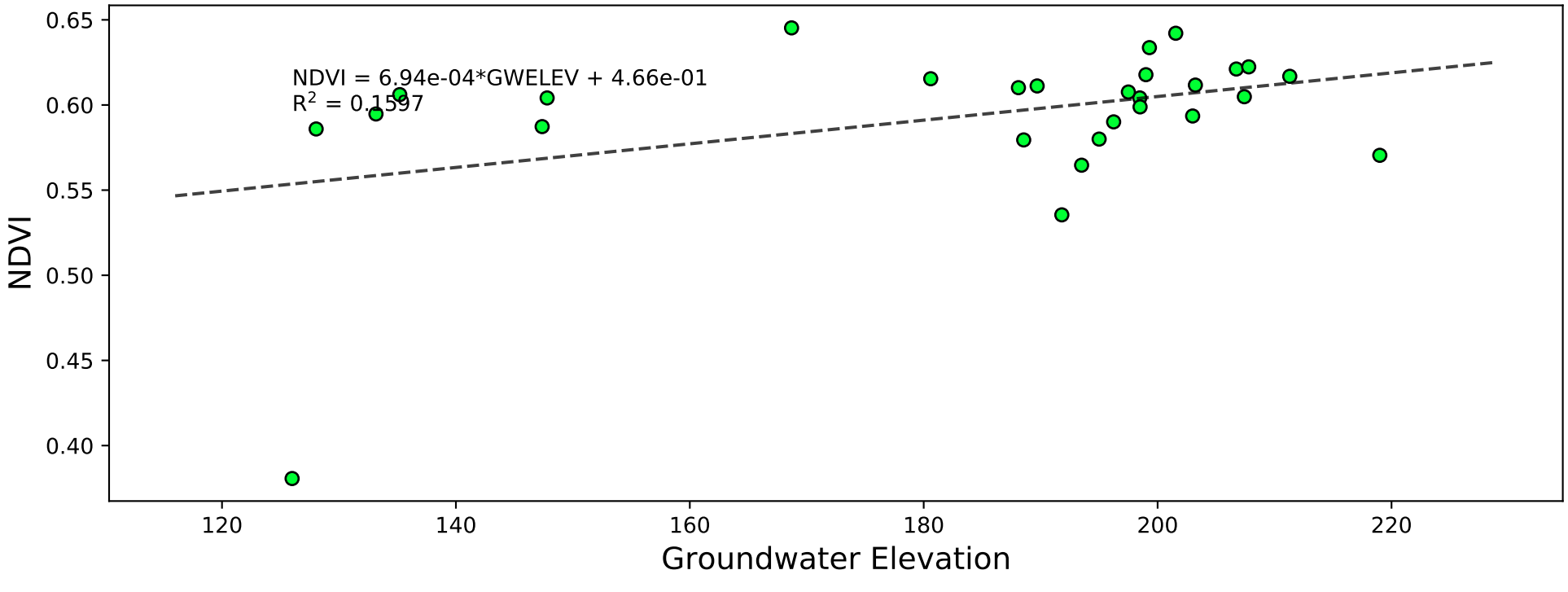

GDE Unit :: 49402
Well 1-37
NDMI
NDVI
Depth to Water
NDVI/NDMI
Date
40
60
80
100
120
140
160
180
200
1.0
0.8
0.6
0.4
0.2
0.0
1984
1988
1992
1996
2000
2004
2008
2012
2016
2020

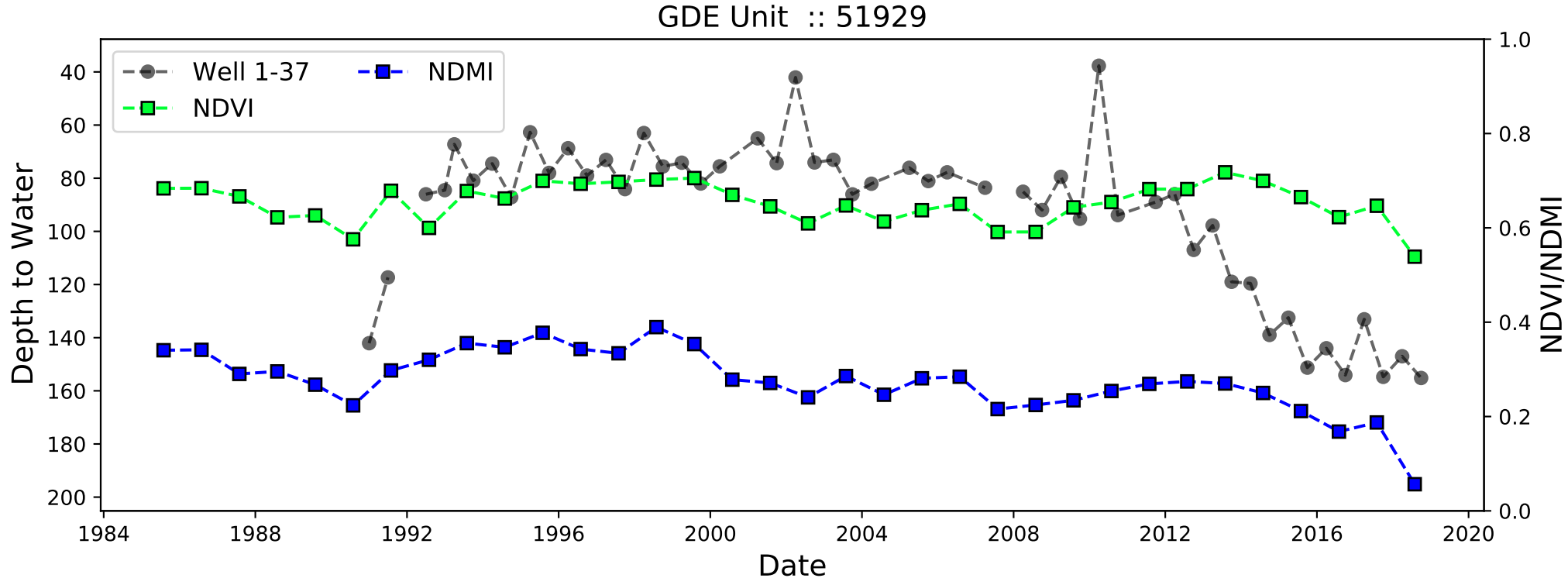

NDMI = 1.25e-03*GWELEV + -1.58e-02
R2 = 0.3905
NDMI
Groundwater Elevation
0.25
0.20
0.15
0.10
0.05
0.00
120
140
160
180
200
220

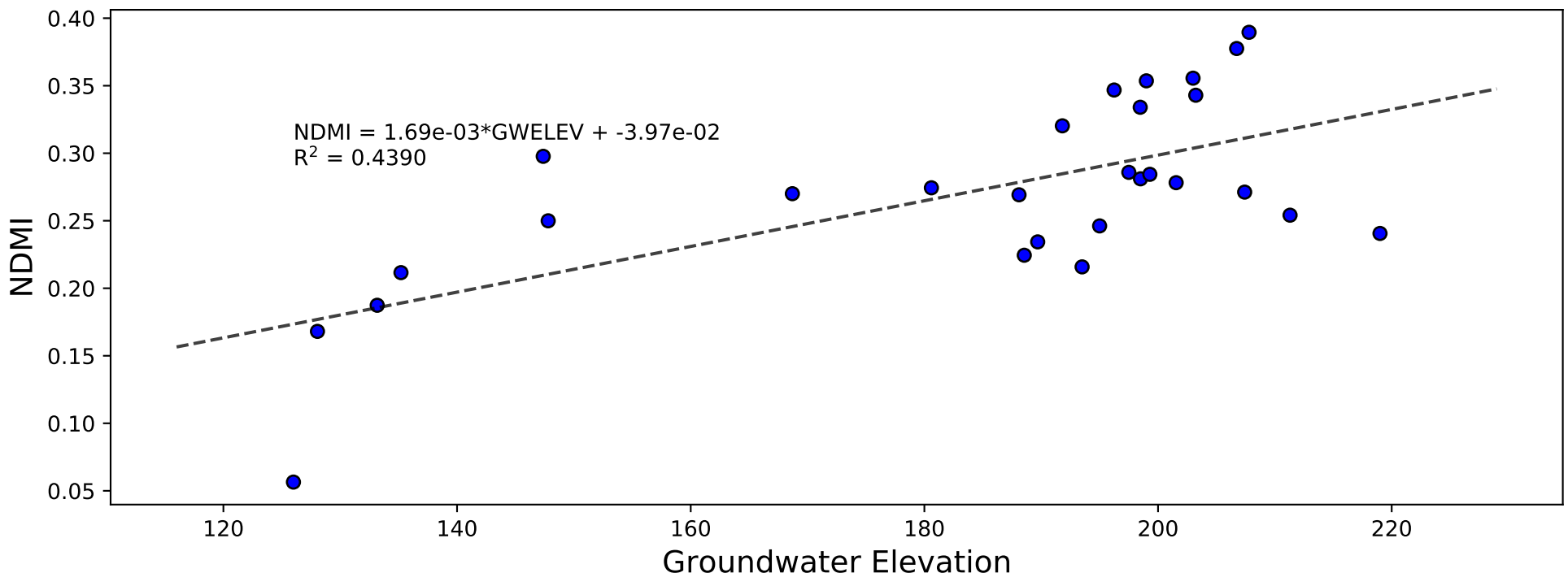

NDVI = 3.86e-04*GWELEV + 5.26e-01
R2 = 0.0453
NDVI
Groundwater Elevation
0.65
0.60
0.55
0.50
0.45
0.40
120
140
160
180
200
220

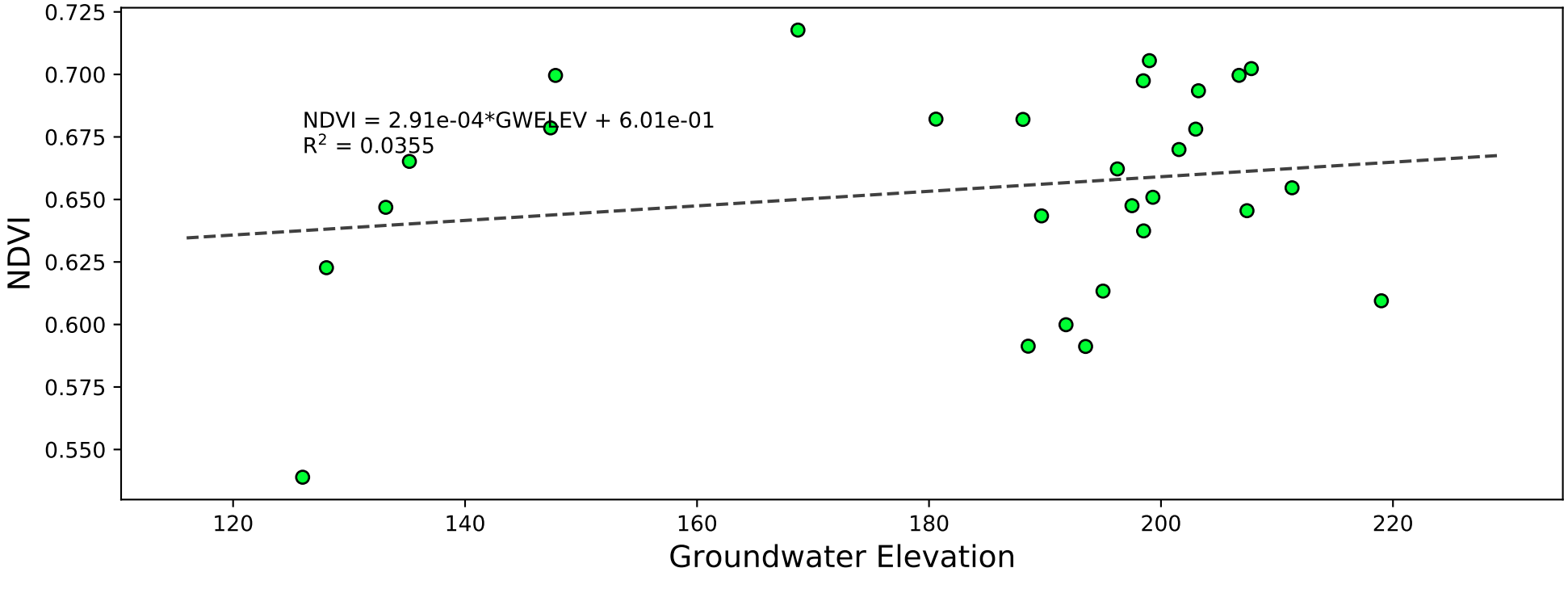

GDE Unit :: 51914
Well 1-37
NDMI
NDVI
Depth to Water
NDVI/NDMI
Date
1984
1988
1992
1996
2000
2004
2008
2012
2016
2020
40
60
80
100
120
140
160
180
200
1.0
0.8
0.6
0.4
0.2
0.0

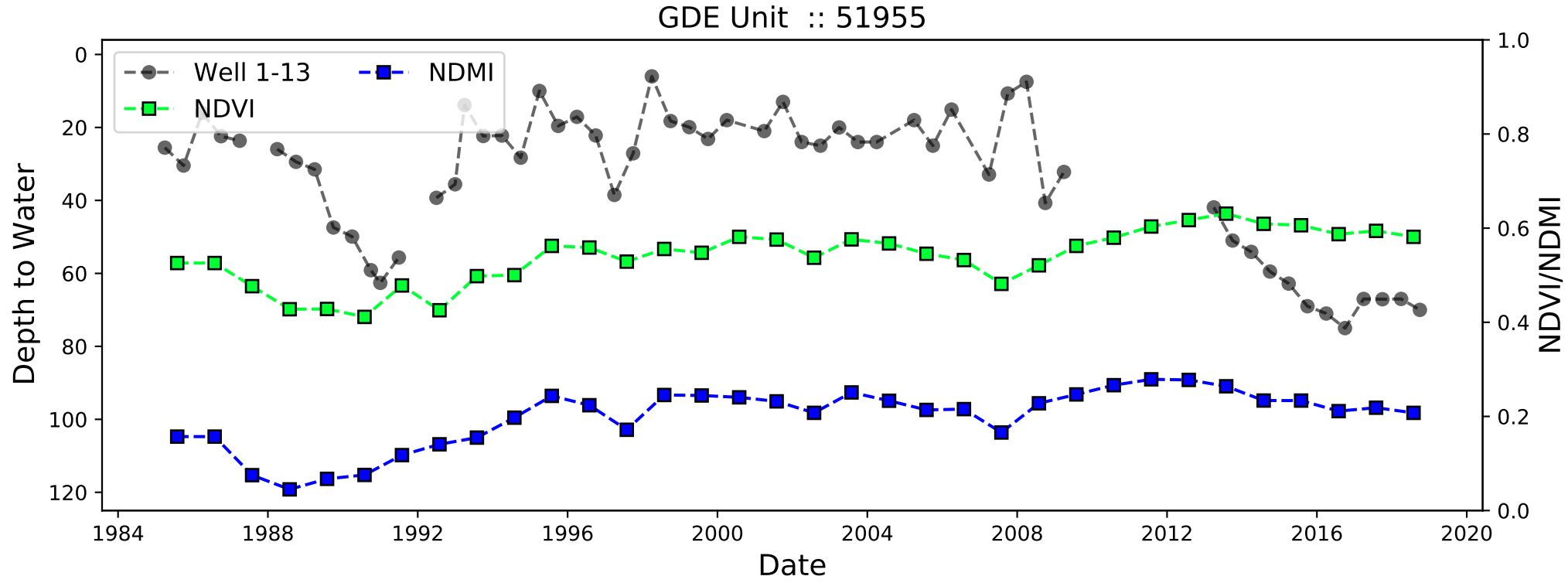

NDMI = 1.43e-03*GWELEV + -4.55e-02
R^2 = 0.4469
NDMI
Groundwater Elevation
0.25
0.20
0.15
0.10
0.05
0.00
−0.05
120
140
160
180
200
220

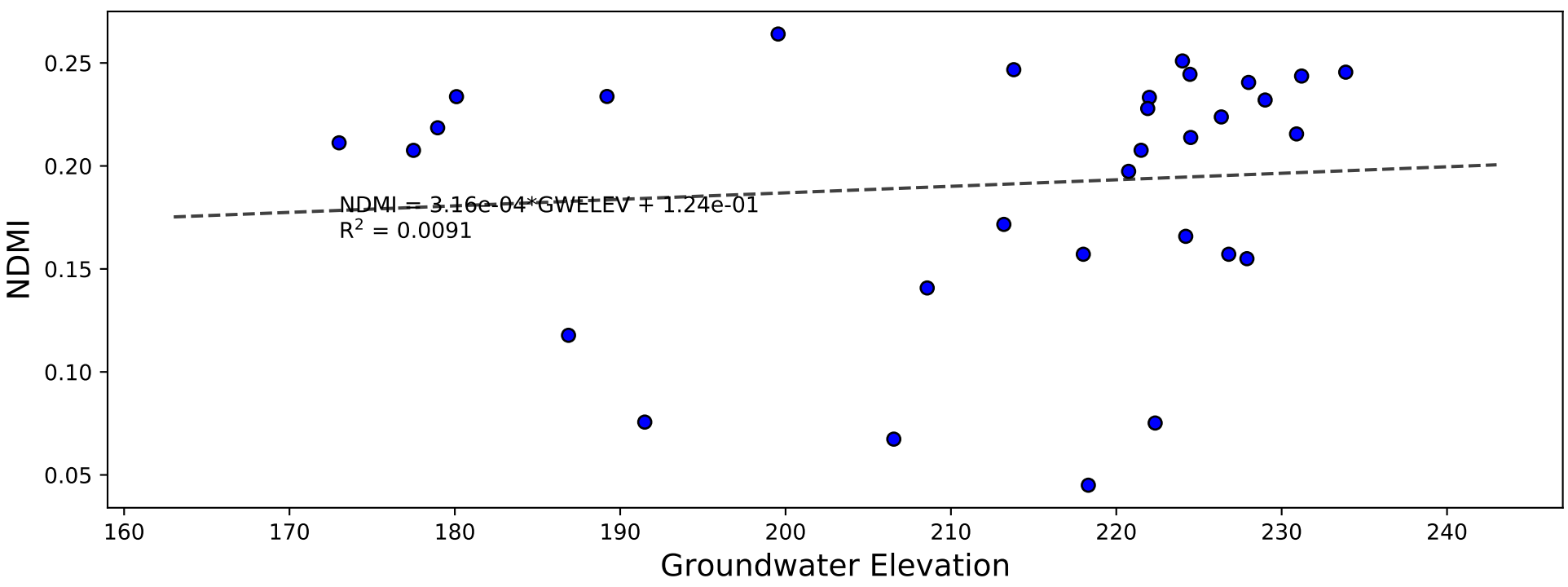

NDVI = 6.94e-04*GWELEV + 4.66e-01
R^2 = 0.1597
NDVI
Groundwater Elevation
0.65
0.60
0.55
0.50
0.45
0.40
120
140
160
180
200
220

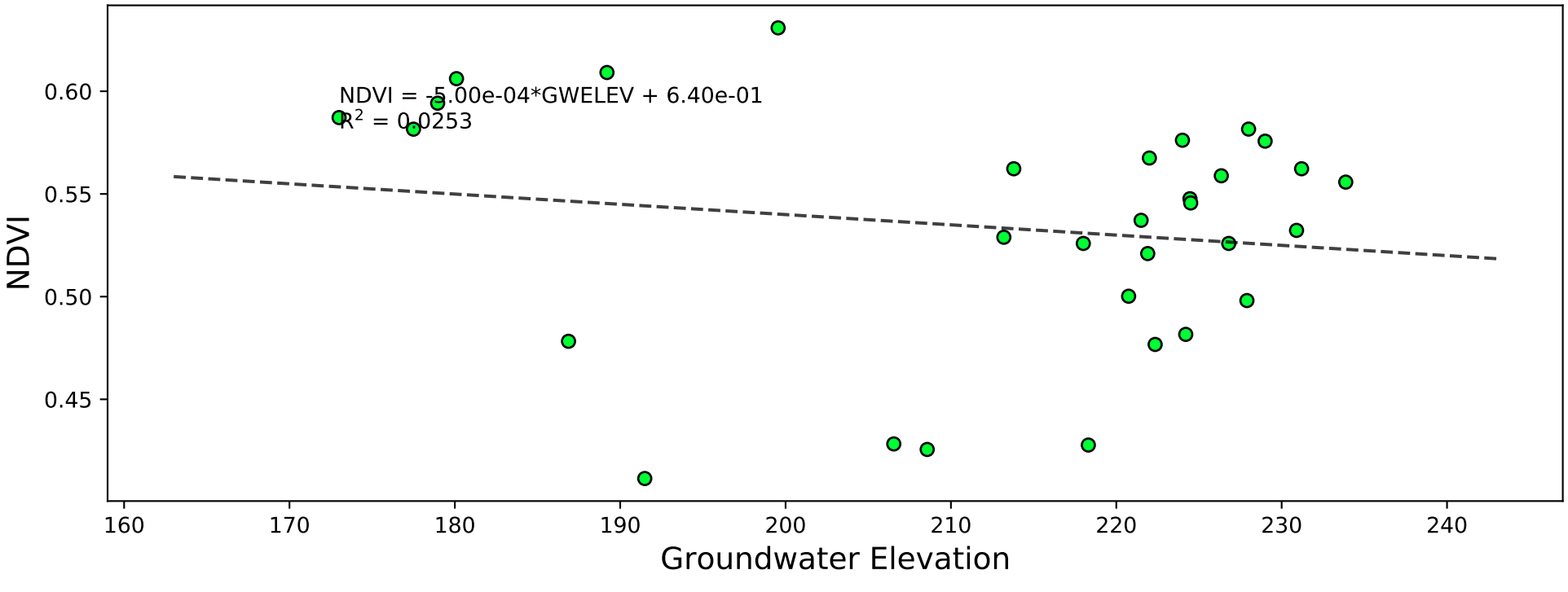

GDE Unit :: 51929
Well 1-37
NDMI
NDVI
Depth to Water
NDVI/NDMI
Date
1984
1988
1992
1996
2000
2004
2008
2012
2016
2020
40
60
80
100
120
140
160
180
200
1.0
0.8
0.6
0.4
0.2
0.0


NDMI = 1.69e-03*GWELEV + -3.97e-02
R2 = 0.4390
NDMI
Groundwater Elevation
0.40
0.35
0.30
0.25
0.20
0.15
0.10
0.05
120
140
160
180
200
220


NDVI = 2.91e-04*GWELEV + 6.01e-01
R2 = 0.0355
NDVI
Groundwater Elevation
0.725
0.700
0.675
0.650
0.625
0.600
0.575
0.550
120
140
160
180
200
220

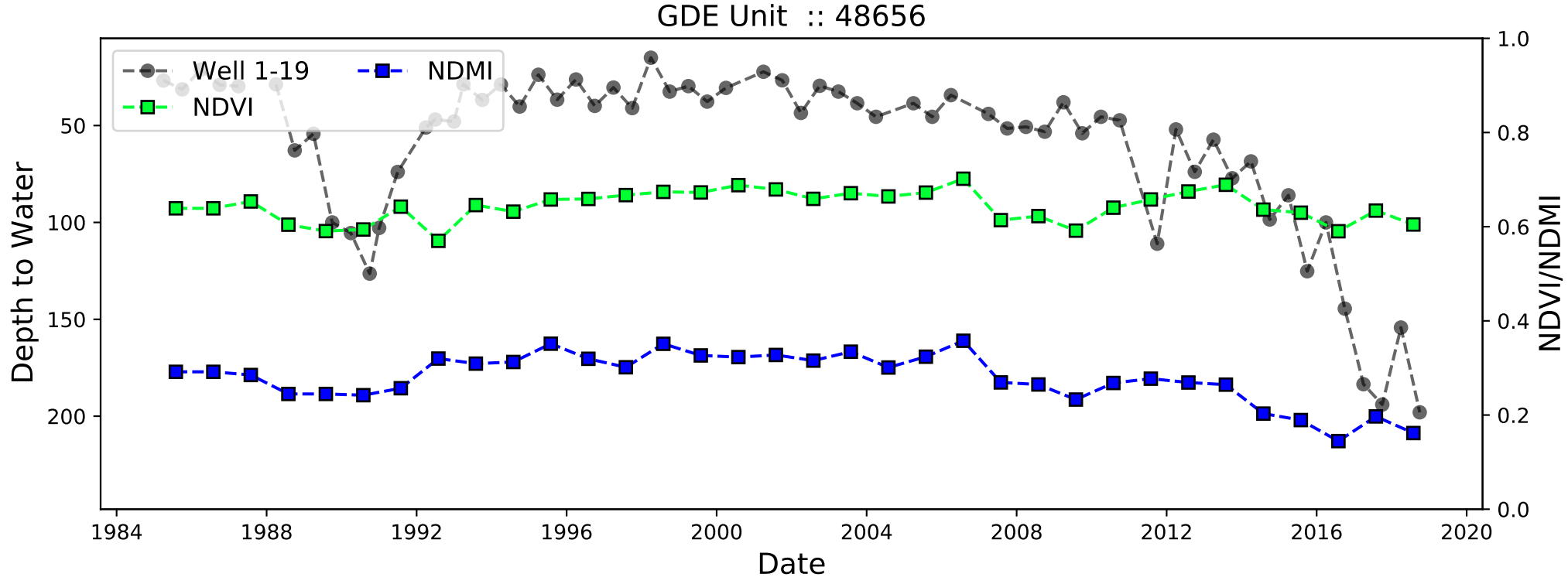

GDE Unit :: 51955
Well 1-13
NDMI
NDVI
Depth to Water
NDVI/NDMI
Date
0
20
40
60
80
100
120
1.0
0.8
0.6
0.4
0.2
0.0
1984
1988
1992
1996
2000
2004
2008
2012
2016
2020

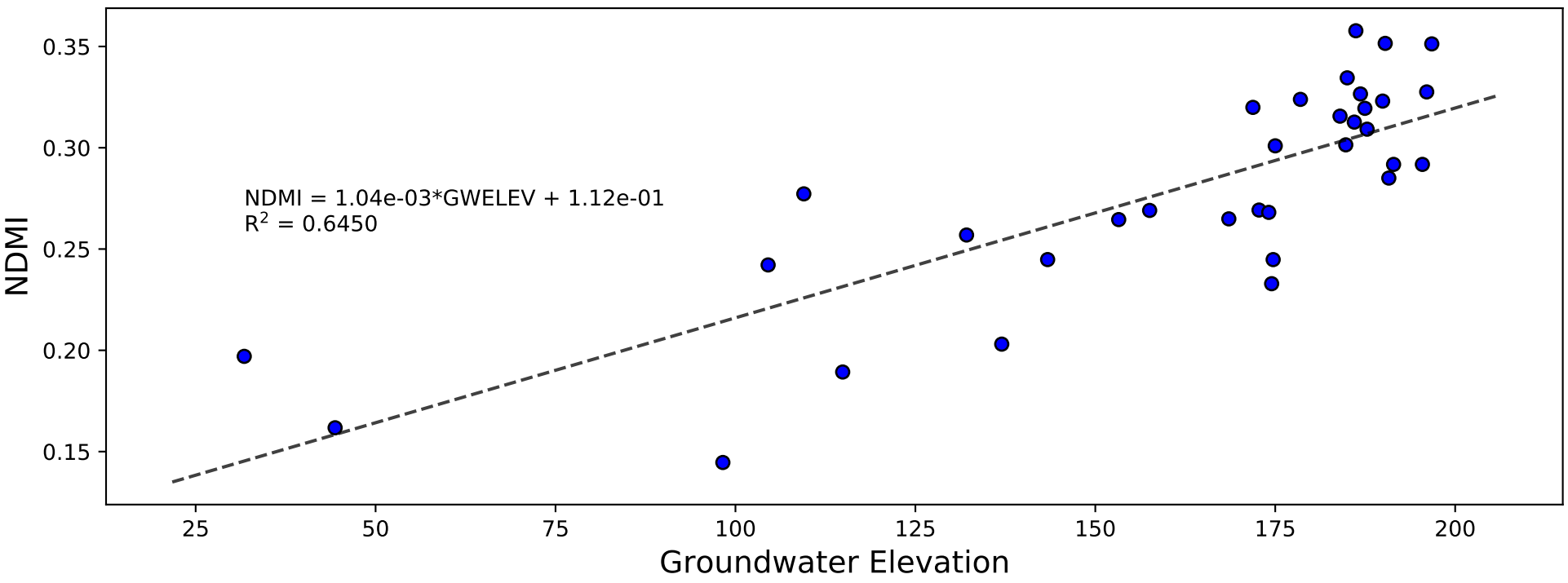

NDMI = 3.16e-04*GWELEV + 1.24e-01
R2 = 0.0091
NDMI
Groundwater Elevation
0.25
0.20
0.15
0.10
0.05
160
170
180
190
200
210
220
230
240

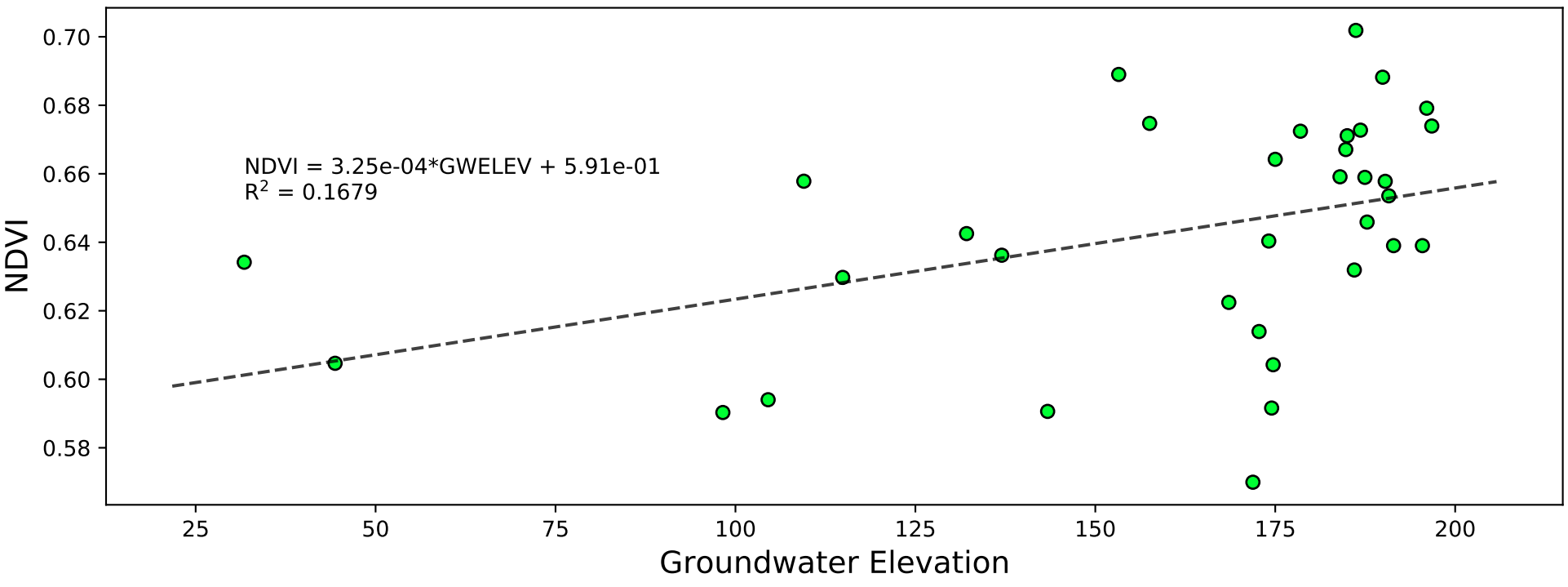

NDVI = -5.00e-04*GWELEV + 6.40e-01
R2 = 0.0253
NDVI
Groundwater Elevation
0.60
0.55
0.50
0.45
160
170
180
190
200
210
220
230
240

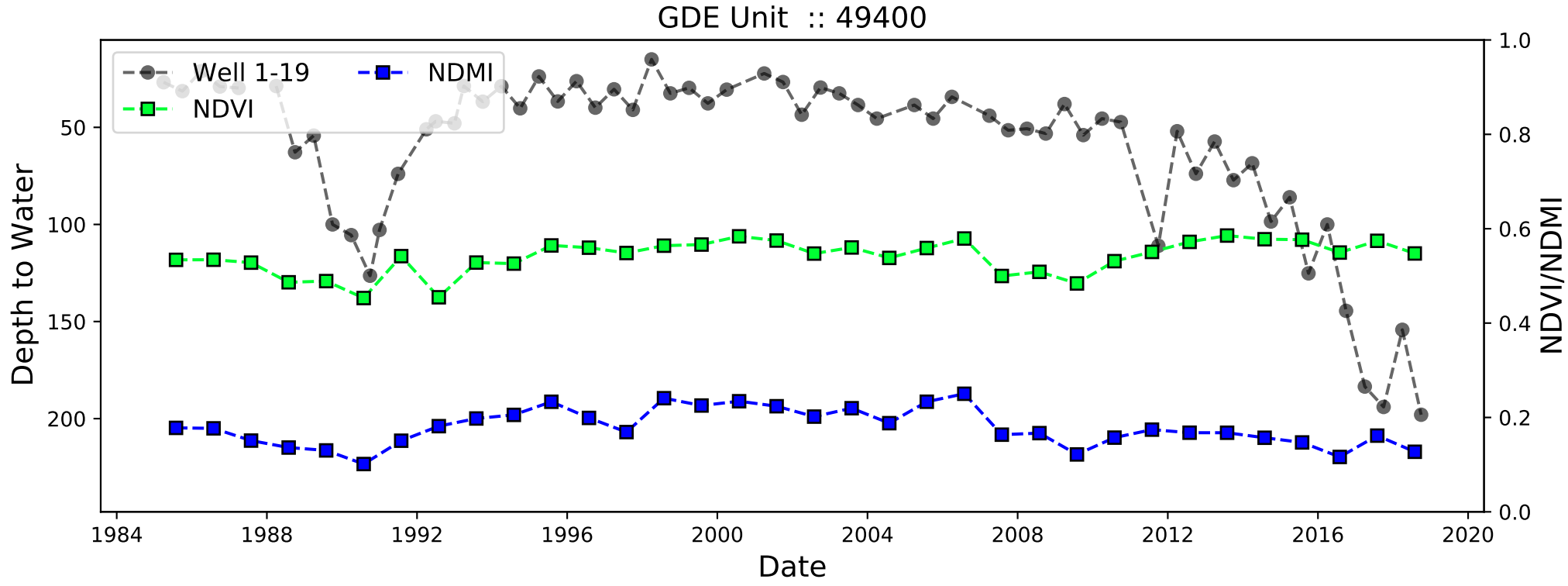
Sycamore Creek GDE Evaluation Unit

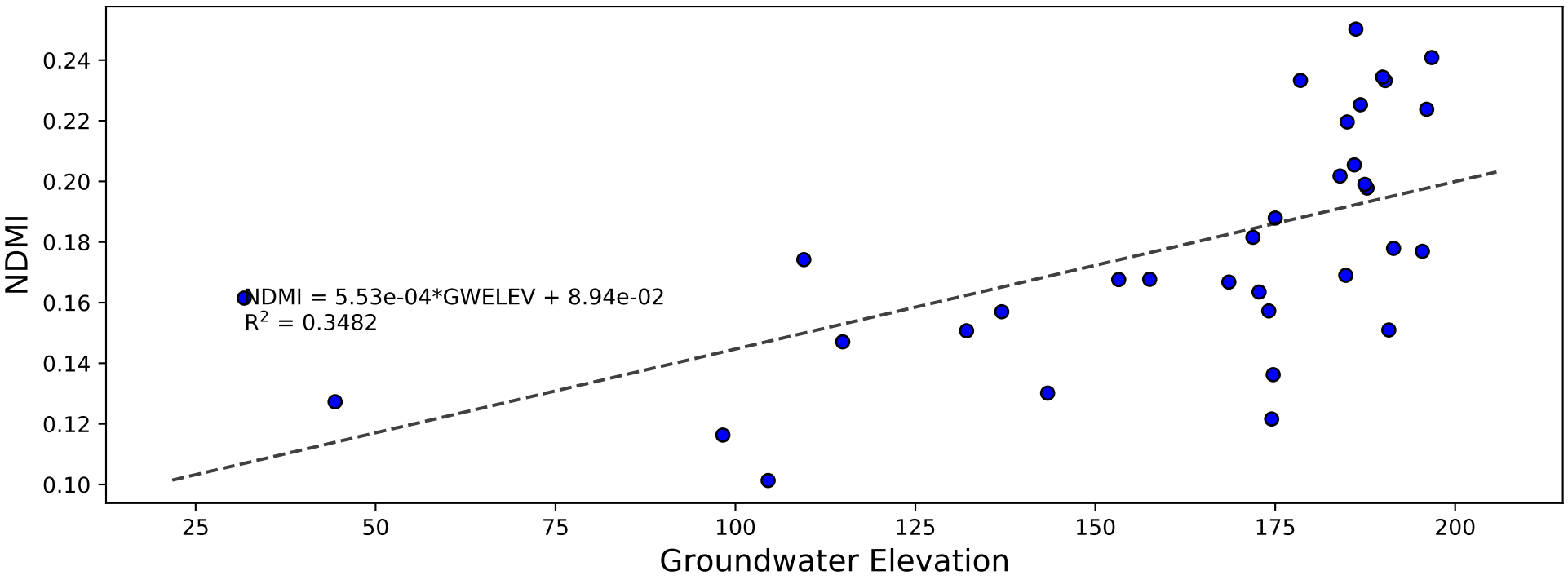
Groundwater Level and Habitat Health Correlations

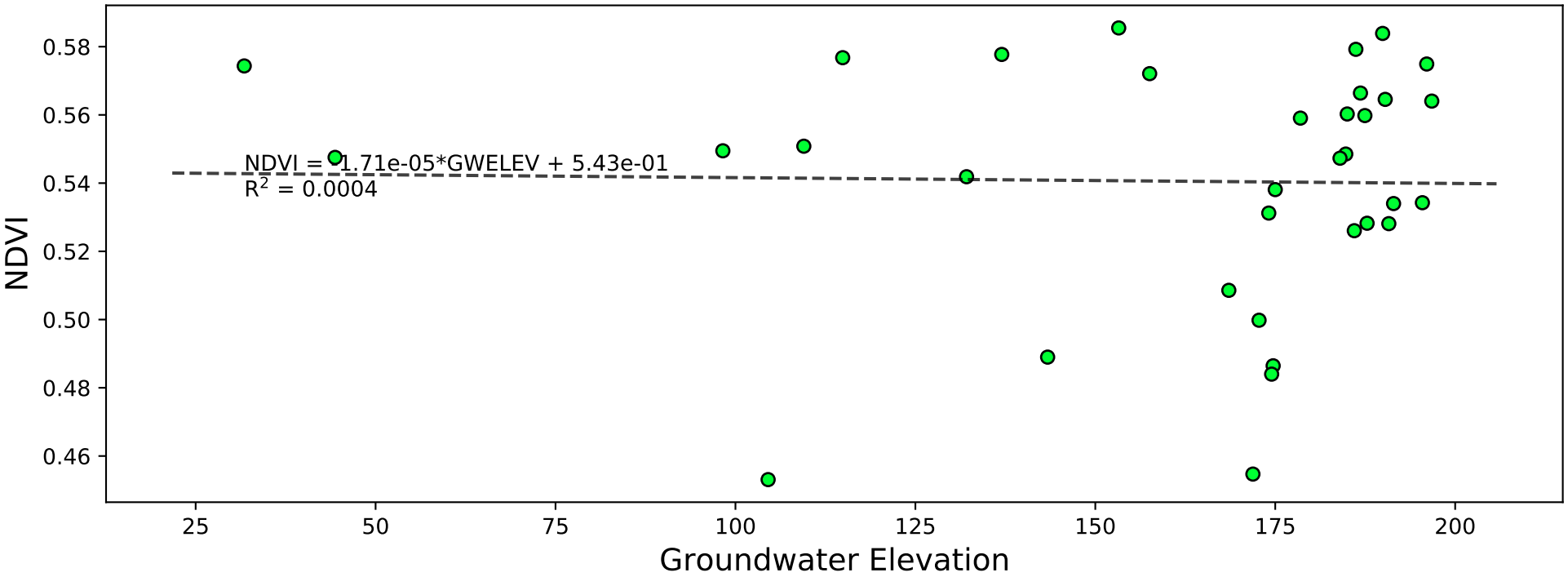

GDE Unit :: 48656
Well 1-19
NDMI
NDVI
Depth to Water
NDVI/NDMI
Date
50
100
150
200
0.0
0.2
0.4
0.6
0.8
1.0
1984
1988
1992
1996
2000
2004
2008
2012
2016
2020

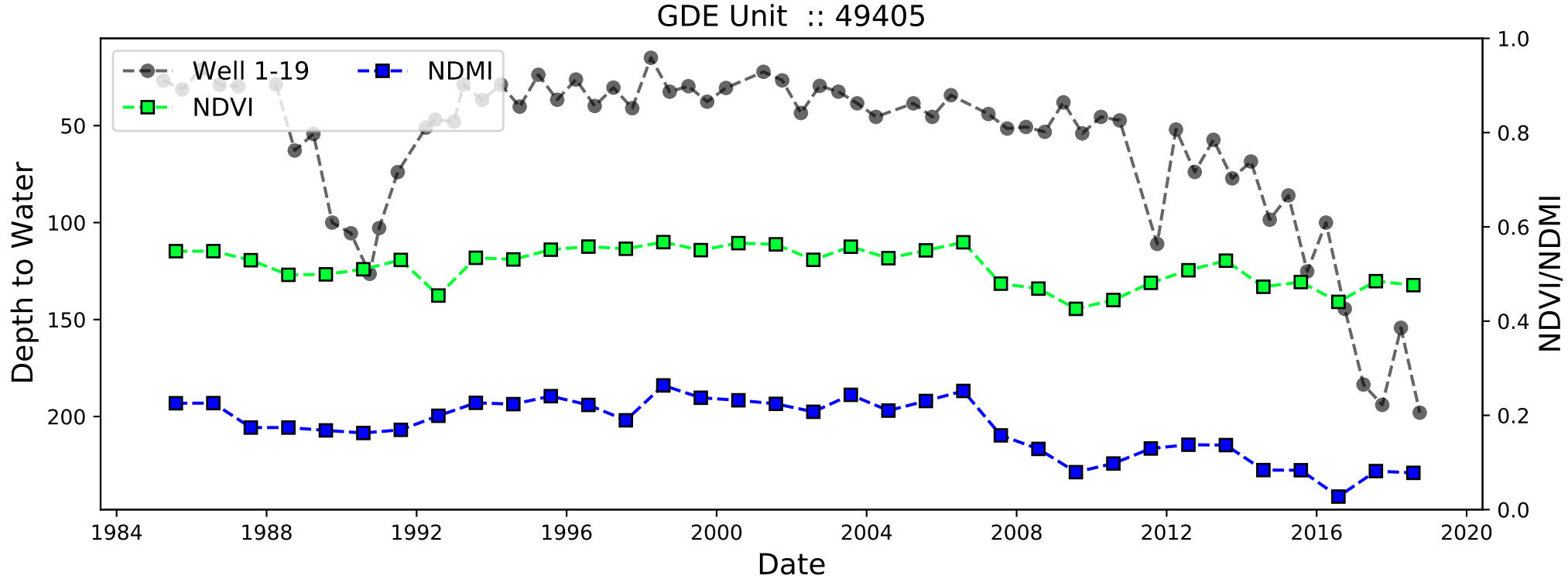

NDMI = 1.04e-03*GWELEV + 1.12e-01
R^2 = 0.6450
NDMI
Groundwater Elevation
0.15
0.20
0.25
0.30
0.35
25
50
75
100
125
150
175
200

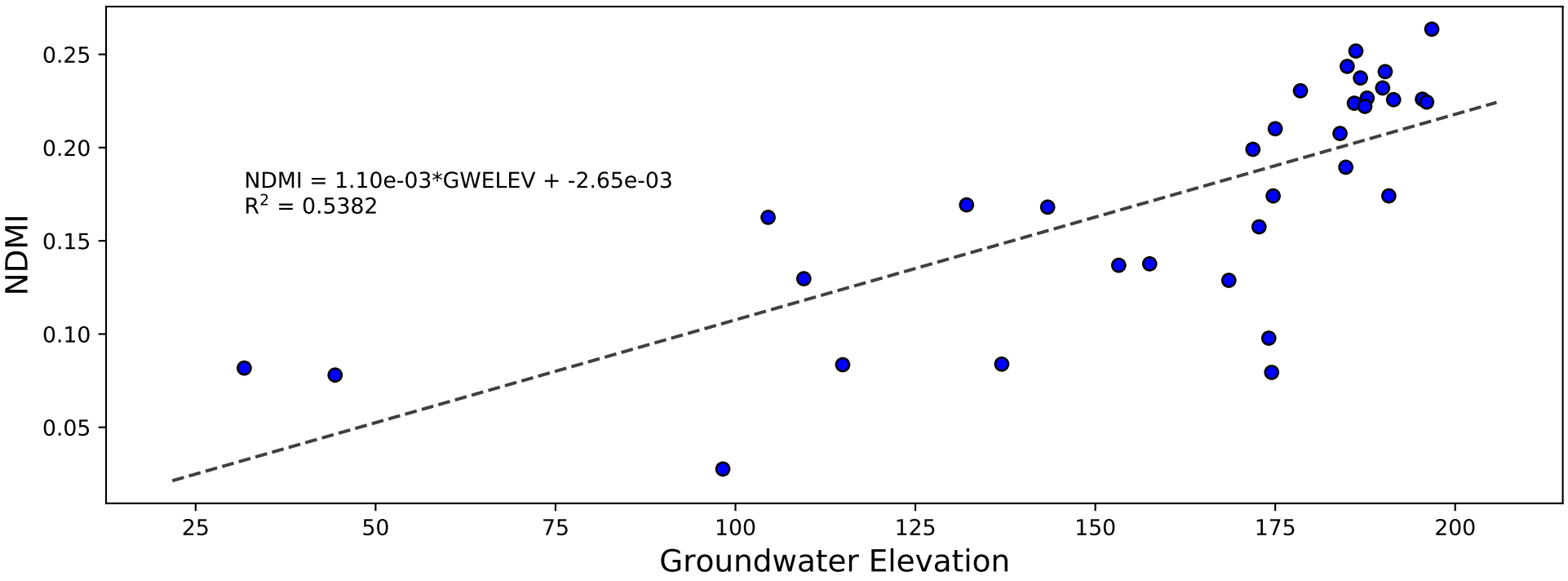

NDVI = 3.25e-04*GWELEV + 5.91e-01
R^2 = 0.1679
NDVI
Groundwater Elevation
0.58
0.60
0.62
0.64
0.66
0.68
0.70
25
50
75
100
125
150
175
200

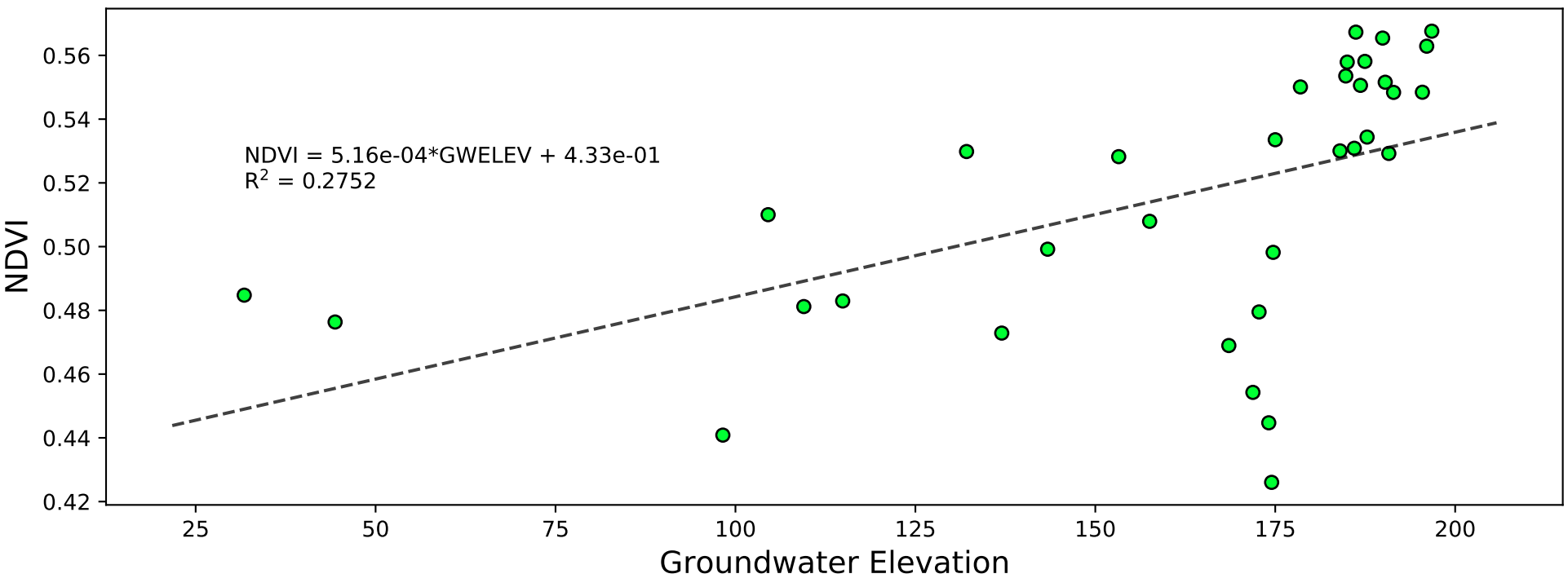

GDE Unit :: 49400
Well 1-19
NDMI
NDVI
Depth to Water
NDVI/NDMI
Date
1984
1988
1992
1996
2000
2004
2008
2012
2016
2020
50
100
150
200
0.0
0.2
0.4
0.6
0.8
1.0

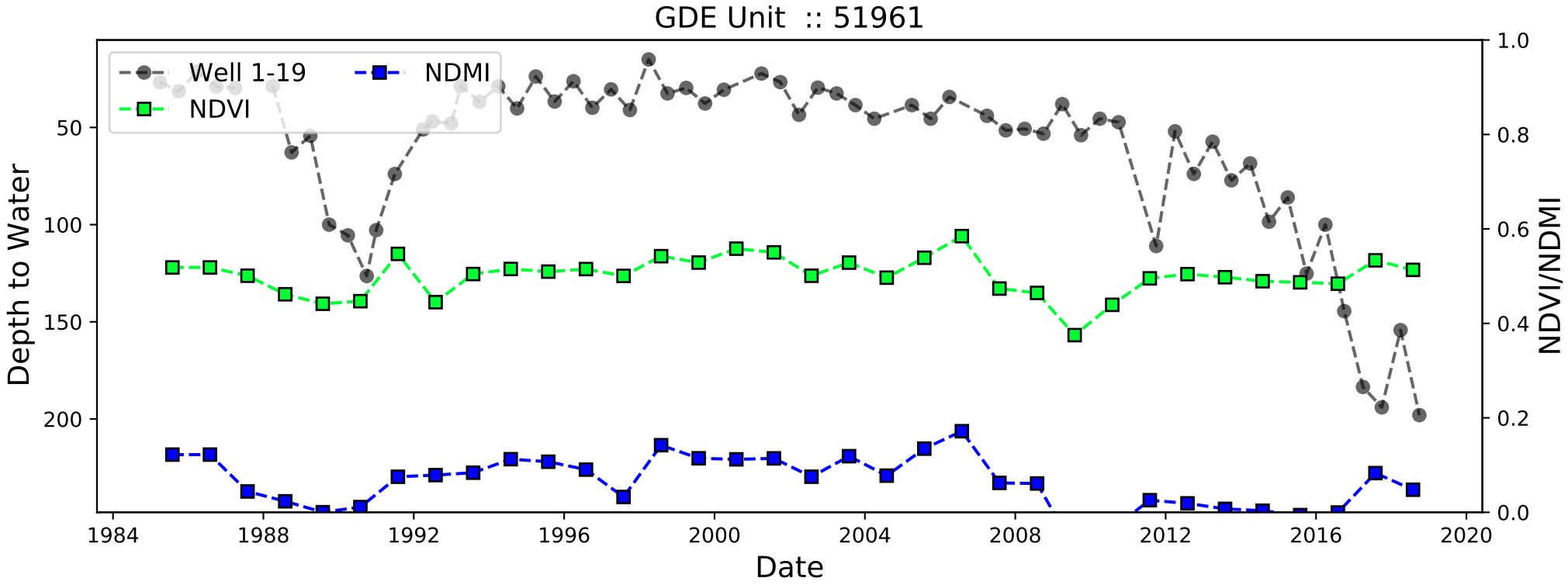

NDMI = 5.53e-04*GWELEV + 8.94e-02
R2 = 0.3482
NDMI
Groundwater Elevation
0.10
0.12
0.14
0.16
0.18
0.20
0.22
0.24
25
50
75
100
125
150
175
200

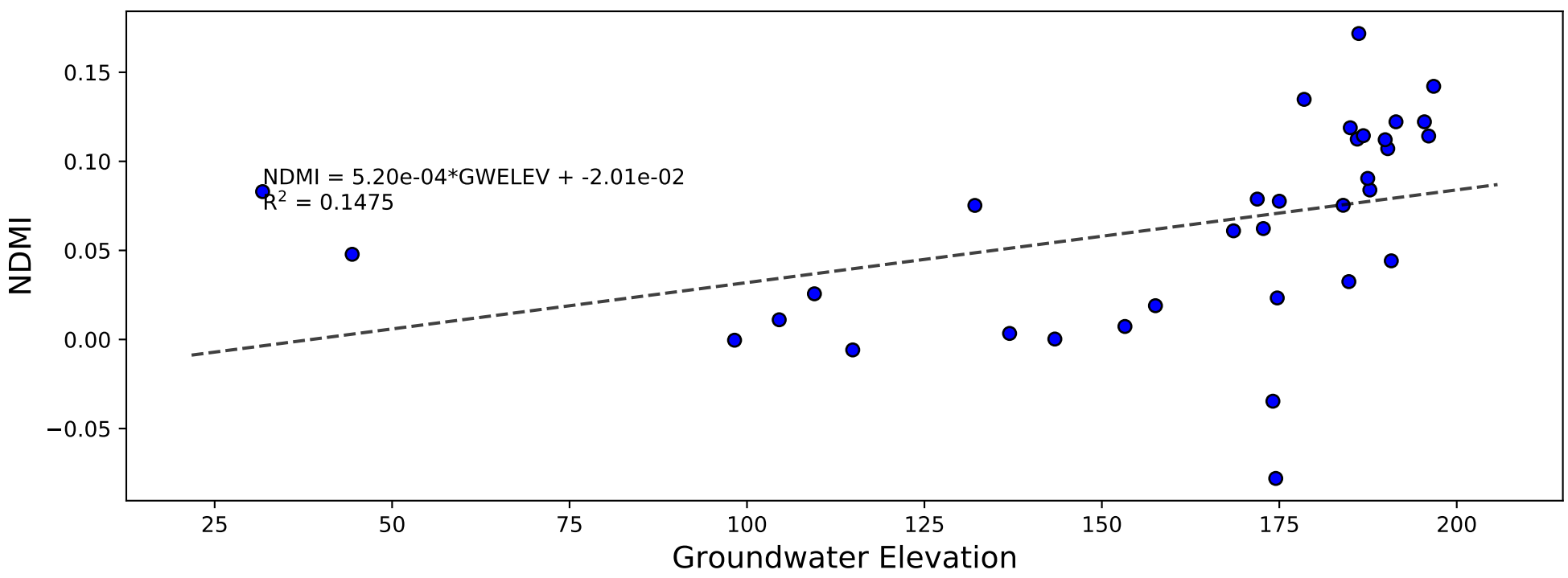

NDVI = -1.71e-05*GWELEV + 5.43e-01
R2 = 0.0004
NDVI
Groundwater Elevation
0.46
0.48
0.50
0.52
0.54
0.56
0.58
25
50
75
100
125
150
175
200

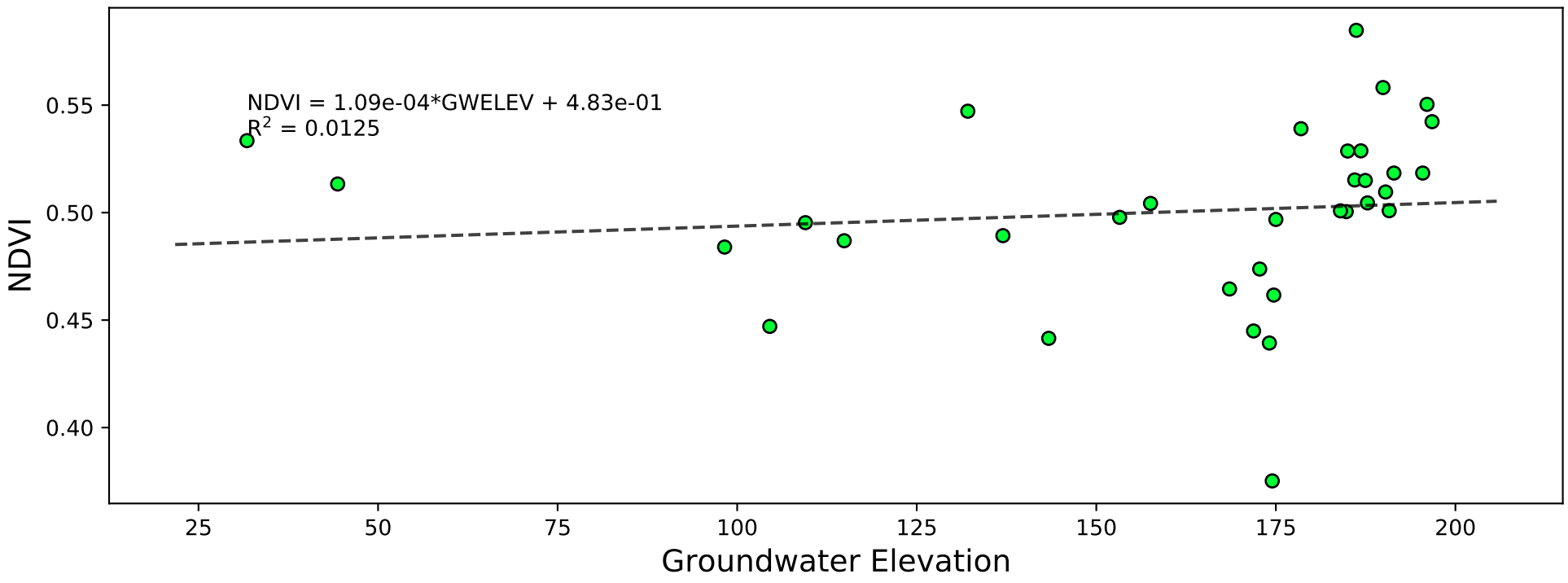

GDE Unit :: 49405
Well 1-19
NDMI
NDVI
Depth to Water
NDVI/NDMI
Date
1984
1988
1992
1996
2000
2004
2008
2012
2016
2020
50
100
150
200
1.0
0.8
0.6
0.4
0.2
0.0

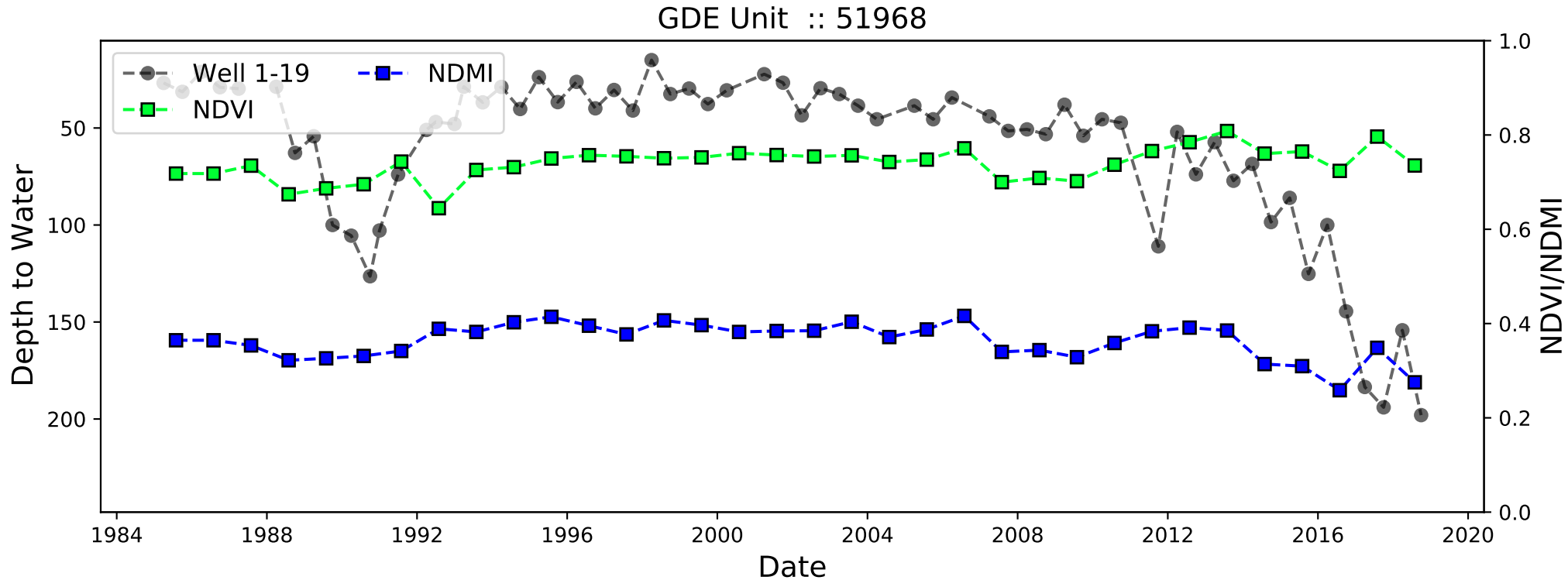

NDMI = 1.10e-03*GWELEV + -2.65e-03
R^2 = 0.5382
NDMI
Groundwater Elevation
0.25
0.20
0.15
0.10
0.05
25
50
75
100
125
150
175
200

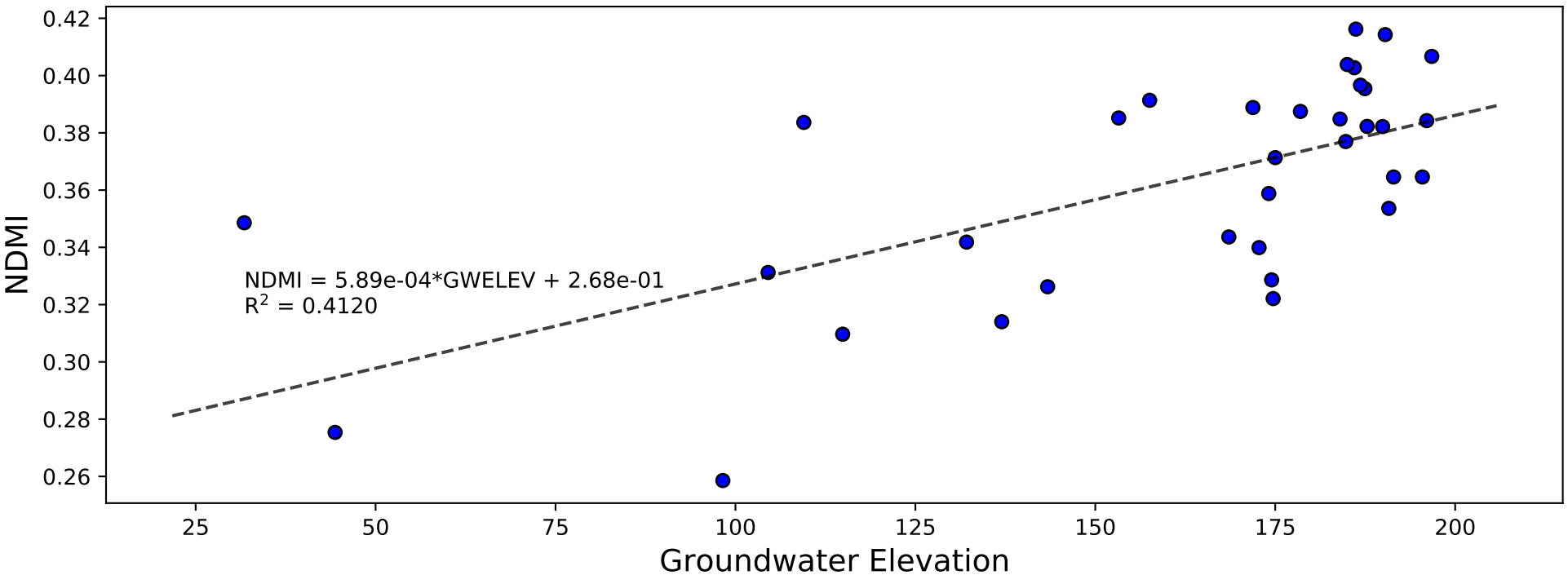

NDVI = 5.16e-04*GWELEV + 4.33e-01
R^2 = 0.2752
NDVI
Groundwater Elevation
0.56
0.54
0.52
0.50
0.48
0.46
0.44
0.42
25
50
75
100
125
150
175
200

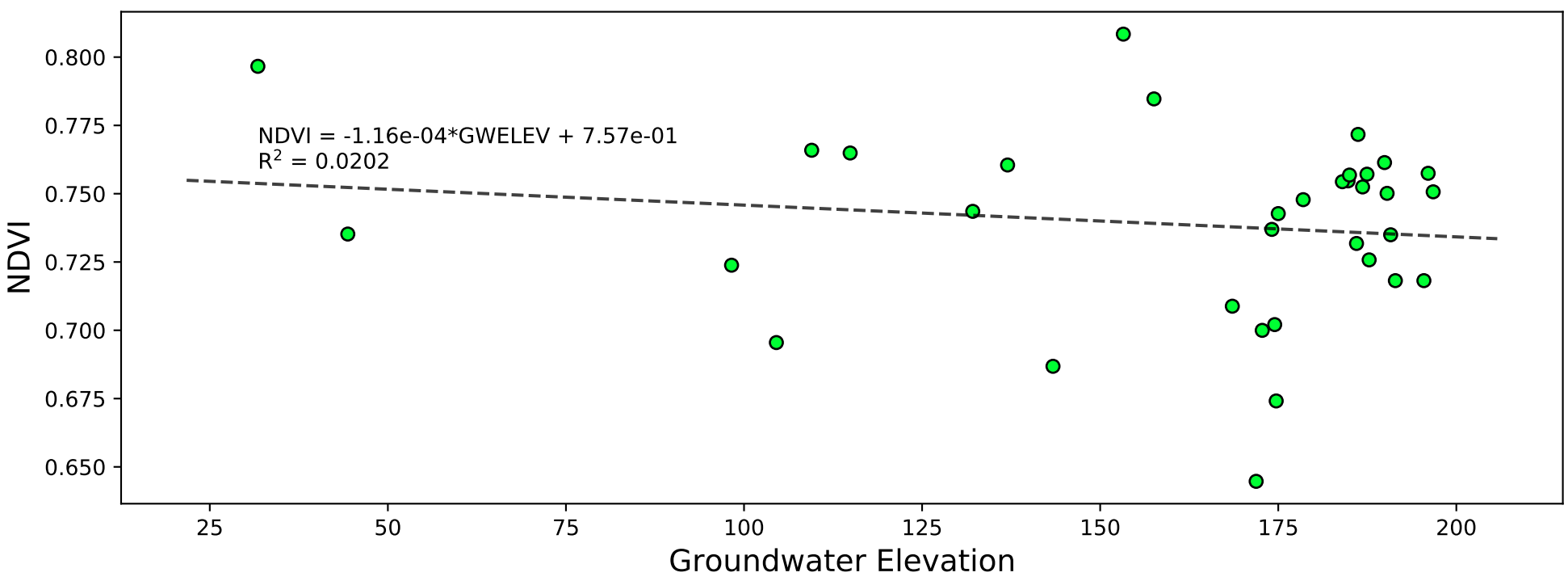

GDE Unit :: 51961
Well 1-19
NDMI
NDVI
Depth to Water
NDVI/NDMI
Date
1984
1988
1992
1996
2000
2004
2008
2012
2016
2020
50
100
150
200
1.0
0.8
0.6
0.4
0.2
0.0


NDMI = 5.20e-04*GWELEV + -2.01e-02
R^2 = 0.1475
NDMI
Groundwater Elevation
0.15
0.10
0.05
0.00
−0.05
25
50
75
100
125
150
175
200


NDVI = 1.09e-04*GWELEV + 4.83e-01
R^2 = 0.0125
NDVI
Groundwater Elevation
0.55
0.50
0.45
0.40
25
50
75
100
125
150
175
200

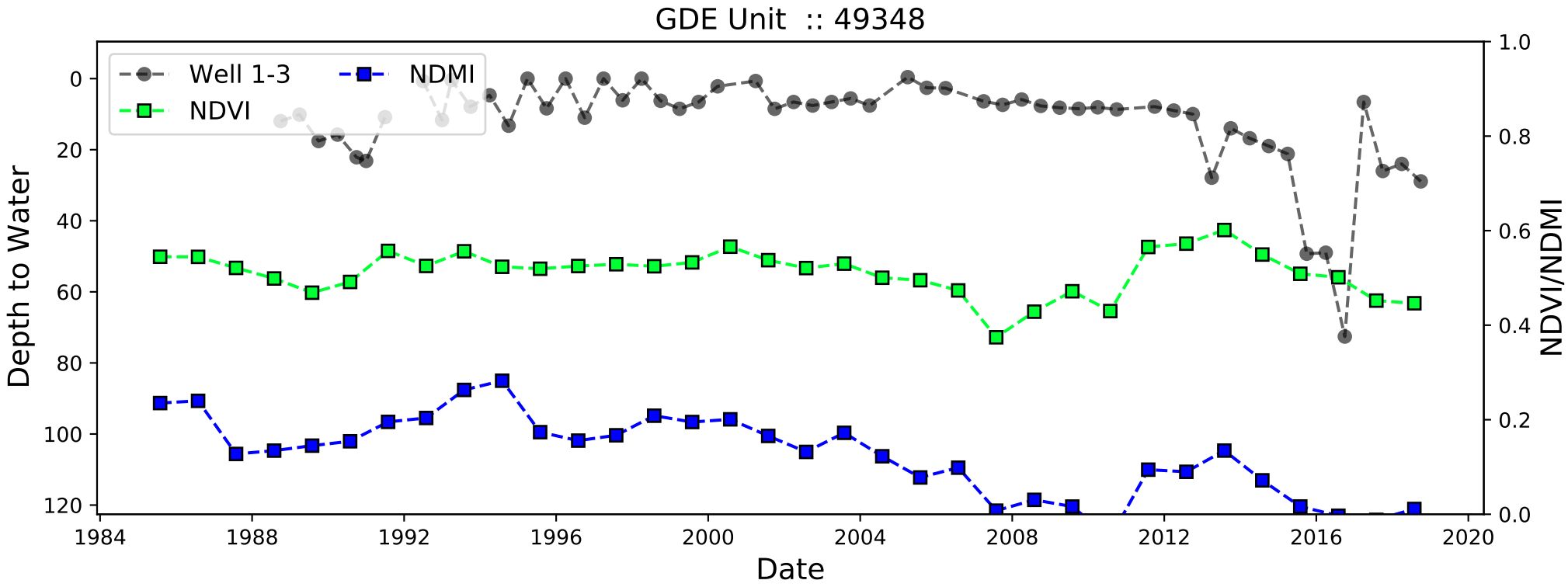

GDE Unit :: 51968
Well 1-19
NDMI
NDVI
Depth to Water
NDVI/NDMI
Date
50
100
150
200
0.0
0.2
0.4
0.6
0.8
1.0
1984
1988
1992
1996
2000
2004
2008
2012
2016
2020

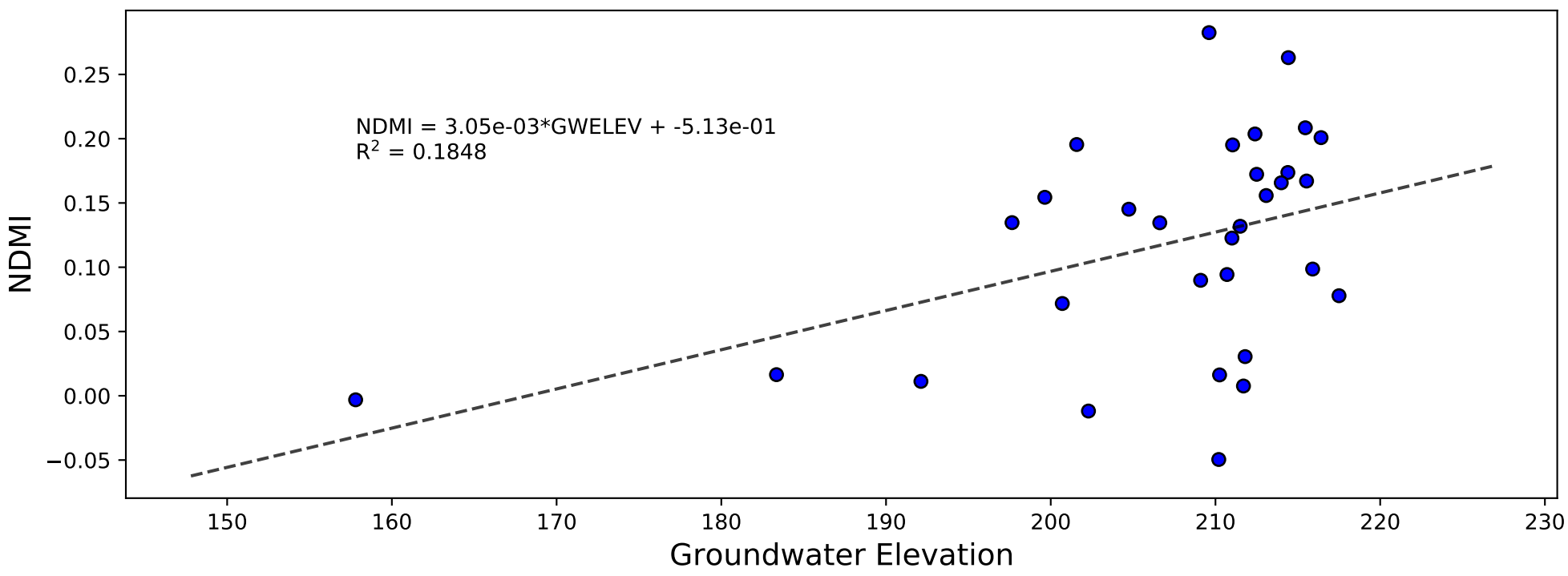

NDMI
NDMI = 5.89e-04*GWELEV + 2.68e-01
R2 = 0.4120
Groundwater Elevation
0.26
0.28
0.30
0.32
0.34
0.36
0.38
0.40
0.42
25
50
75
100
125
150
175
200

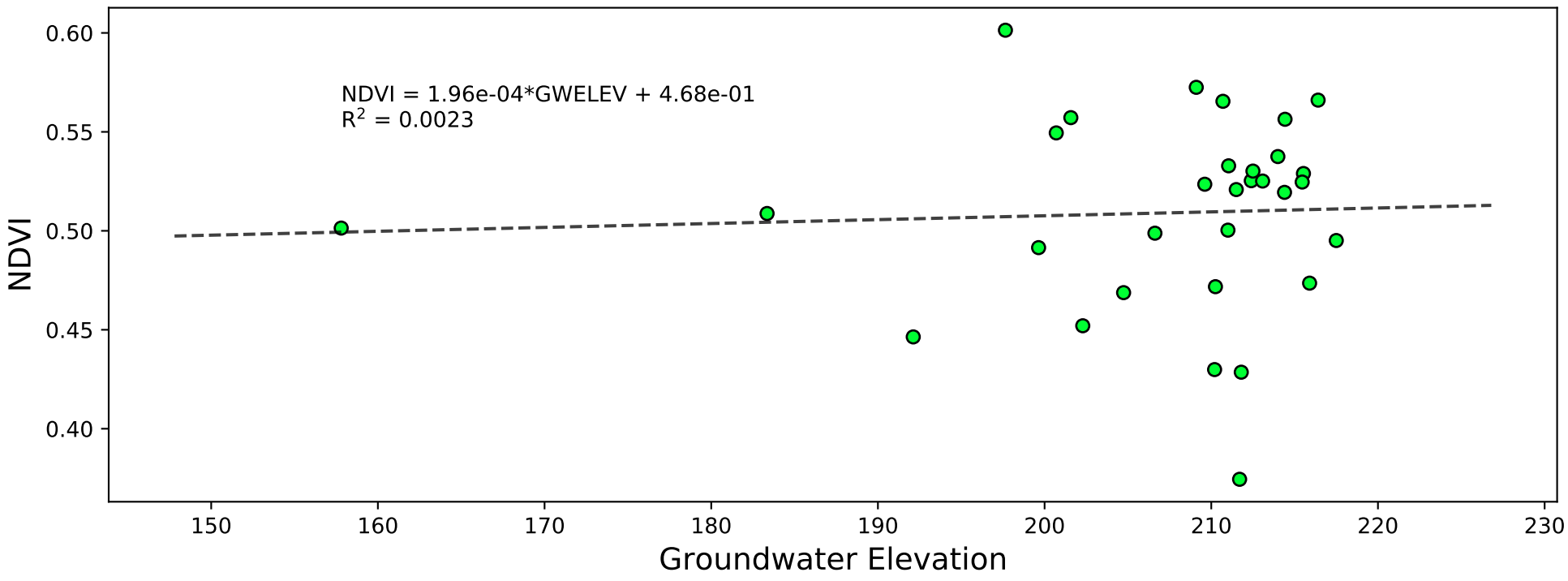

NDVI
NDVI = -1.16e-04*GWELEV + 7.57e-01
R2 = 0.0202
Groundwater Elevation
0.650
0.675
0.700
0.725
0.750
0.775
0.800
25
50
75
100
125
150
175
200

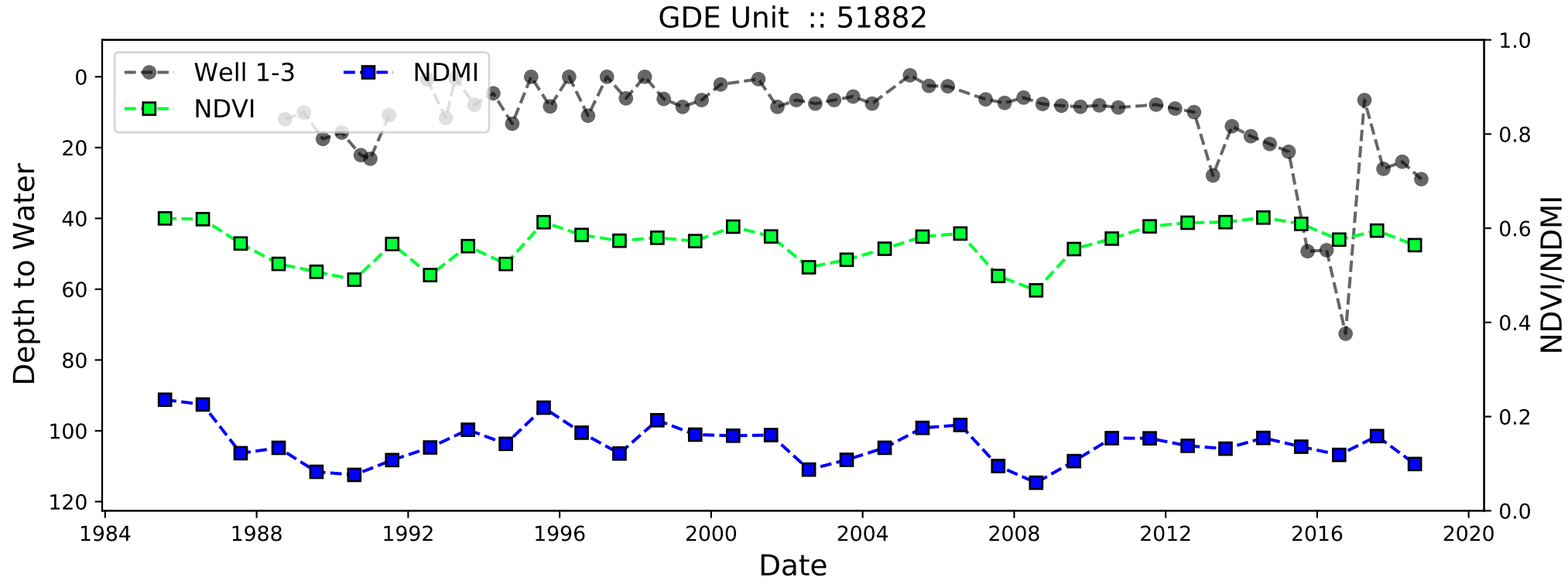
Toro Canyon GDE Evaluation Unit

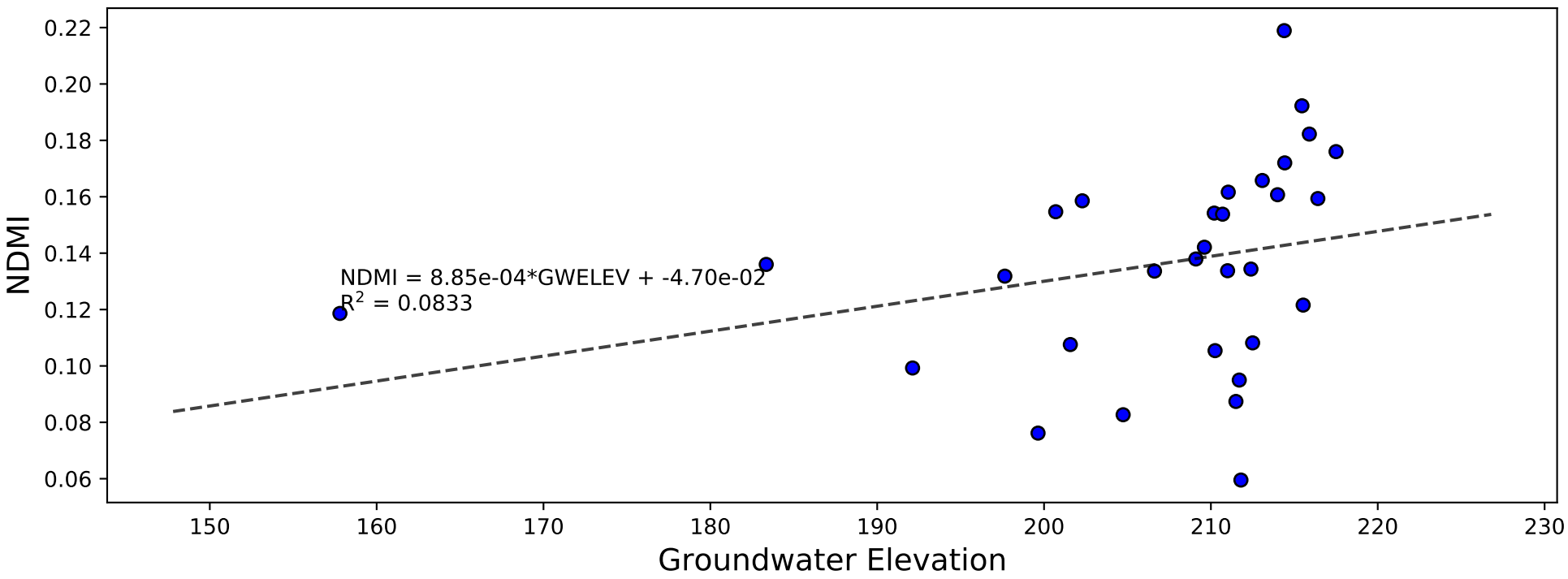
Groundwater Level and Habitat Health Correlations

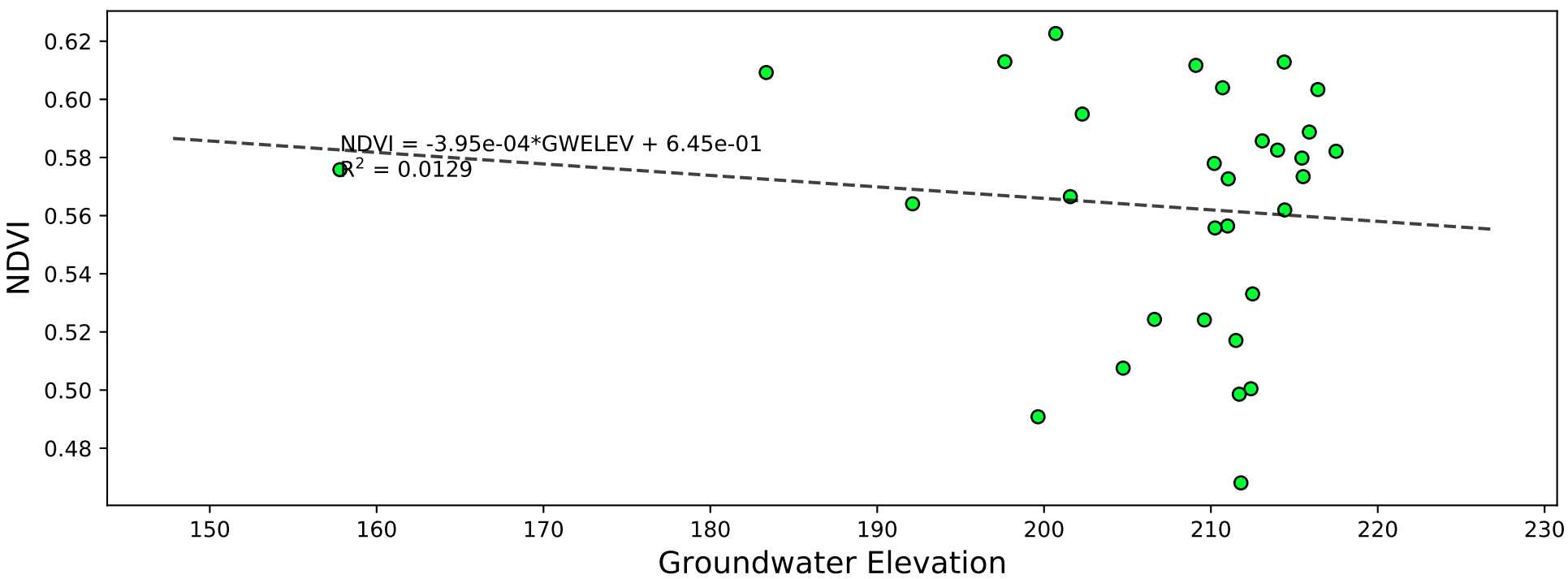

GDE Unit :: 49348
Well 1-3
NDMI
NDVI
Depth to Water
NDVI/NDMI
Date
0
20
40
60
80
100
120
1.0
0.8
0.6
0.4
0.2
0.0
1984
1988
1992
1996
2000
2004
2008
2012
2016
2020

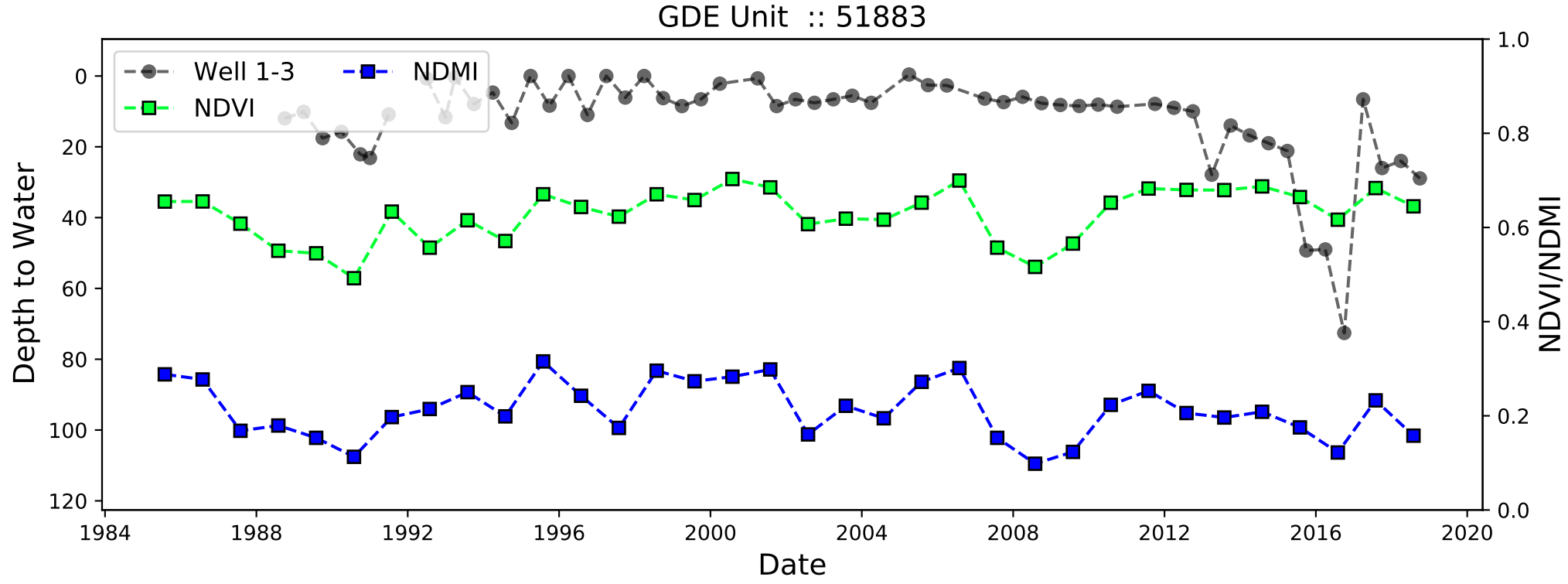

NDMI = 3.05e-03*GWELEV + -5.13e-01
R^2 = 0.1848
NDMI
Groundwater Elevation
0.25
0.20
0.15
0.10
0.05
0.00
−0.05
150
160
170
180
190
200
210
220
230

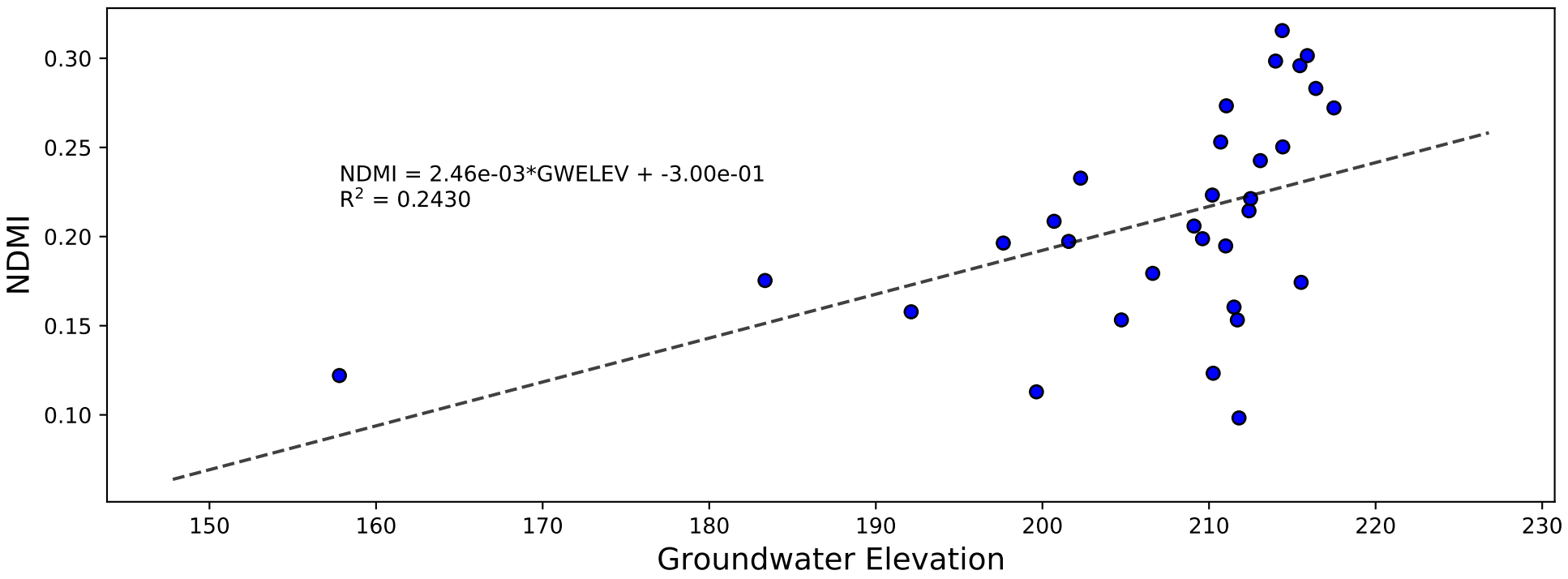

NDVI = 1.96e-04*GWELEV + 4.68e-01
R^2 = 0.0023
NDVI
Groundwater Elevation
0.60
0.55
0.50
0.45
0.40
150
160
170
180
190
200
210
220
230

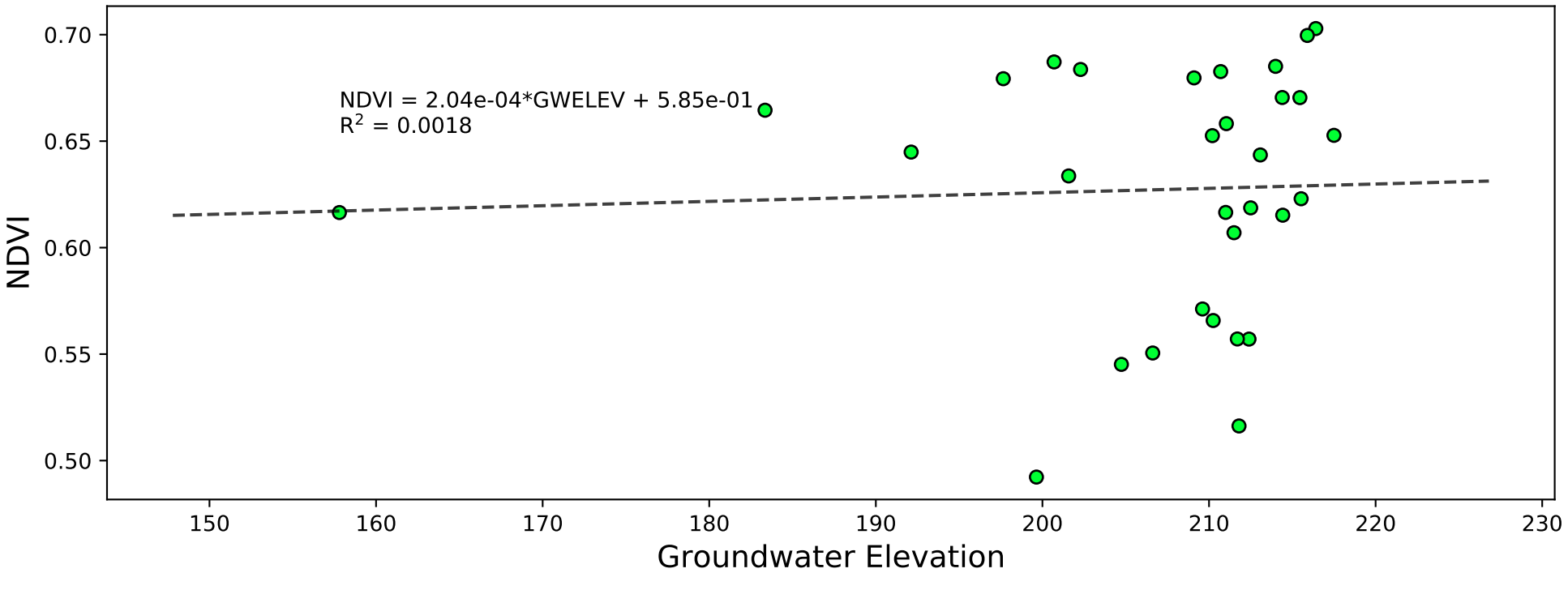

GDE Unit :: 51882
Well 1-3
NDMI
NDVI
Depth to Water
NDVI/NDMI
Date

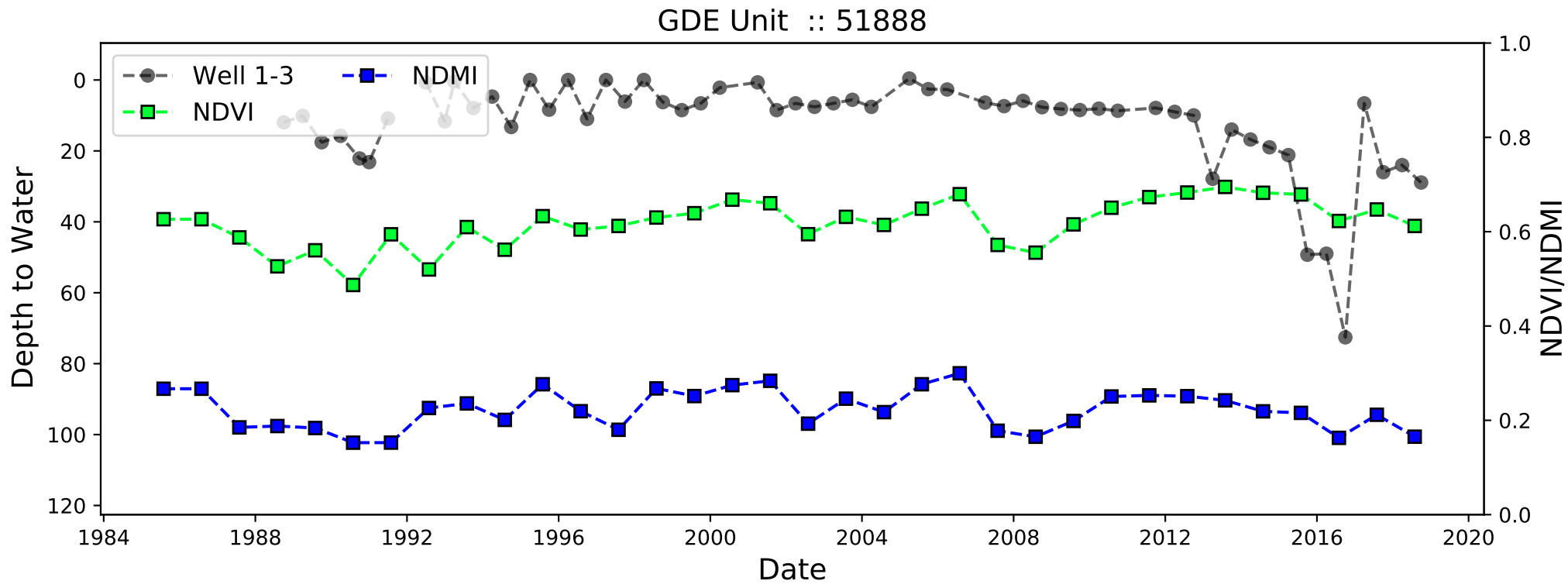

NDMI = 8.85e-04*GWELEV + -4.70e-02
R2 = 0.0833
NDMI
Groundwater Elevation

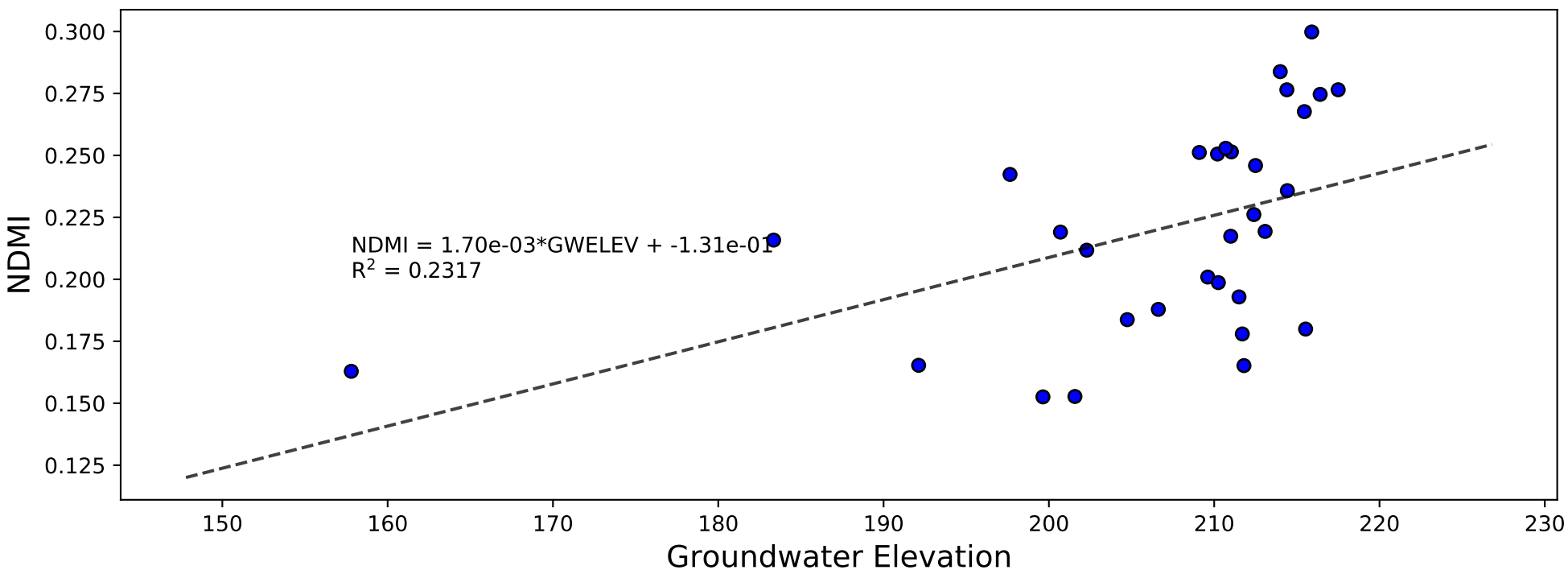

NDVI = -3.95e-04*GWELEV + 6.45e-01
R2 = 0.0129
NDVI
Groundwater Elevation

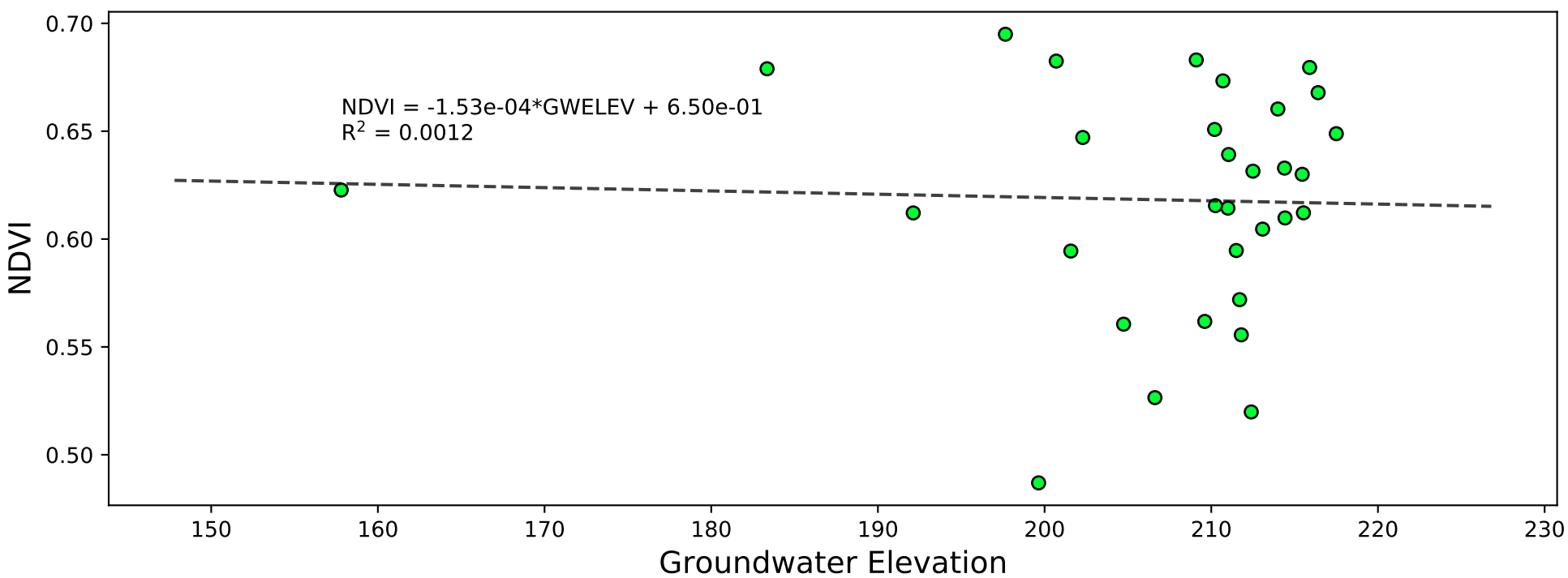

GDE Unit :: 51883
Well 1-3
NDMI
NDVI
Depth to Water
NDVI/NDMI
Date
0
20
40
60
80
100
120
1.0
0.8
0.6
0.4
0.2
0.0
1984
1988
1992
1996
2000
2004
2008
2012
2016
2020

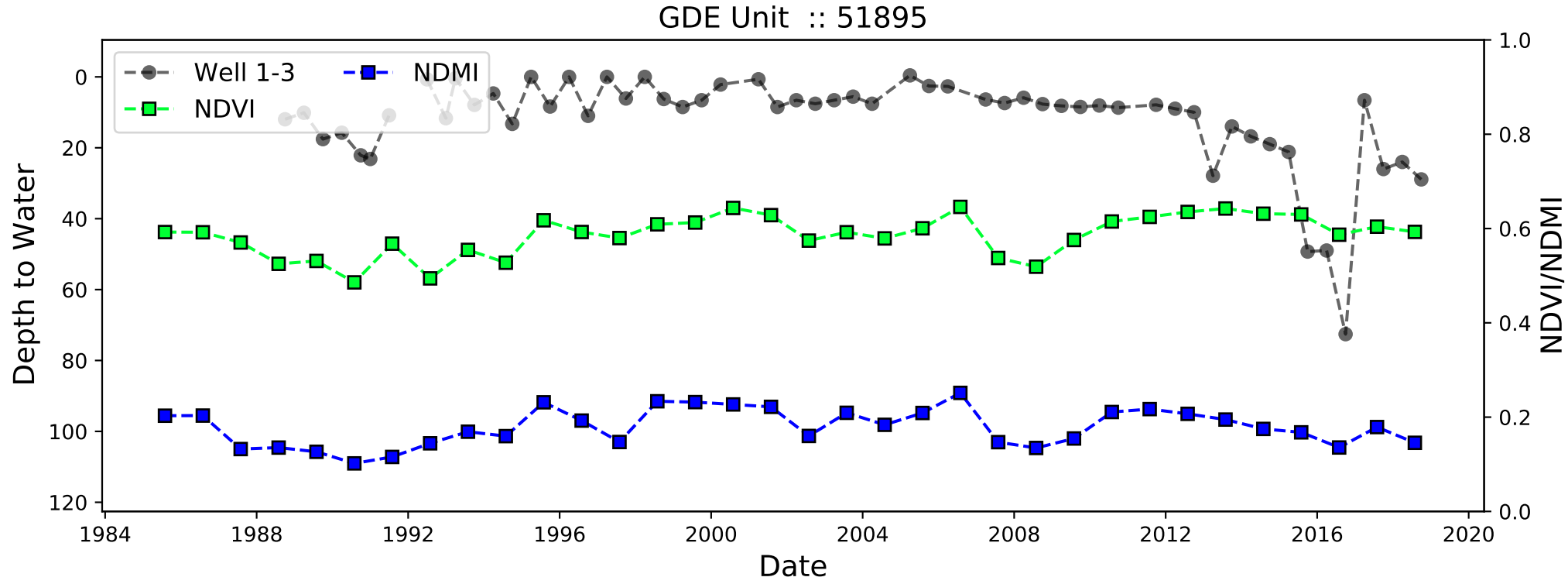

NDMI = 2.46e-03*GWELEV + -3.00e-01
R^2 = 0.2430
NDMI
Groundwater Elevation
0.30
0.25
0.20
0.15
0.10
150
160
170
180
190
200
210
220
230

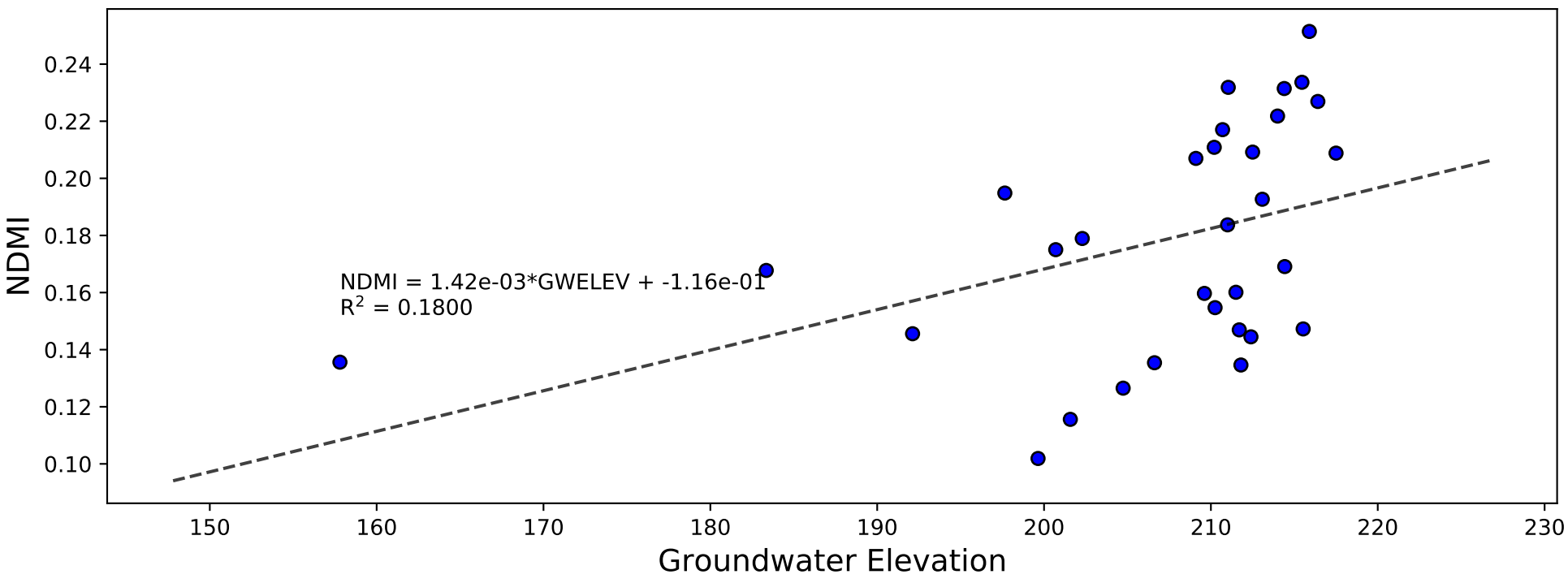

NDVI = 2.04e-04*GWELEV + 5.85e-01
R^2 = 0.0018
NDVI
Groundwater Elevation
0.70
0.65
0.60
0.55
0.50
150
160
170
180
190
200
210
220
230

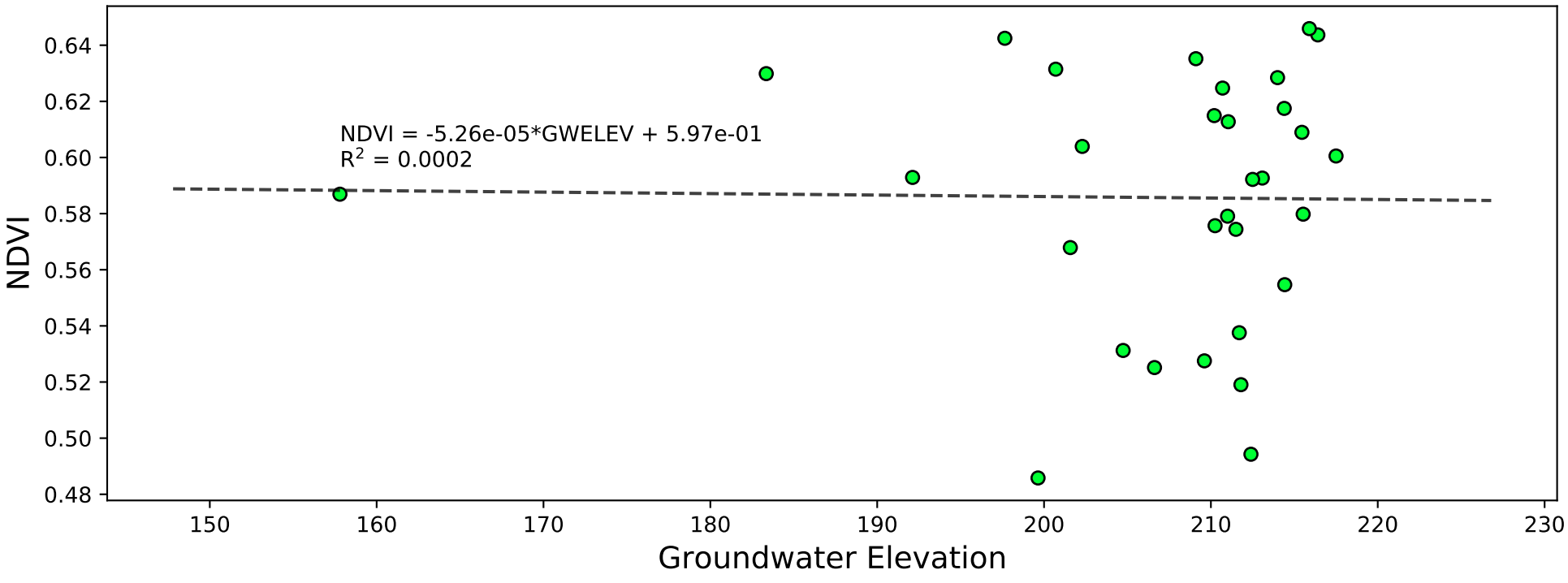

GDE Unit :: 51888
Well 1-3
NDMI
NDVI
Depth to Water
NDVI/NDMI
Date

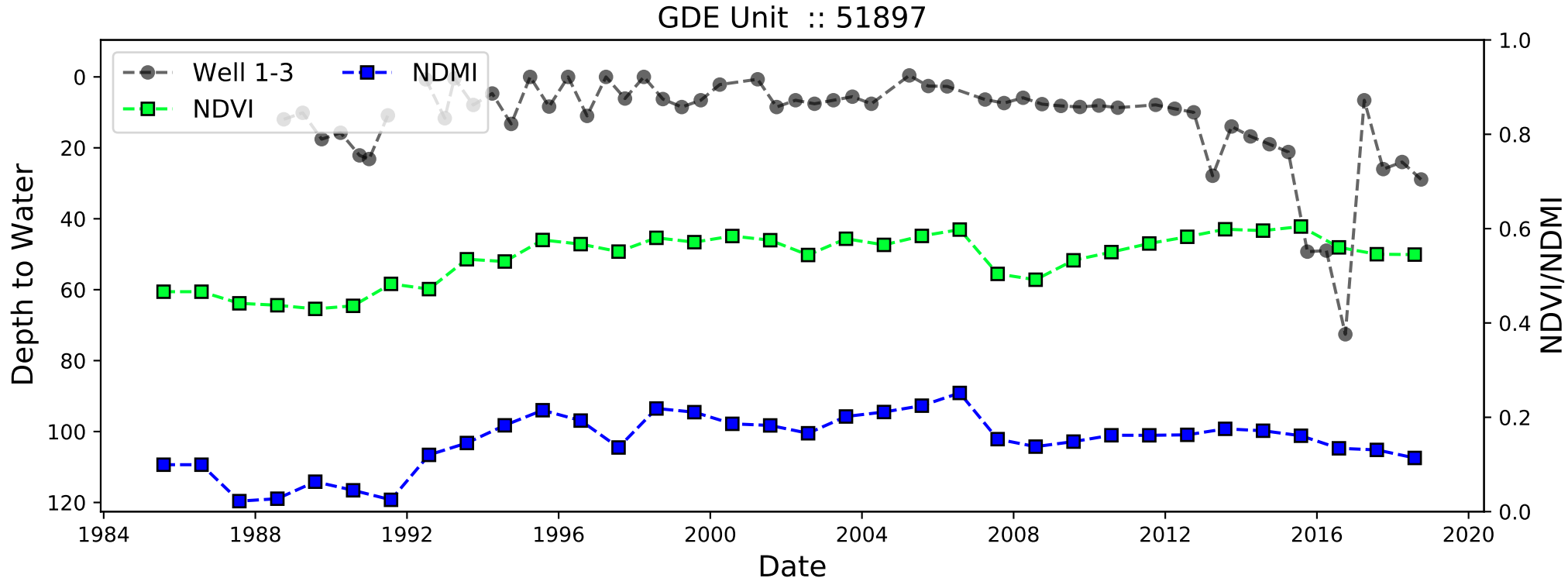

NDMI = 1.70e-03*GWELEV + -1.31e-01
R2 = 0.2317
NDMI
Groundwater Elevation

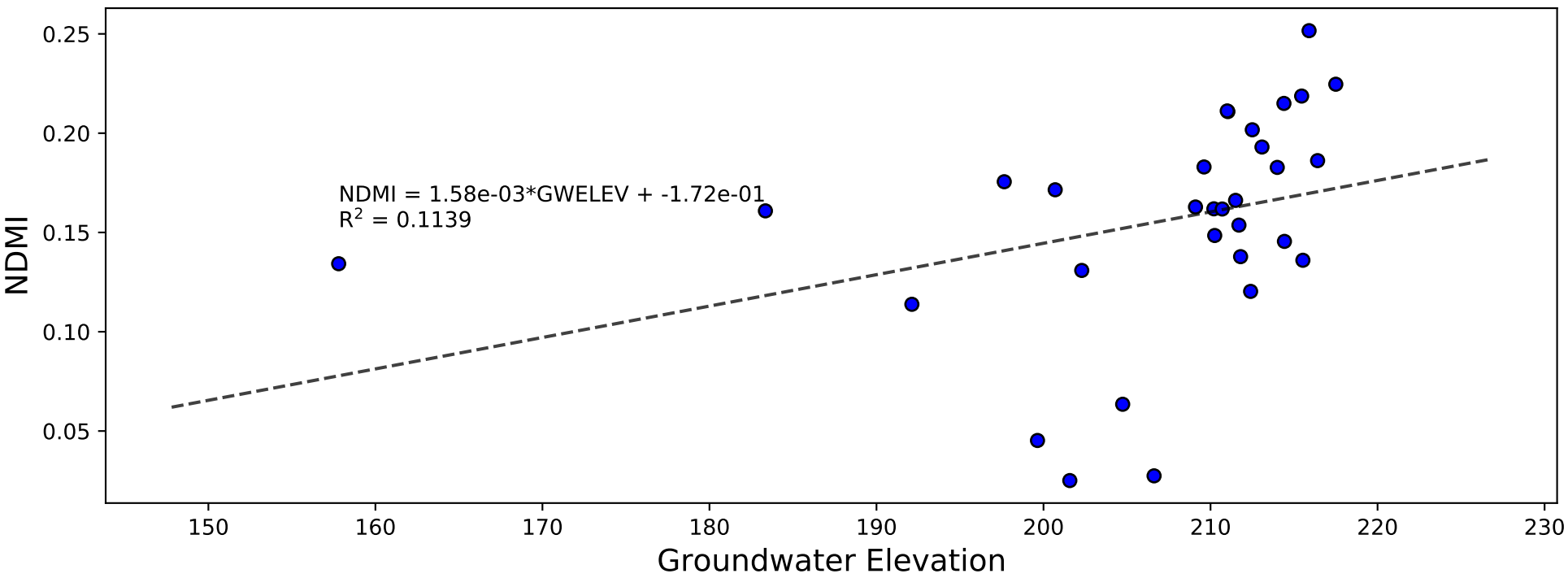

NDVI = -1.53e-04*GWELEV + 6.50e-01
R2 = 0.0012
NDVI
Groundwater Elevation

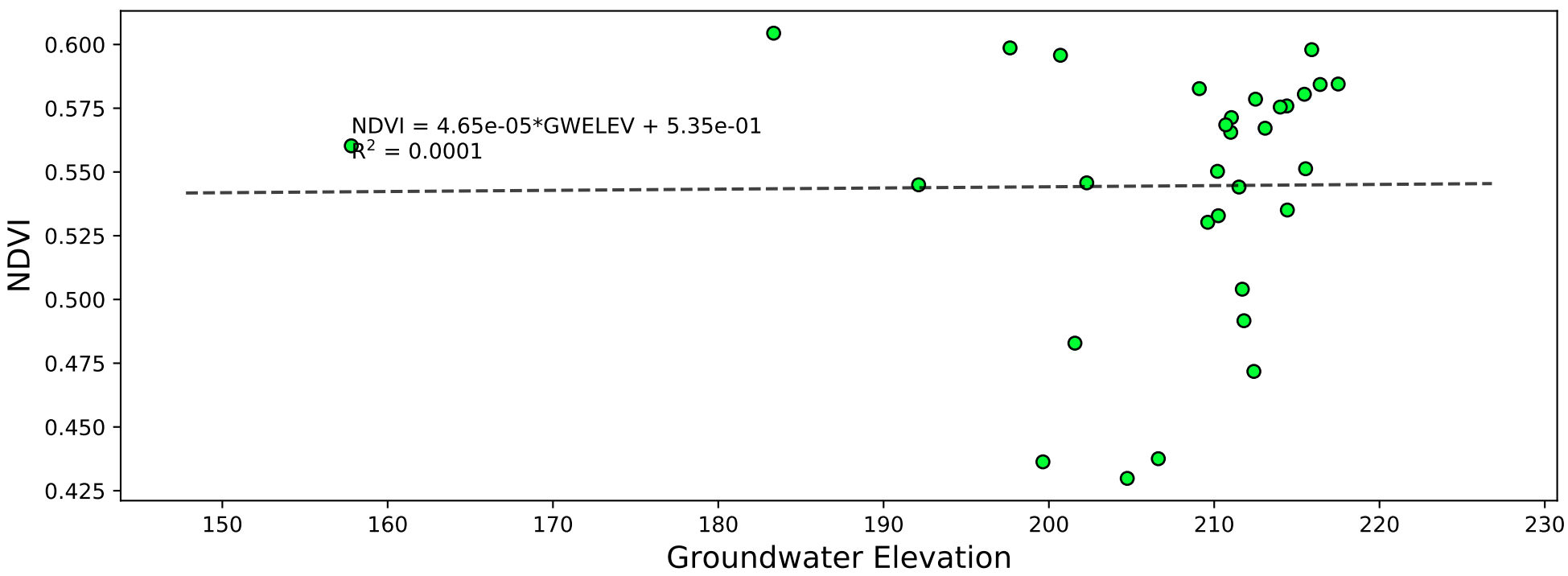

GDE Unit :: 51895
Well 1-3
NDMI
NDVI
Depth to Water
NDVI/NDMI
Date
0
20
40
60
80
100
120
1.0
0.8
0.6
0.4
0.2
0.0
1984
1988
1992
1996
2000
2004
2008
2012
2016
2020

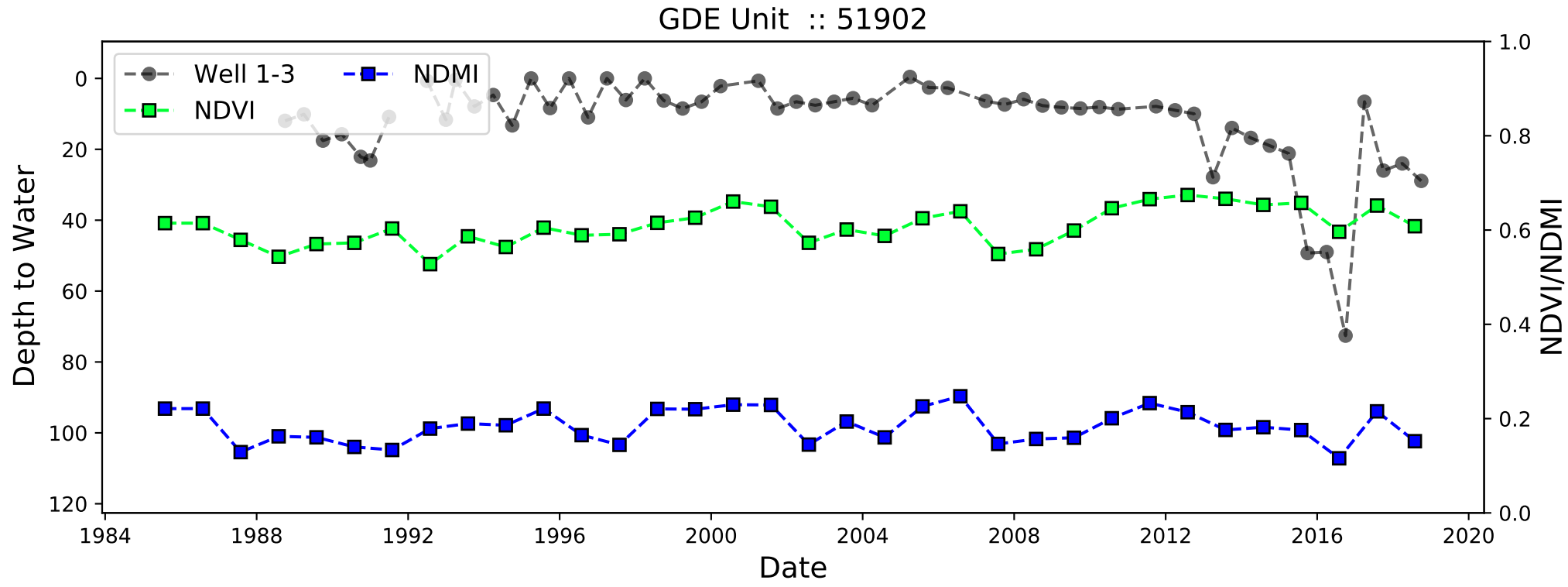

NDMI
NDMI = 1.42e-03*GWELEV + -1.16e-01
R^2 = 0.1800
Groundwater Elevation
0.24
0.22
0.20
0.18
0.16
0.14
0.12
0.10
150
160
170
180
190
200
210
220
230

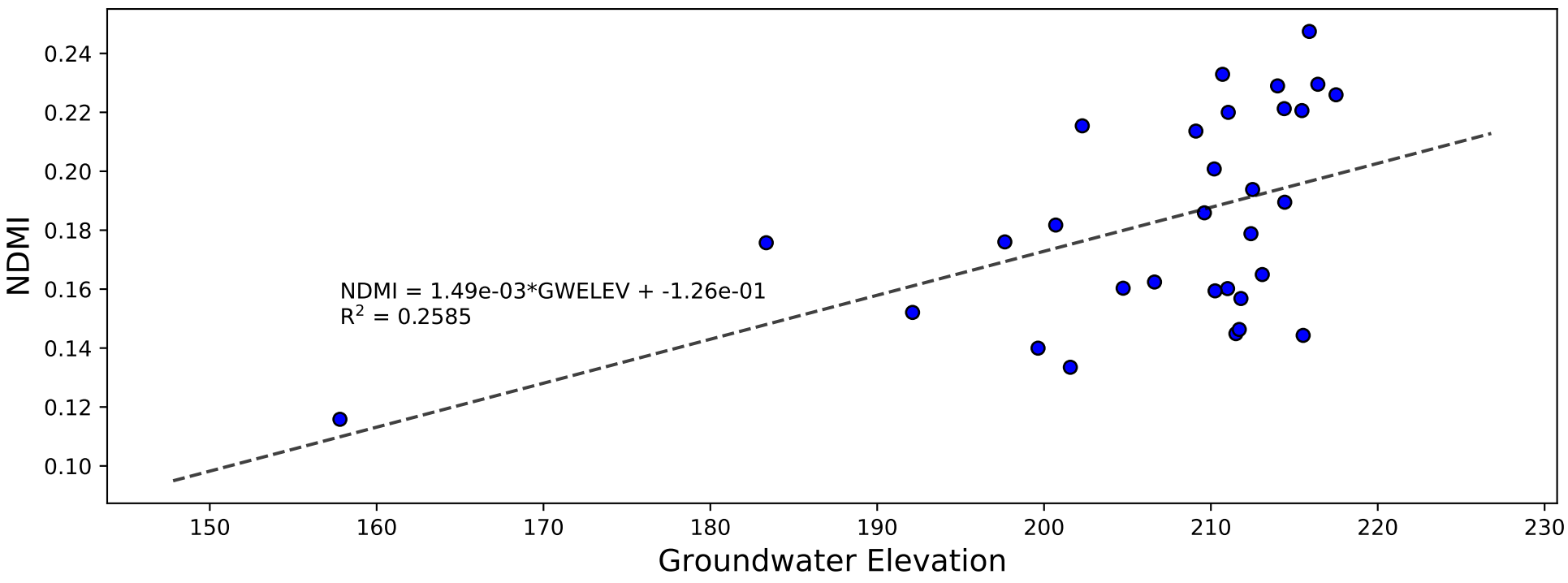

NDVI
NDVI = -5.26e-05*GWELEV + 5.97e-01
R^2 = 0.0002
Groundwater Elevation
0.64
0.62
0.60
0.58
0.56
0.54
0.52
0.50
0.48
150
160
170
180
190
200
210
220
230

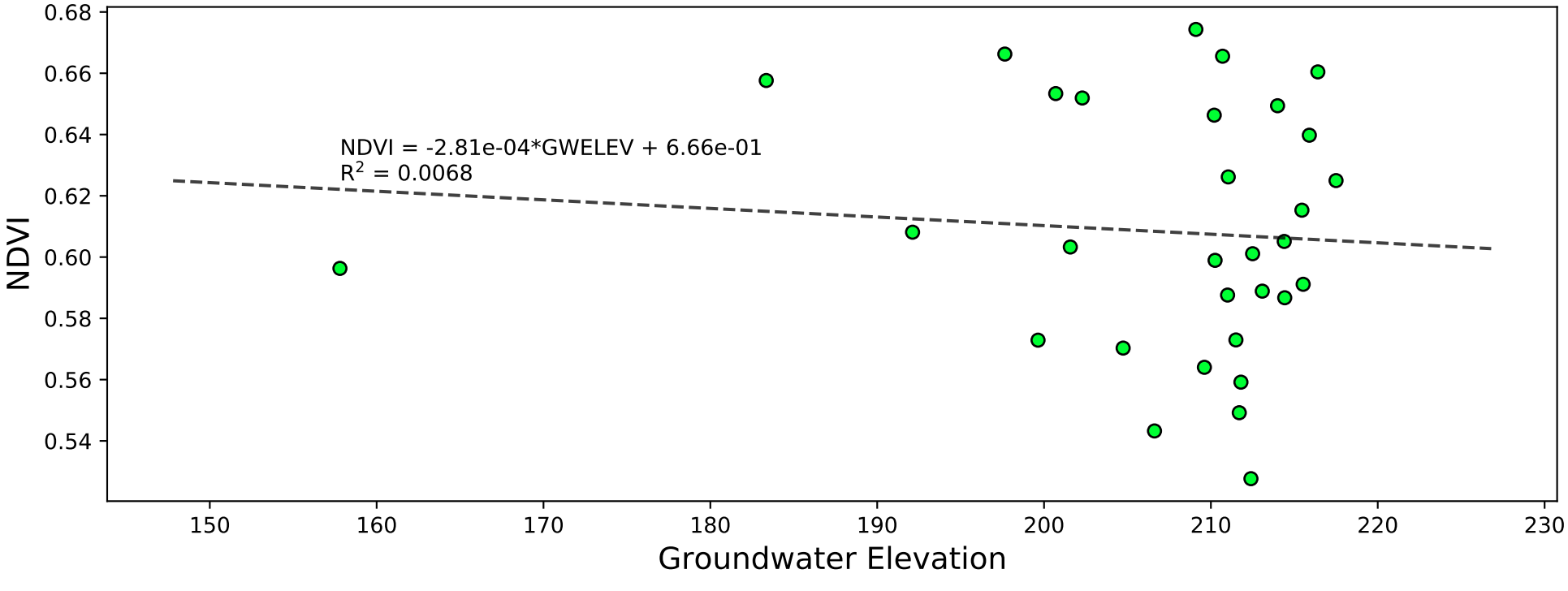

GDE Unit :: 51897
Well 1-3
NDMI
NDVI
Depth to Water
NDVI/NDMI
Date
0
20
40
60
80
100
120
1.0
0.8
0.6
0.4
0.2
0.0
1984
1988
1992
1996
2000
2004
2008
2012
2016
2020

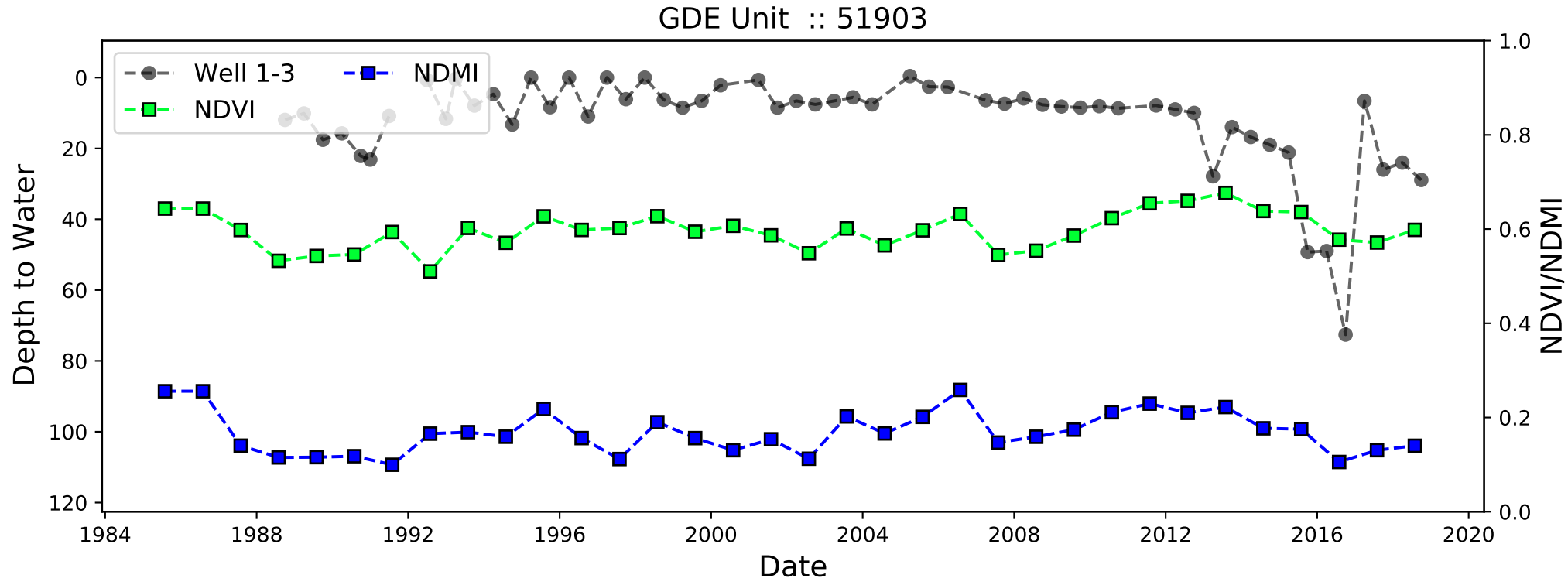

NDMI = 1.58e-03*GWELEV + -1.72e-01
R2 = 0.1139
NDMI
Groundwater Elevation
0.25
0.20
0.15
0.10
0.05
150
160
170
180
190
200
210
220
230

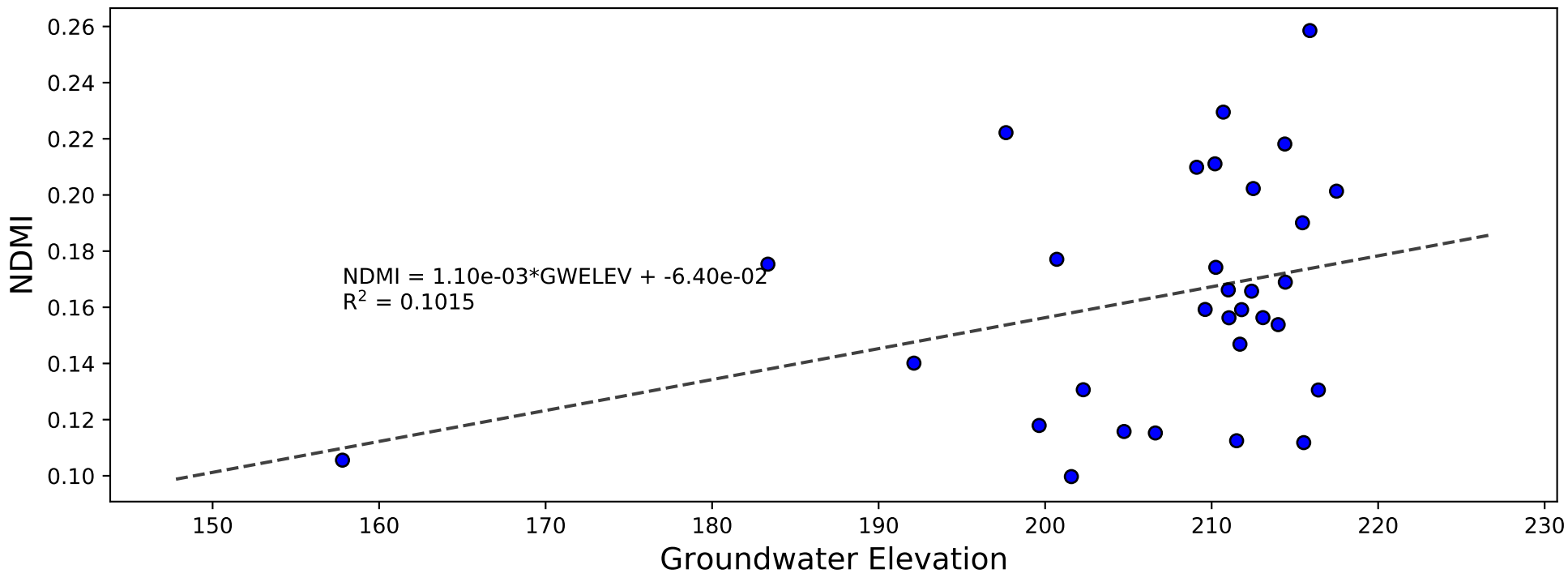

NDVI = 4.65e-05*GWELEV + 5.35e-01
R2 = 0.0001
NDVI
Groundwater Elevation
0.600
0.575
0.550
0.525
0.500
0.475
0.450
0.425
150
160
170
180
190
200
210
220
230

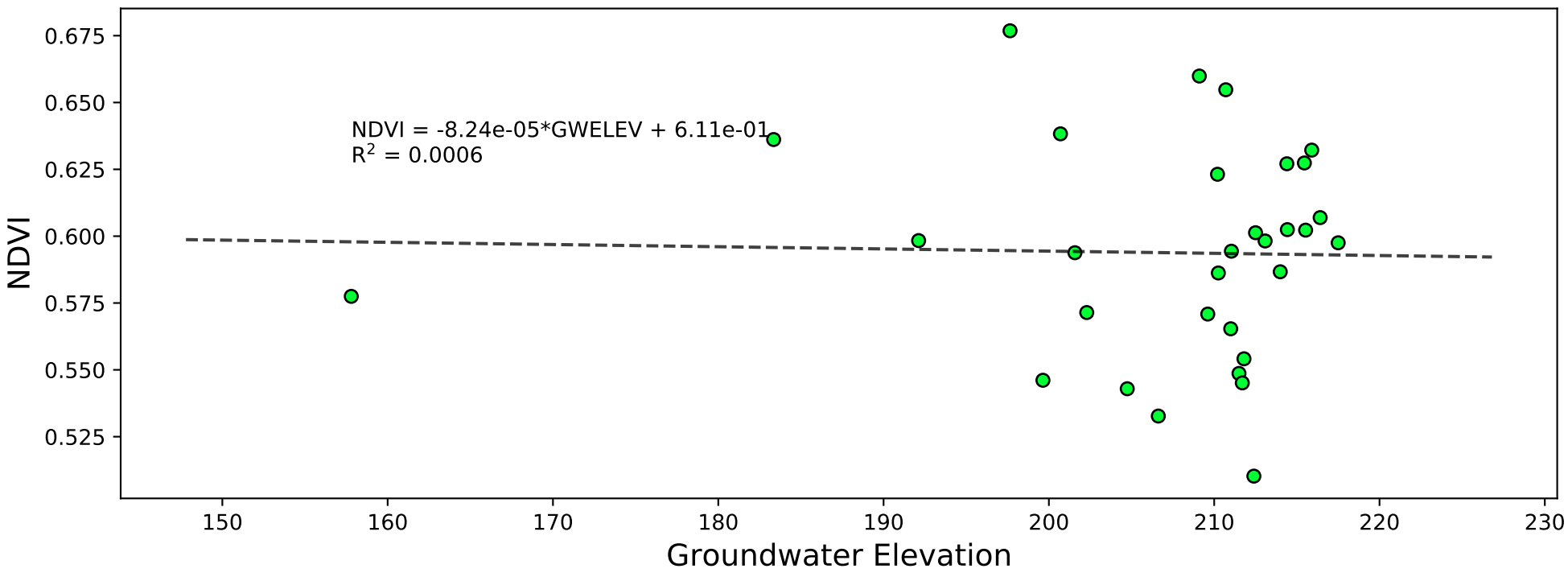

GDE Unit :: 51902
Well 1-3
NDMI
NDVI
Depth to Water
NDVI/NDMI
Date
0
20
40
60
80
100
120
1.0
0.8
0.6
0.4
0.2
0.0
1984
1988
1992
1996
2000
2004
2008
2012
2016
2020

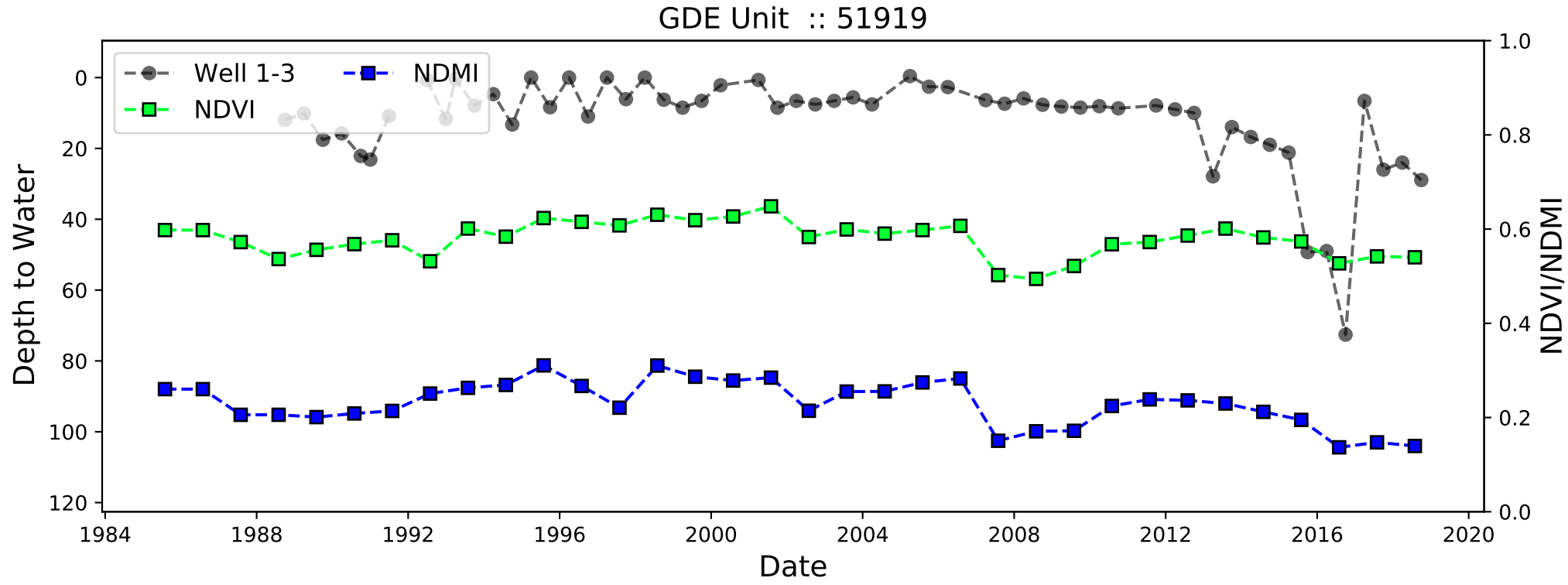

NDMI
NDMI = 1.49e-03*GWELEV + -1.26e-01
R2 = 0.2585
Groundwater Elevation
0.24
0.22
0.20
0.18
0.16
0.14
0.12
0.10
150
160
170
180
190
200
210
220
230

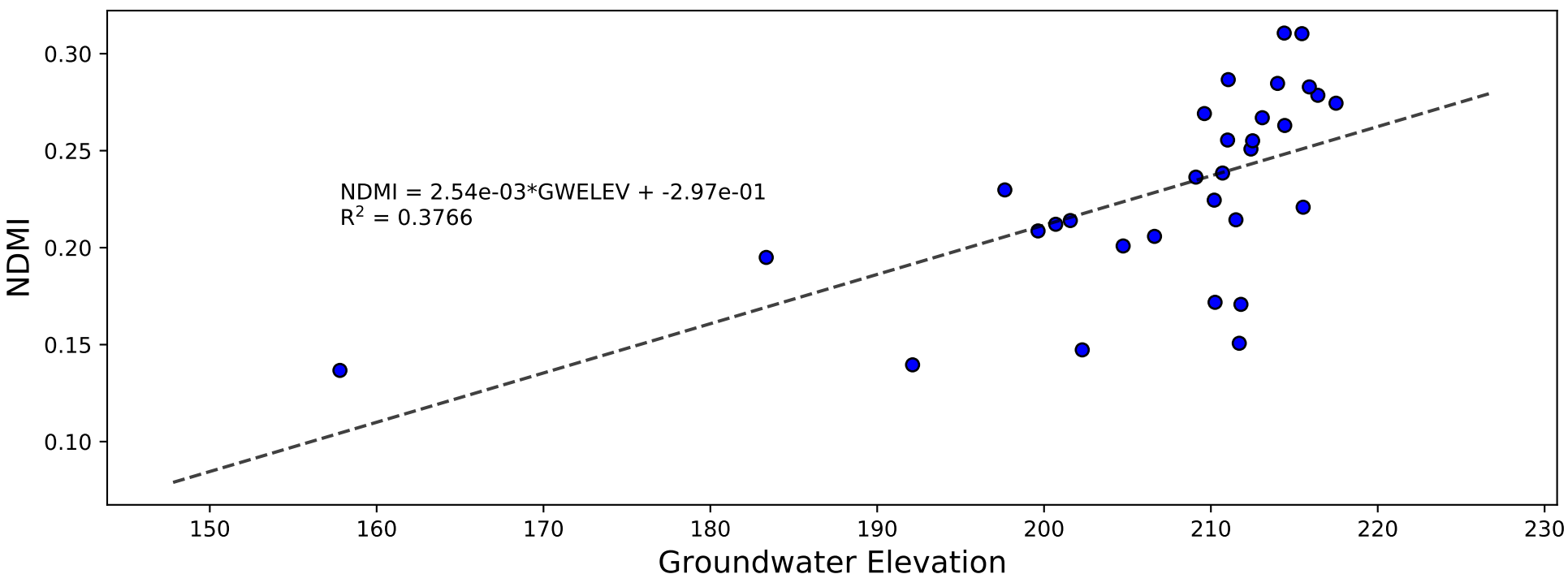

NDVI
NDVI = -2.81e-04*GWELEV + 6.66e-01
R2 = 0.0068
Groundwater Elevation
0.68
0.66
0.64
0.62
0.60
0.58
0.56
0.54
150
160
170
180
190
200
210
220
230

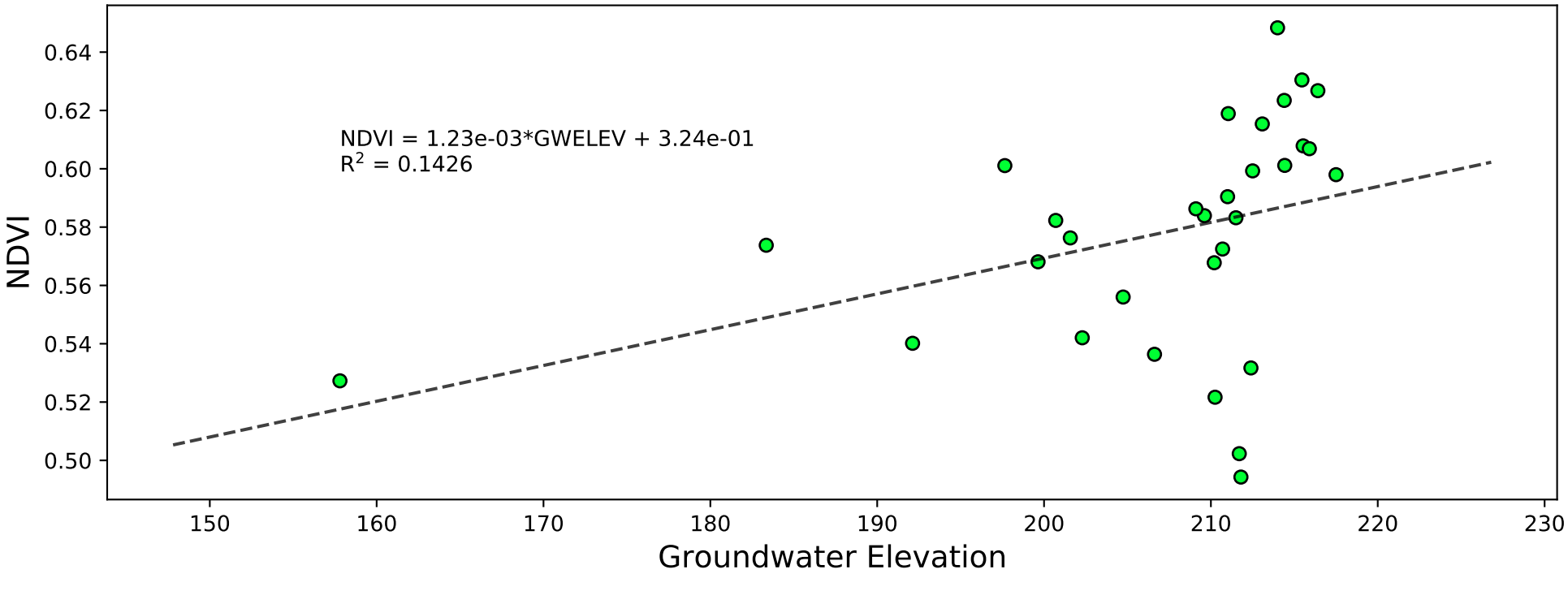

GDE Unit :: 51903
Well 1-3
NDMI
NDVI
Depth to Water
NDVI/NDMI
Date

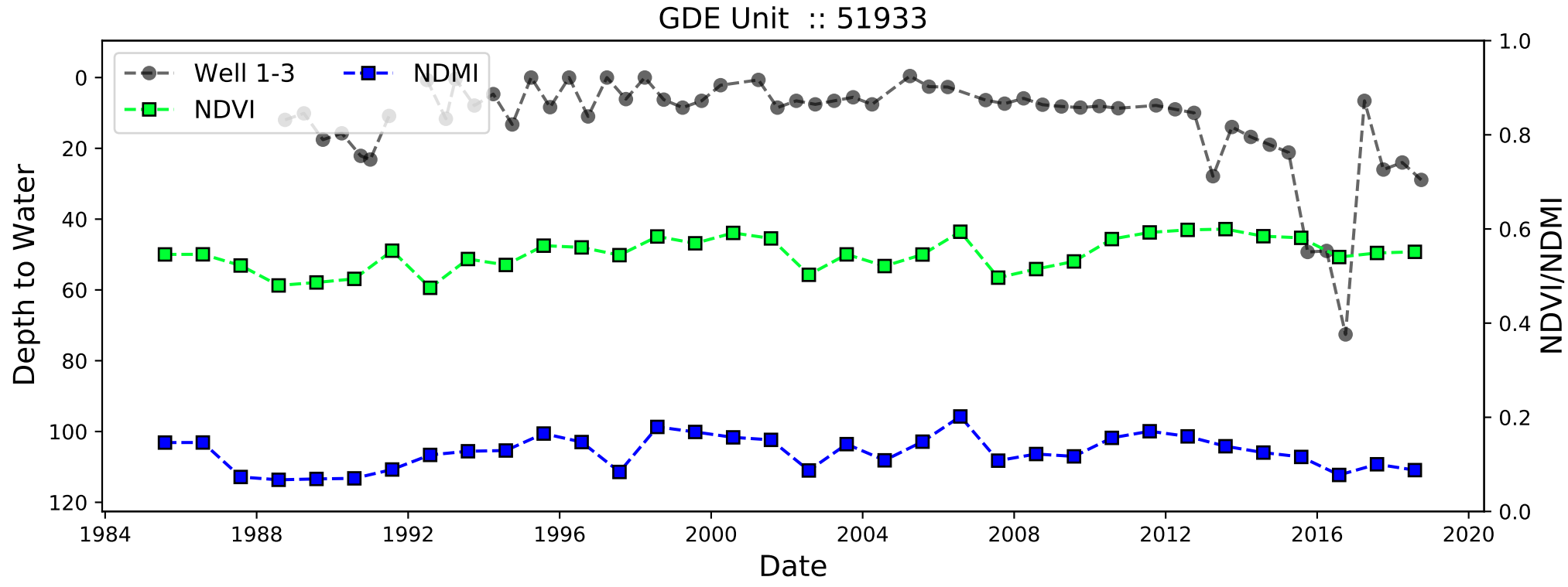

NDMI = 1.10e-03*GWELEV + -6.40e-02
R2 = 0.1015
NDMI
Groundwater Elevation

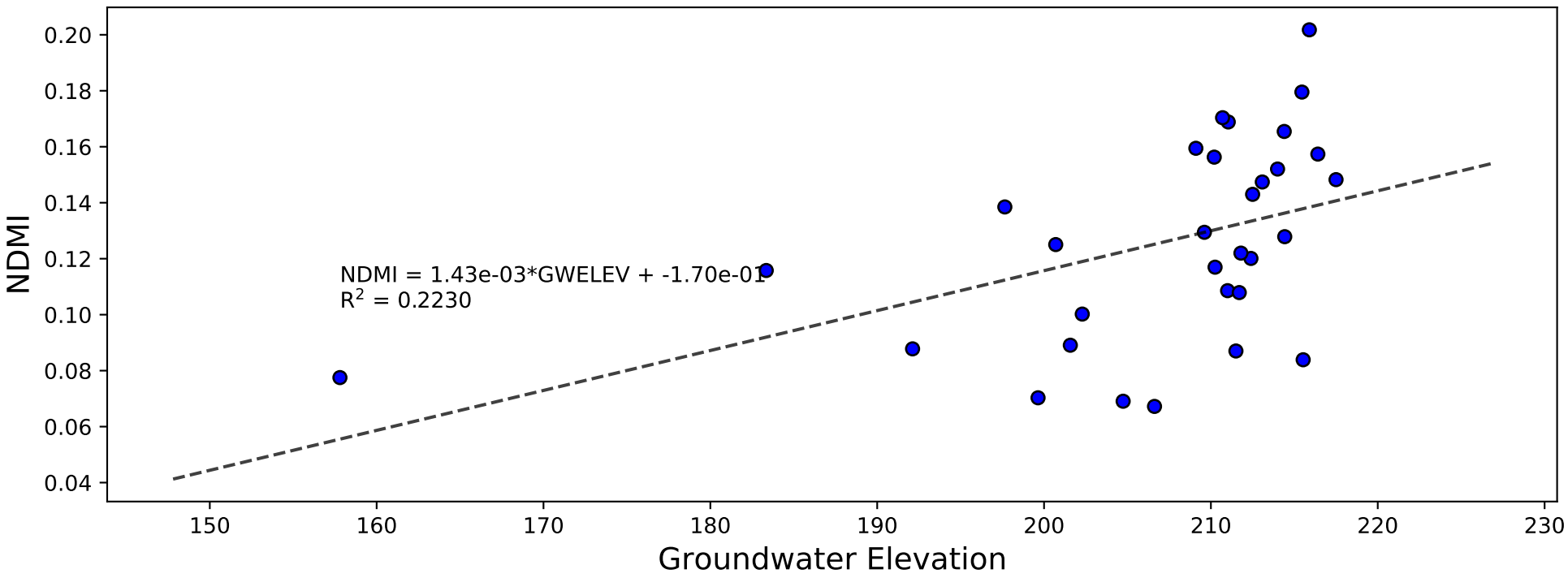

NDVI = -8.24e-05*GWELEV + 6.11e-01
R2 = 0.0006
NDVI
Groundwater Elevation

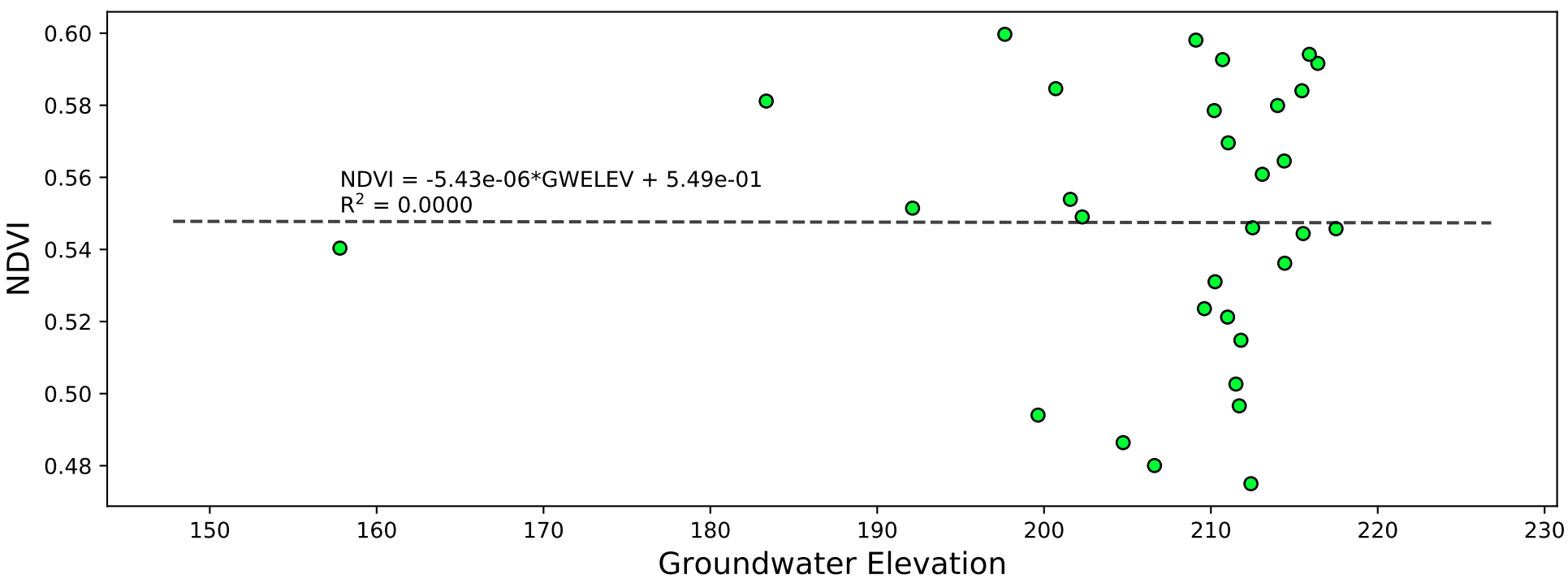

GDE Unit :: 51919
Well 1-3
NDMI
NDVI
Depth to Water
NDVI/NDMI
Date
0
20
40
60
80
100
120
1.0
0.8
0.6
0.4
0.2
0.0
1984
1988
1992
1996
2000
2004
2008
2012
2016
2020

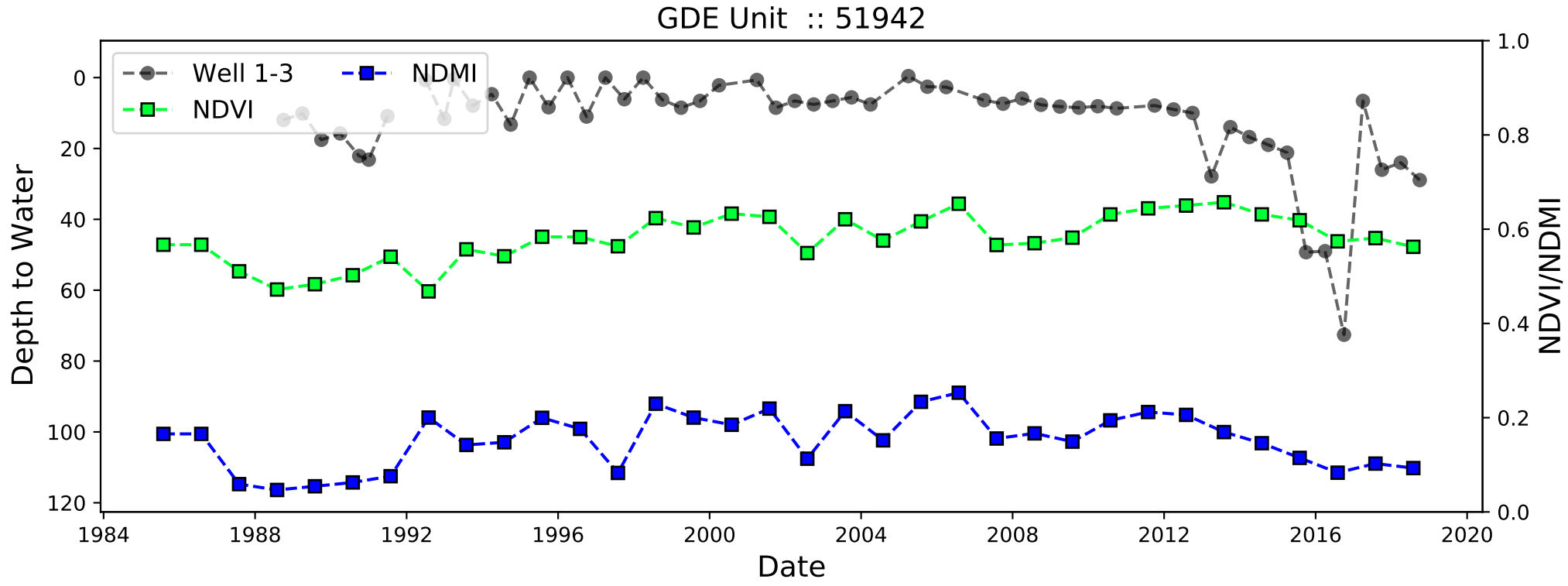

NDMI = 2.54e-03*GWELEV + -2.97e-01
R2 = 0.3766
NDMI
Groundwater Elevation
0.30
0.25
0.20
0.15
0.10
150
160
170
180
190
200
210
220
230

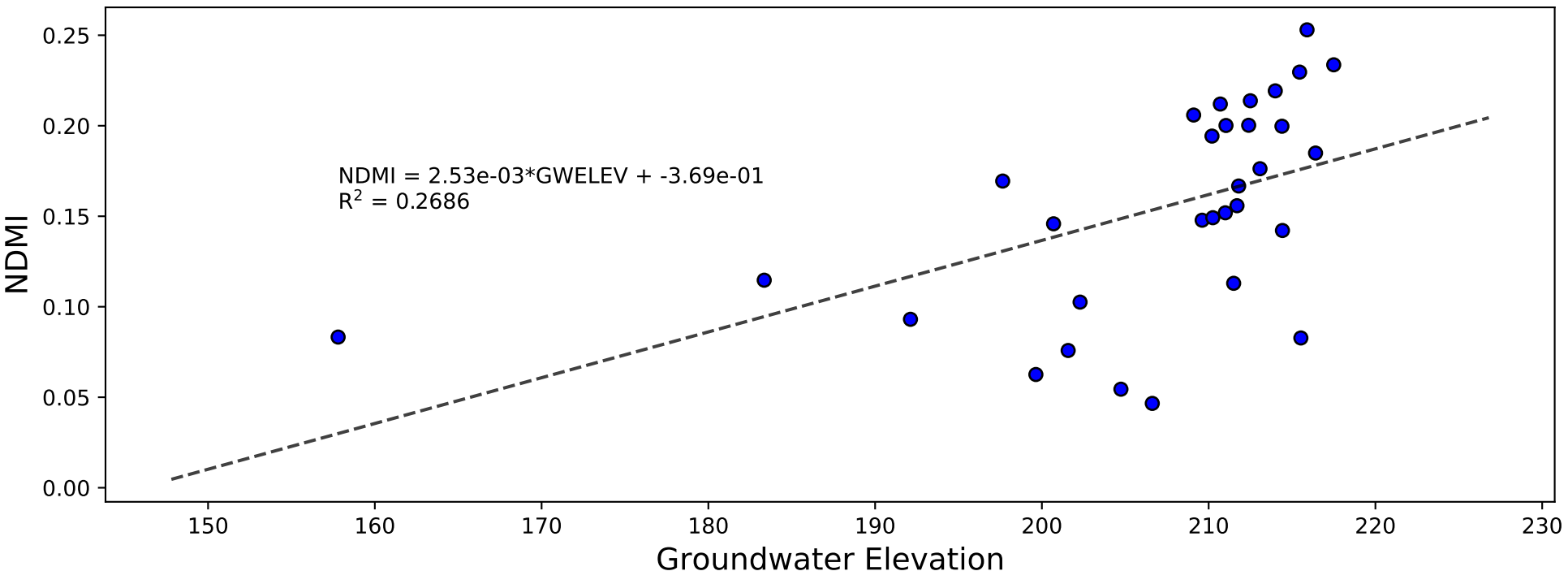

NDVI = 1.23e-03*GWELEV + 3.24e-01
R2 = 0.1426
NDVI
Groundwater Elevation
0.64
0.62
0.60
0.58
0.56
0.54
0.52
0.50
150
160
170
180
190
200
210
220
230

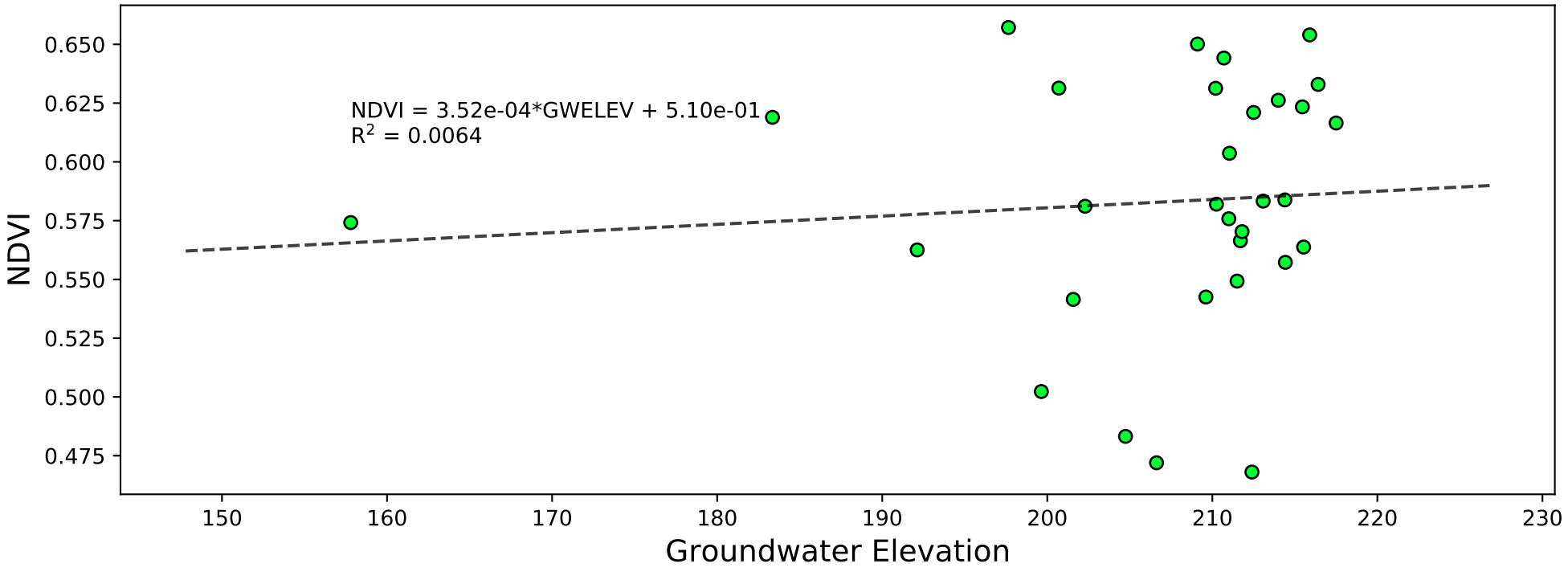

GDE Unit :: 51933
Well 1-3
NDMI
NDVI
Depth to Water
NDVI/NDMI
Date

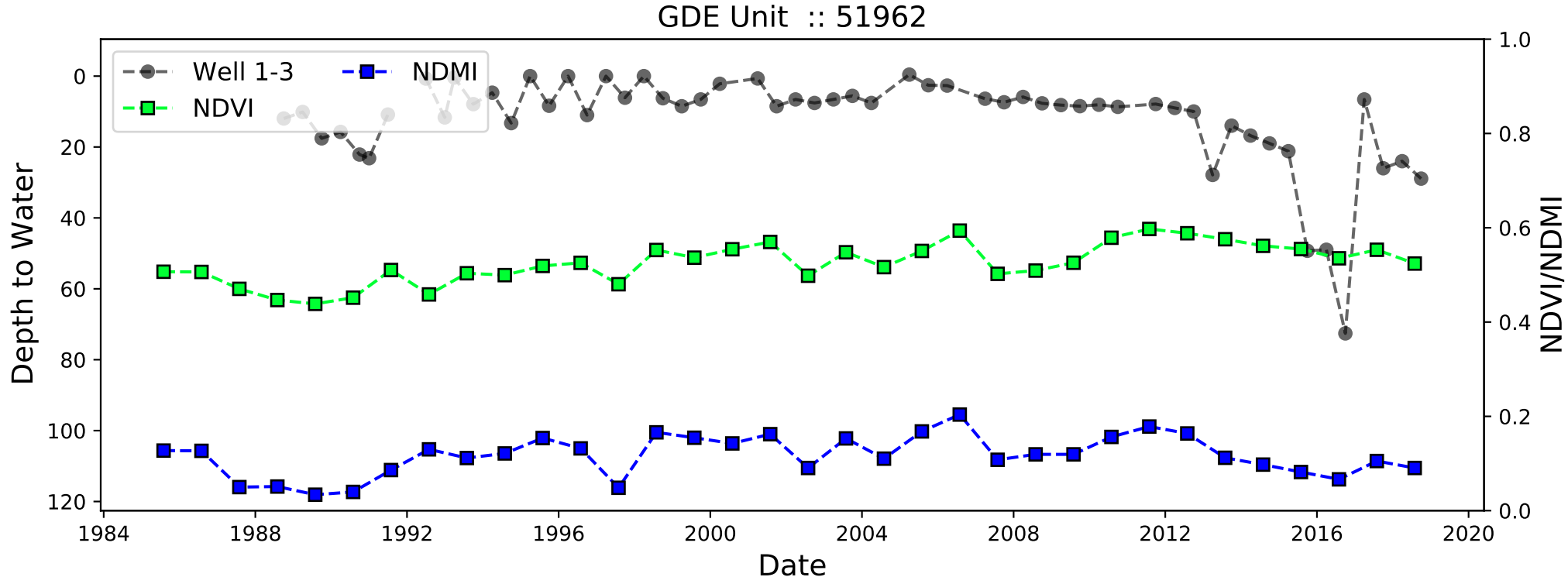

NDMI = 1.43e-03*GWELEV + -1.70e-01
R2 = 0.2230
NDMI
Groundwater Elevation

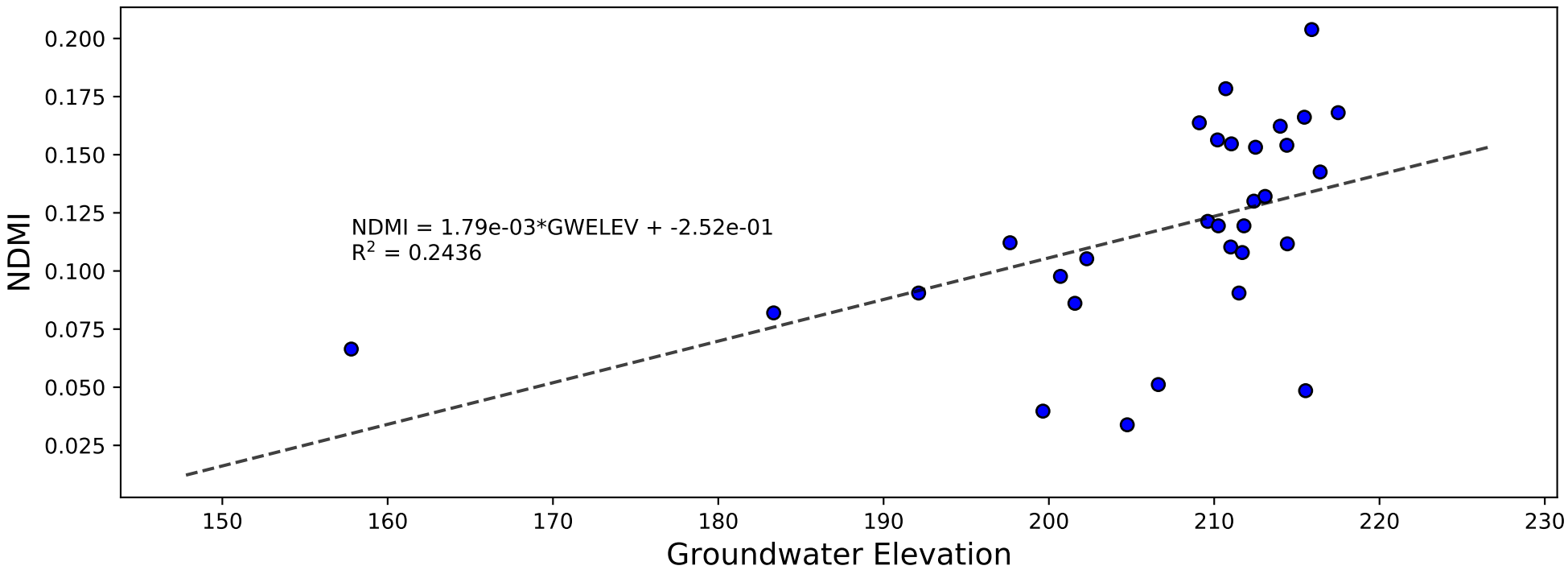

NDVI = -5.43e-06*GWELEV + 5.49e-01
R2 = 0.0000
NDVI
Groundwater Elevation

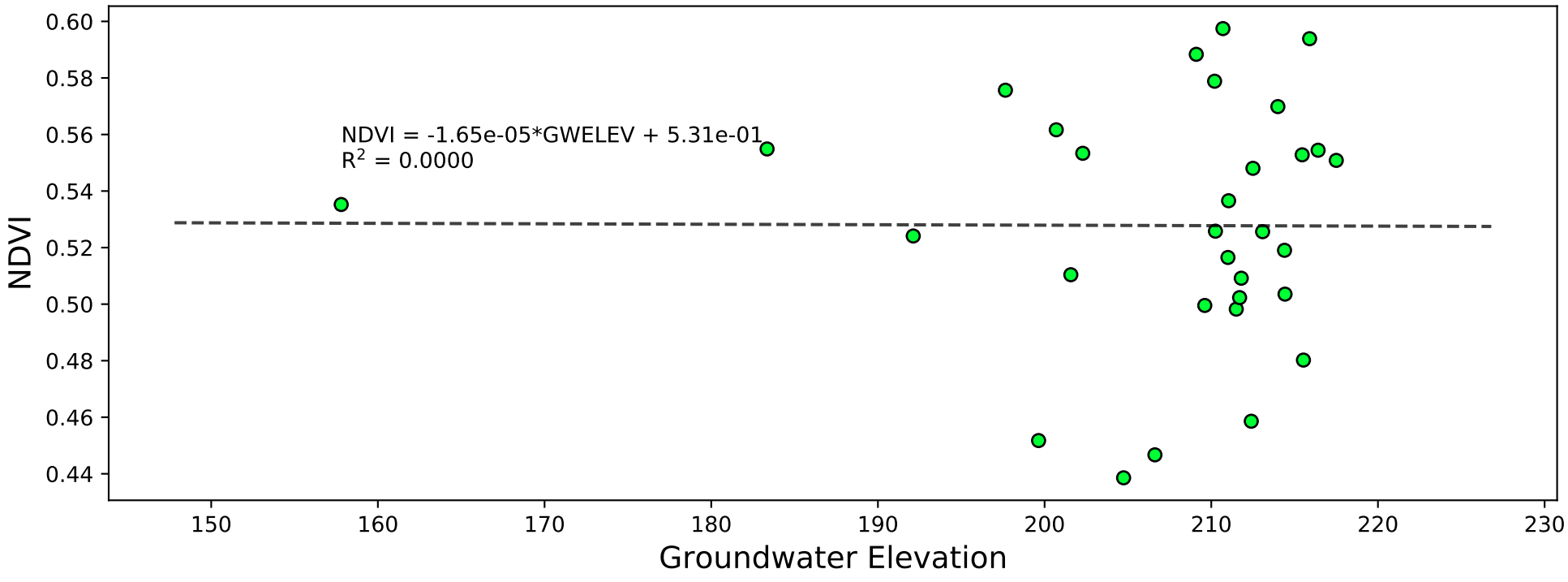

GDE Unit :: 51942
Well 1-3
NDMI
NDVI
Depth to Water
NDVI/NDMI
Date
0
20
40
60
80
100
120
1.0
0.8
0.6
0.4
0.2
0.0
1984
1988
1992
1996
2000
2004
2008
2012
2016
2020

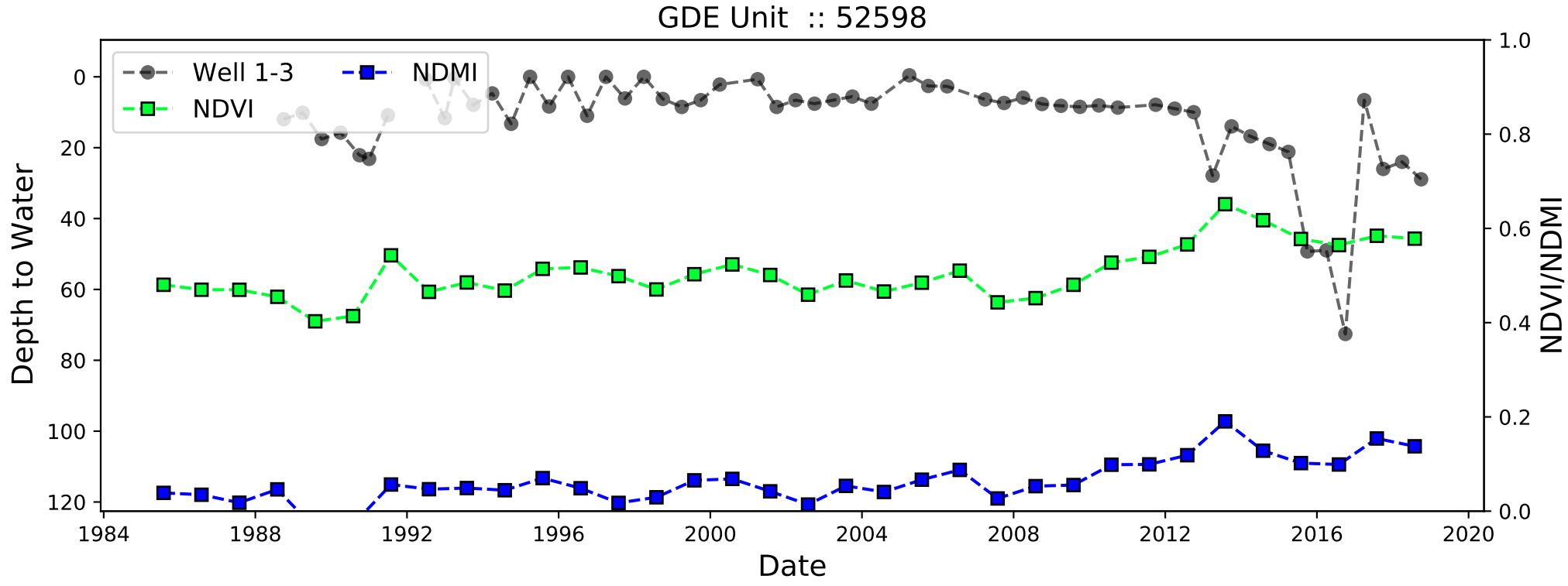

NDMI = 2.53e-03*GWELEV + -3.69e-01
R^2 = 0.2686
NDMI
Groundwater Elevation
0.25
0.20
0.15
0.10
0.05
0.00
150
160
170
180
190
200
210
220
230

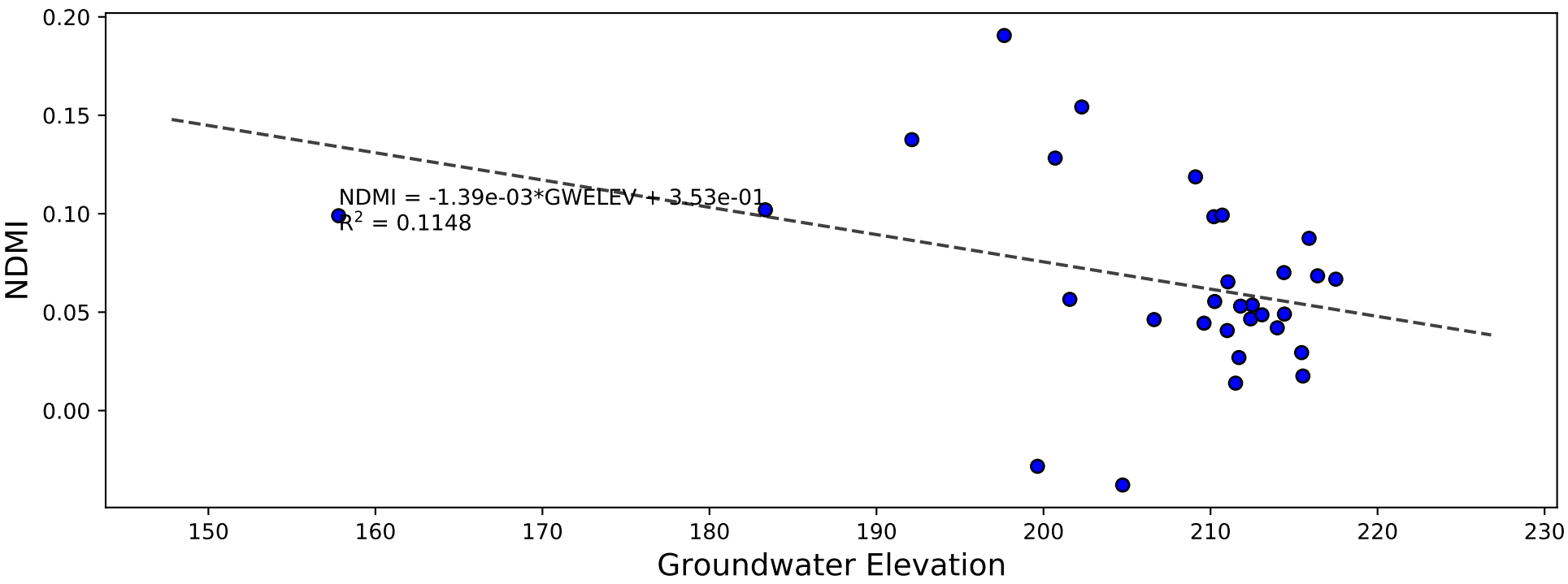

NDVI = 3.52e-04*GWELEV + 5.10e-01
R^2 = 0.0064
NDVI
Groundwater Elevation
0.650
0.625
0.600
0.575
0.550
0.525
0.500
0.475
150
160
170
180
190
200
210
220
230

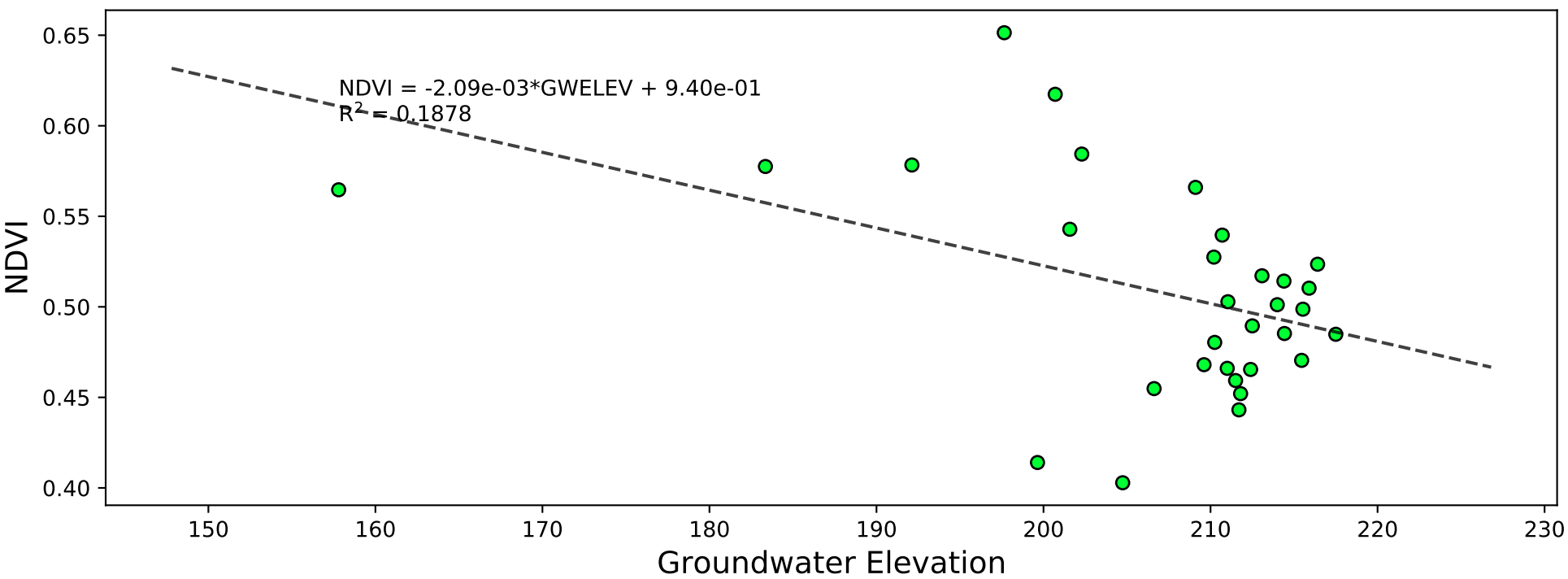

GDE Unit :: 51962
Well 1-3
NDMI
NDVI
Depth to Water
NDVI/NDMI
Date

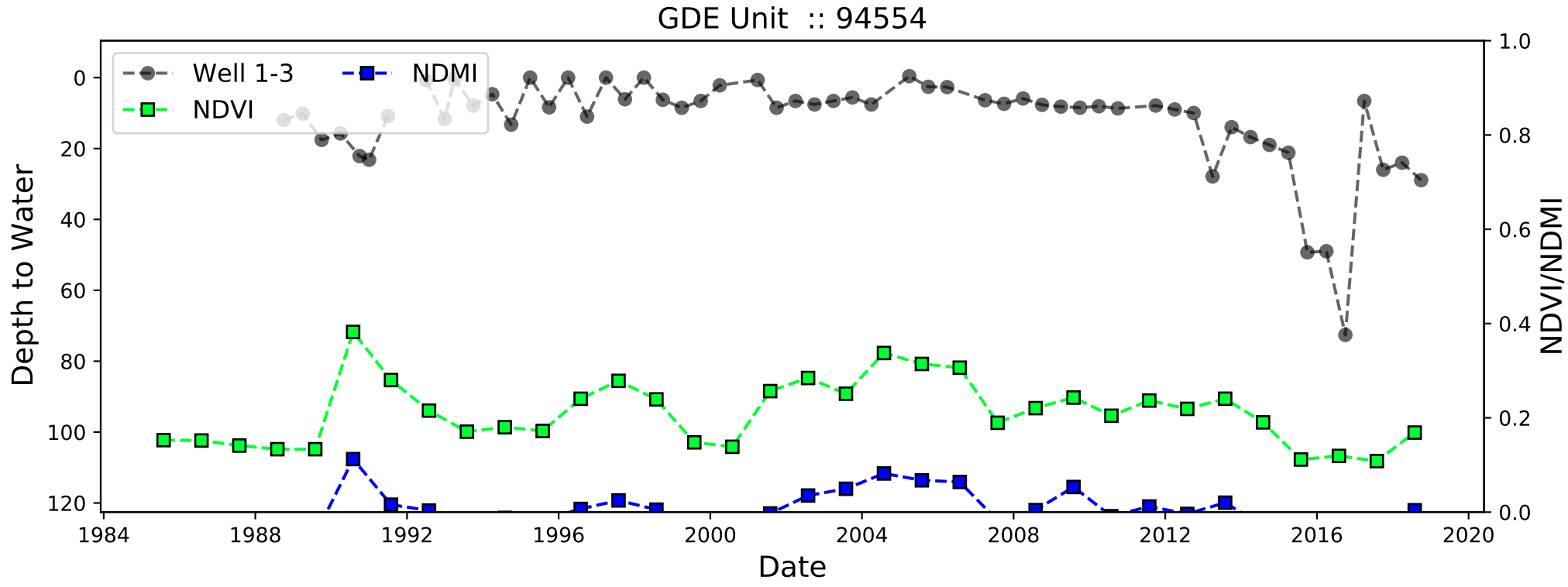

NDMI = 1.79e-03*GWELEV + -2.52e-01
R2 = 0.2436
NDMI
Groundwater Elevation

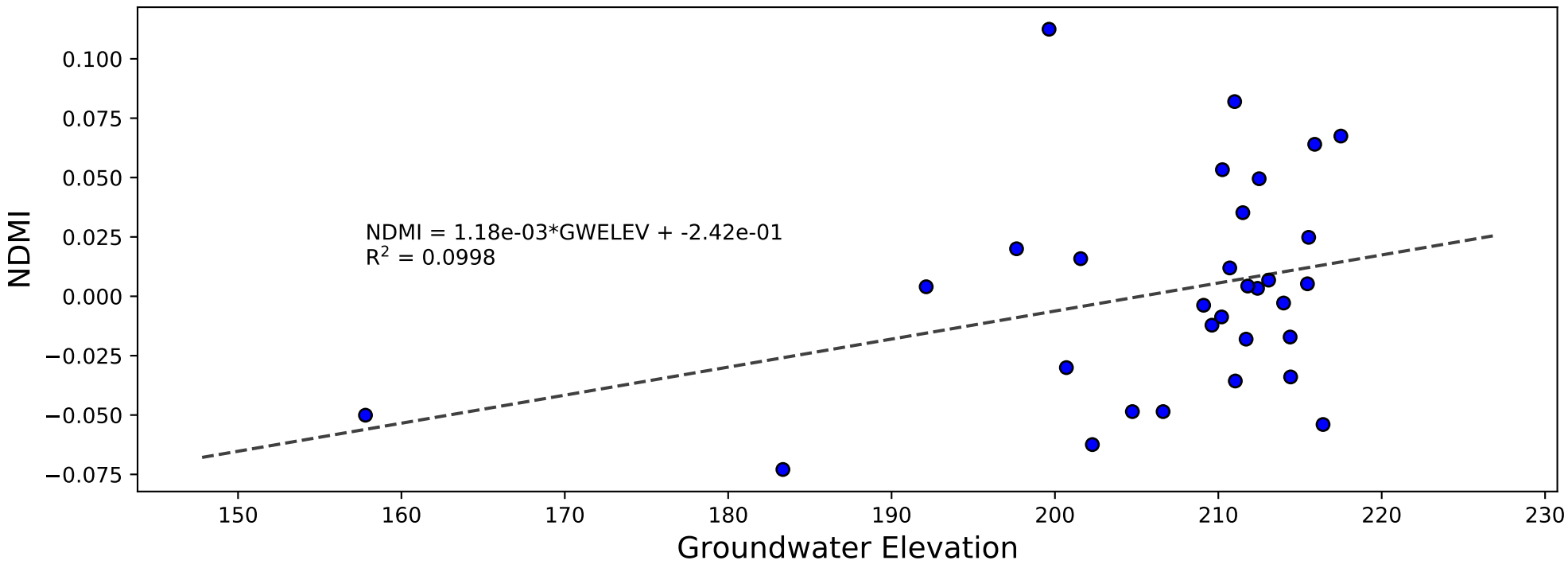

NDVI = -1.65e-05*GWELEV + 5.31e-01
R2 = 0.0000
NDVI
Groundwater Elevation

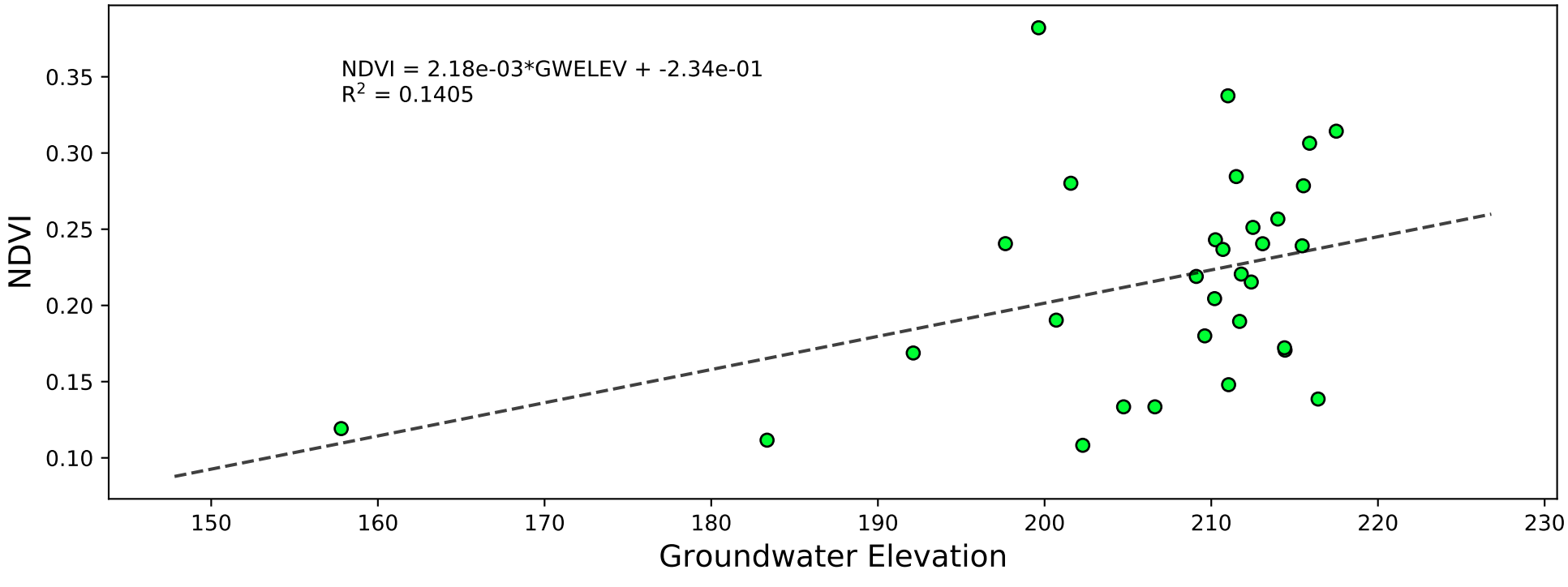

GDE Unit :: 52598
Well 1-3
NDMI
NDVI
Depth to Water
NDVI/NDMI
Date
0
20
40
60
80
100
120
1.0
0.8
0.6
0.4
0.2
0.0
1984
1988
1992
1996
2000
2004
2008
2012
2016
2020


NDMI = -1.39e-03*GWELEV + 3.53e-01
R² = 0.1148
NDMI
Groundwater Elevation
0.20
0.15
0.10
0.05
0.00
150
160
170
180
190
200
210
220
230


NDVI = -2.09e-03*GWELEV + 9.40e-01
R² = 0.1878
NDVI
Groundwater Elevation
0.65
0.60
0.55
0.50
0.45
0.40
150
160
170
180
190
200
210
220
230


GDE Unit :: 94554
Well 1-3
NDMI
NDVI
Depth to Water
NDVI/NDMI
Date
0
20
40
60
80
100
120
1.0
0.8
0.6
0.4
0.2
0.0
1984
1988
1992
1996
2000
2004
2008
2012
2016
2020


NDMI = 1.18e-03*GWELEV + -2.42e-01
R2 = 0.0998
NDMI
Groundwater Elevation
0.100
0.075
0.050
0.025
0.000
−0.025
−0.050
−0.075
150
160
170
180
190
200
210
220
230


NDVI = 2.18e-03*GWELEV + -2.34e-01
R2 = 0.1405
NDVI
Groundwater Elevation
0.35
0.30
0.25
0.20
0.15
0.10
150
160
170
180
190
200
210
220
230

Appendix G
Water Budget Tables

This appendix contains water budget tables that provide an 'accounting and assessment of the total volume of groundwater and surface water entering and leaving the basin, including historical, current, and projected water budgets conditions, and the change in the volume of water stored' (GSP Emergency Regulations, §354.18). The water budgets, and corresponding components, are reported on a water year basis and in units of acre-feet (AF) or acre-feet per year (AFY). The water budget tables summarize measured surface water importation volumes, estimates and measurements of total groundwater usage in the Montecito Groundwater Basin (MGB), and model-generated estimates of groundwater recharge, discharge, and total change in groundwater in storage. The water budget tables are separated into three distinct time periods: historical (water year 1970-2014), current (water years 2015-2019), and future (water years 2020-2069). Model-estimated water budgets were generated using the Montecito Basin Numerical Model. Additionally, the data reported in this appendix were used to support an evaluation of overdraft (Section 2.3.7) and develop an estimate of the MGB's sustainable yield (Section 2.3.8).

(This appendix is referenced throughout Section 2.3 of this GSP.)

Table G-1 Climate Stations Used to Simulate Precipitation in the BNM		
Station	Elevation [ft. MSL]	Historical Average Annual Precipitation [in.]
NOAA	16	17.3
Montecito	135	20.1
KTYD	2,375	25.7
Cold Springs Debris	519	23.1
Doulton Tunnel	1,775	27.2
Summerland	85	17.6

Table G-2
Historical (WY 1970-2014) Water Budget for the Montecito Groundwater Basin

		Inflows to Groundwater System (Acre-Feet)									Outflows from Groundwater System (Acre-Feet)									Change in Storage (Acre-Feet)	
					Subsurface Inflows									Subsurface Outflows							
Water Year	Water Year Type	Precipitation Recharge	Creek Recharge	Return Flows	From Santa Barbara Basin	From Carpinteria Basin	Mountain Front Recharge	Bedrock	Subtotal	Ocean	Total Inflows	Groundwater Production	Groundwater Discharges to Creeks	Surface Leakage	To Santa Barbara Basin	To Carpinteria Basin	Underflows to Mountain Front	Bedrock	Subtotal	Ocean	Total Outflows	Annual	Cumulative
1970	Dry	**2,419**	**6,826**	**665**	**4**	**86**	**411**	**694**	*1,195*	18	11,123	255	3,303	2,652	252	230	284	314	*1,080*	6,999	14,289	**-3,166**	**-3,166**
1971	Below Normal	**3,648**	**6,496**	**646**	**4**	**84**	**333**	**589**	*1,011*	25	11,826	258	2,892	2,183	228	226	244	400	*1,099*	6,266	12,698	**-872**	**-4,038**
1972	Dry	**3,245**	**5,865**	**720**	**4**	**79**	**280**	**565**	*929*	41	10,800	247	2,589	1,880	201	218	217	401	*1,037*	5,502	11,255	**-455**	**-4,494**
1973	Above Normal	**8,968**	**7,657**	**566**	**8**	**88**	**466**	**496**	*1,057*	29	18,277	281	3,564	2,943	258	234	296	624	*1,412*	7,221	15,421	**2,856**	**-1,638**
1974	Below Normal	**4,821**	**7,463**	**569**	**5**	**89**	**441**	**587**	*1,122*	22	13,997	280	3,506	2,850	242	235	299	395	*1,170*	7,054	14,860	**-863**	**-2,500**
1975	Above Normal	**6,239**	**7,598**	**551**	**6**	**89**	**461**	**538**	*1,094*	22	15,504	305	3,517	2,849	242	234	298	462	*1,236*	7,042	14,950	**554**	**-1,946**
1976	Below Normal	**2,519**	**6,529**	**588**	**3**	**80**	**343**	**622**	*1,048*	33	10,718	401	2,896	2,168	213	221	250	337	*1,021*	5,955	12,440	**-1,723**	**-3,669**
1977	Dry	**2,756**	**5,736**	**521**	**4**	**75**	**262**	**573**	*914*	68	9,996	624	2,409	1,759	194	211	217	355	*977*	5,222	10,991	**-995**	**-4,664**
1978	Wet	**15,778**	**7,601**	**536**	**8**	**107**	**584**	**563**	*1,263*	34	25,212	627	4,529	4,371	323	285	371	916	*1,895*	8,392	19,814	**5,398**	**734**
1979	Above Normal	**4,027**	**7,958**	**582**	**5**	**92**	**520**	**674**	*1,291*	19	13,877	453	3,826	3,257	287	240	339	351	*1,217*	7,982	16,735	**-2,858**	**-2,124**
1980	Above Normal	**7,487**	**7,487**	**580**	**6**	**94**	**504**	**575**	*1,179*	26	16,759	474	3,722	3,184	274	249	318	506	*1,346*	7,494	16,220	**539**	**-1,585**
1981	Below Normal	**3,546**	**6,832**	**610**	**3**	**83**	**399**	**605**	*1,089*	29	12,106	427	3,131	2,371	229	224	275	371	*1,099*	6,373	13,402	**-1,296**	**-2,881**
1982	Below Normal	**2,277**	**5,863**	**534**	**1**	**75**	**309**	**591**	*976*	60	9,710	451	2,546	1,786	198	208	227	345	*978*	5,303	11,065	**-1,355**	**-4,235**
1983	Wet	**9,482**	**7,964**	**552**	**3**	**74**	**610**	**531**	*1,218*	67	19,283	549	3,932	3,477	182	203	370	731	*1,485*	6,216	15,659	**3,623**	**-612**
1984	Below Normal	**3,596**	**7,691**	**681**	**4**	**75**	**550**	**621**	*1,250*	38	13,255	572	3,802	3,164	190	208	345	361	*1,104*	6,474	15,116	**-1,860**	**-2,472**
1985	Dry	**2,963**	**6,569**	**641**	**4**	**74**	**370**	**597**	*1,045*	52	11,271	658	2,941	2,219	182	206	257	386	*1,031*	5,574	12,422	**-1,151**	**-3,624**
1986	Above Normal	**7,851**	**7,215**	**628**	**7**	**88**	**434**	**524**	*1,054*	35	16,783	670	3,411	2,798	242	238	281	566	*1,328*	6,768	14,975	**1,808**	**-1,815**
1987	Dry	**2,171**	**5,545**	**662**	**3**	**81**	**306**	**647**	*1,037*	30	9,444	607	2,683	1,978	214	218	222	312	*967*	5,603	11,838	**-2,394**	**-4,209**
1988	Below Normal	**4,104**	**5,892**	**659**	**7**	**77**	**273**	**545**	*902*	43	11,599	666	2,532	1,825	208	211	214	438	*1,070*	5,388	11,481	**119**	**-4,091**
1989	Dry	**2,293**	**4,780**	**676**	**4**	**76**	**241**	**595**	*915*	69	8,734	837	2,160	1,513	188	207	185	359	*939*	4,634	10,083	**-1,349**	**-5,440**
1990	Critical	**3,874**	**4,900**	**606**	**2**	**70**	**286**	**535**	*893*	135	10,409	1,105	2,203	1,522	164	196	209	491	*1,060*	4,092	9,982	**427**	**-5,013**
1991	Above Normal	**5,274**	**5,187**	**518**	**4**	**71**	**293**	**534**	*902*	132	12,013	1,155	2,391	1,681	189	205	220	515	*1,128*	4,644	11,000	**1,013**	**-4,000**
1992	Above Normal	**8,814**	**6,946**	**564**	**6**	**88**	**453**	**530**	*1,077*	54	17,456	836	3,403	2,804	251	238	280	622	*1,391*	6,671	15,105	**2,350**	**-1,650**
1993	Wet	**13,233**	**8,359**	**570**	**9**	**112**	**679**	**631**	*1,431*	20	23,612	790	5,049	4,808	345	287	406	705	*1,742*	9,081	21,470	**2,142**	**492**
1994	Dry	**3,925**	**7,515**	**589**	**4**	**88**	**532**	**664**	*1,287*	24	13,340	772	3,771	3,105	252	226	339	369	*1,186*	7,061	15,894	**-2,554**	**-2,063**
1995	Wet	**15,115**	**8,111**	**556**	**8**	**115**	**685**	**629**	*1,437*	18	25,237	786	5,247	5,074	345	301	412	764	*1,821*	9,204	22,132	**3,105**	**1,042**
1996	Above Normal	**4,210**	**7,631**	**617**	**5**	**95**	**500**	**702**	*1,302*	17	13,777	729	3,767	3,161	298	248	333	361	*1,239*	7,974	16,870	**-3,093**	**-2,051**
1997	Above Normal	**8,015**	**7,924**	**693**	**7**	**106**	**537**	**588**	*1,237*	16	17,886	709	3,951	3,488	313	269	320	501	*1,403*	8,112	17,663	**223**	**-1,828**
1998	Wet	**18,052**	**8,399**	**570**	**9**	**139**	**706**	**688**	*1,542*	13	28,577	833	5,783	5,868	479	351	419	833	*2,081*	10,786	25,351	**3,226**	**1,398**
1999	Dry	**1,440**	**6,680**	**668**	**3**	**87**	**419**	**754**	*1,263*	22	10,073	738	3,280	2,630	266	226	287	270	*1,048*	6,808	14,505	**-4,432**	**-3,034**
2000	Above Normal	**6,214**	**6,777**	**696**	**7**	**85**	**398**	**560**	*1,050*	26	14,762	749	3,170	2,500	254	230	272	513	*1,268*	6,647	14,334	**428**	**-2,606**
2001	Above Normal	**9,434**	**7,446**	**679**	**8**	**103**	**486**	**544**	*1,142*	17	18,718	781	3,759	3,295	316	268	303	564	*1,451*	7,990	17,276	**1,442**	**-1,164**
2002	Dry	**2,493**	**6,056**	**720**	**4**	**85**	**344**	**665**	*1,098*	24	10,392	692	2,908	2,228	245	222	242	326	*1,035*	6,160	13,023	**-2,631**	**-3,795**
2003	Above Normal	**7,738**	**7,674**	**700**	**6**	**92**	**429**	**501**	*1,028*	25	17,164	719	3,414	2,736	261	240	280	542	*1,324*	7,179	15,372	**1,792**	**-2,003**
2004	Dry	**4,075**	**6,708**	**783**	**5**	**85**	**378**	**572**	*1,040*	34	12,641	902	3,048	2,340	241	226	265	383	*1,115*	6,160	13,565	**-924**	**-2,927**
2005	Wet	**16,446**	**8,418**	**705**	**8**	**115**	**685**	**628**	*1,437*	24	27,030	949	5,467	5,366	365	302	421	838	*1,927*	9,397	23,107	**3,924**	**997**
2006	Above Normal	**5,377**	**8,090**	**689**	**6**	**94**	**544**	**660**	*1,305*	19	15,481	904	3,992	3,438	296	244	350	399	*1,288*	8,032	17,655	**-2,173**	**-1,177**
2007	Critical	**1,398**	**5,731**	**822**	**2**	**85**	**341**	**680**	*1,108*	39	9,098	1,062	2,723	2,015	221	203	234	299	*956*	5,351	12,107	**-3,009**	**-4,186**
2008	Below Normal	**6,867**	**6,753**	**812**	**5**	**85**	**405**	**544**	*1,039*	43	15,514	1,034	3,148	2,501	233	205	272	579	*1,289*	6,050	14,022	**1,492**	**-2,694**
2009	Dry	**2,567**	**6,177**	**749**	**3**	**79**	**313**	**594**	*989*	58	10,540	923	2,673	1,923	200	194	232	361	*987*	5,344	11,849	**-1,309**	**-4,003**
2010	Above Normal	**7,722**	**7,734**	**681**	**7**	**83**	**450**	**492**	*1,032*	43	17,212	983	3,371	2,732	236	202	292	579	*1,308*	6,620	15,014	**2,198**	**-1,805**
2011	Wet	**10,078**	**8,079**	**622**	**6**	**92**	**612**	**542**	*1,253*	23	20,056	940	4,244	3,711	278	217	384	594	*1,472*	7,875	18,242	**1,814**	**8**
2012	Dry	**1,772**	**6,597**	**672**	**4**	**80**	**407**	**694**	*1,185*	32	10,258	987	3,129	2,429	206	191	282	308	*988*	5,949	13,481	**-3,223**	**-3,215**
2013	Dry	**2,443**	**6,034**	**761**	**4**	**75**	**316**	**593**	*987*	53	10,279	1,083	2,559	1,837	192	181	231	386	*990*	5,044	11,512	**-1,233**	**-4,448**
2014	Critical	**1,680**	**4,584**	**631**	**2**	**69**	**218**	**605**	*894*	152	7,941	1,476	1,995	1,327	159	170	179	363	*871*	3,718	9,386	**-1,445**	**-5,893**
1970-2014 Avg		**5,966**	**6,891**	**641**	**5**	**88**	**434**	**597**	***1,123***	**41**	**14,661**	**717**	**3,385**	**2,794**	**248**	**230**	**288**	**475**	***1,241***	**6,654**	**14,792**	**-131**	
Critical WY Type Avg		2,317	5,072	686	2	75	281	607	*965*	109	9,149	1,214	2,307	1,621	181	190	207	384	*962*	4,387	10,492	-1,343	
Dry WY Type Avg		2,659	6,238	679	4	81	352	631	1,068	40	10,684	717	2,881	2,192	218	212	251	348	1,029	5,851	12,670	-1,986	
Below Normal WY Type Avg		3,922	6,690	637	4	81	382	588	1,055	37	12,341	511	3,057	2,356	218	217	266	403	1,104	6,108	13,135	-795	
Above Normal WY Type Avg		6,955	7,380	625	6	91	462	566	1,125	34	16,119	696	3,518	2,919	265	238	299	507	1,310	7,170	15,614	506	
Wet WY Type Avg		14,026	8,133	587	7	108	652	602	1,369	29	24,144	782	4,893	4,668	331	278	398	769	1,775	8,707	20,825	3,319	

Table G-3
Average Annual Water Budget Components by Subarea in the Montecito Groundwater Basin

Water Budget Component			1970-2014 Average					
			Storage Unit 1	Storage Unit 2	Storage Unit 3	Toro Canyon	Summerland Area	Entire MGB
Inflows to Groundwater System (Acre-Feet)		Precipitation Recharge	2,935	593	1,345	859	235	5,966
		Creek Recharge	1,963	403	3,652	797	75	6,891
		Return Flows	299	69	132	124	18	641
	Subsurface Inflows	From Santa Barbara Basin	0	-	5	-	-	5
		From Carpinteria Basin	-	-	-	88	0	88
		Mountain Front Recharge	118	133	97	85	4	437
		Bedrock	297	116	61	102	21	597
		From Adjacent Storage Units	591	3,249	3,133	52	71	-
		Subtotal	1,006	3,498	3,296	327	70	1,127
		Ocean	0	0	39	0	1	41
		Total Inflows	***6,203***	***4,562***	***8,463***	***2,107***	***426***	**14,665**
Outflows from Groundwater System (Acre-Feet)		Groundwater Production	286	90	284	57	0	717
		Groundwater Discharges to Creeks	522	1,235	1,205	418	4	3,385
		Surface Leakage	793	822	934	235	11	2,794
	Subsurface Outflows	To Santa Barbara Basin	0	0	248	0	0	248
		To Carpinteria Basin	0	0	0	230	0	230
		Outflows to Mountain Front	122	54	51	54	8	289
		Bedrock	257	93	29	75	21	475
		To Adjacent Storage Units	4,289	2,289	401	56	52	0
		Subtotal	4,668	147	328	359	30	5,531
		Ocean	0	0	5,441	884	329	6,654
		Total Outflows	**6,269**	**4,583**	**8,592**	**2,010**	**426**	**14,793**
Storage Change			-66	-21	-129	97	0	-128

Table G-4
Land Use Type and Corresponding Water Use Factors Used to Estimate Private Well Extractions in the Montecito Groundwater Basin

Land Use	Irrigated Land Type	Water Use Factor (Acre-Feet Per Year Per Acre)
High Density Residential	Turf	3.38[a]
Low Density Residential	Turf	3.38[a]
Irrigated Pasture	Pasture	4.4[b]
Orchard	Citrus	2[a]
Vineyards	Grapes	2.4[b]
Native Chapparal	Native Vegetation	0.0338[c]

[a]Dudek (2016)

[b]California Department of Water Resources Land and Water Use Data, WY 2011-2015

[c]Estimated by MWD to be 1% of turf requirements

Table G-5
Groundwater Extractions from Wells Located within the Montecito Groundwater Basin

Water Year Ending	Water Year Type	Private Wells		Estimated Water Company Extractions	Montecito Water District Production	Total Extractions within the MGB
		Estimated Extractions (Acre-Feet)	Estimated No. of Active Wells[a]			
1970	Dry	315	72	13	0	**328**
1971	Below Normal	318	69	13	0	**332**
1972	Dry	304	57	13	54	**371**
1973	Above Normal	338	72	13	116	**468**
1974	Below Normal	340	83	13	87	**441**
1975	Above Normal	365	88	13	81	**459**
1976	Below Normal	383	98	13	82	**478**
1977	Dry	341	134	13	282	**637**
1978	Wet	361	167	13	243	**617**
1979	Above Normal	356	174	13	85	**454**
1980	Above Normal	351	183	13	104	**468**
1981	Below Normal	348	200	13	108	**469**
1982	Below Normal	400	219	13	84	**497**
1983	Wet	489	197	13	60	**562**
1984	Below Normal	462	160	13	150	**625**
1985	Dry	492	191	43	175	**710**
1986	Above Normal	507	219	43	177	**726**
1987	Dry	527	203	43	118	**687**
1988	Below Normal	623	189	43	160	**826**
1989	Dry	629	200	43	322	**994**
1990	Critical	711	244	43	521	**1,274**
1991	Above Normal	839	341	43	440	**1,321**
1992	Above Normal	786	271	43	140	**969**
1993	Wet	770	265	43	128	**940**
1994	Dry	763	287	43	123	**928**
1995	Wet	791	296	43	105	**939**
1996	Above Normal	733	293	43	124	**899**
1997	Above Normal	663	252	43	156	**861**
1998	Wet	807	325	43	124	**973**
1999	Dry	774	285	43	72	**888**
2000	Above Normal	768	306	43	113	**923**
2001	Above Normal	808	288	43	65	**916**
2002	Dry	724	253	43	79	**845**
2003	Above Normal	758	283	43	78	**879**
2004	Dry	671	230	43	326	**1,039**
2005	Wet	778	342	43	266	**1,087**
2006	Above Normal	795	343	43	246	**1,084**
2007	Critical	724	252	43	465	**1,231**
2008	Below Normal	734	258	43	417	**1,194**
2009	Dry	786	284	43	281	**1,110**
2010	Above Normal	882	328	43	233	**1,157**
2011	Wet	942	348	43	130	**1,115**
2012	Dry	893	335	43	233	**1,168**
2013	Dry	803	277	43	339	**1,184**
2014	Critical	1,014	364	43	614	**1,670**
2015	Critical	1,234	385	43	582	**1,859**
2016	Dry	1,285	413	43	540	**1,868**
2017	Above Normal	1,332	463	36	637	**2,004**
2018	Critical	1,206	460	41	450	**1,697**
2019	Above Normal	1,273	466	43	314	**1,629**
1970-2014 Avg		**621**	**229**	**33**	**185**	**839**
2015-2019 Avg		**1,266**	**437**	**41**	**505**	**1,811**
Critical WY Type Avg (1970-2014)		816	287	43	533	1,392
Dry WY Type Avg (1970-2014)		617	216	36	185	838
Below Normal WY Type Avg (1970-2014)		451	160	21	136	608
Above Normal WY Type Avg (1970-2014)		639	246	34	154	828
Wet WY Type Avg (1970-2014)		705	277	34	151	890

[a]Includes wells that produce solely from the bedrock that underlies the MGB.

Table G-6 Water Year Type Classification for the 1970-2014 WY Period		
Water Year Type	**No. of Occurrences**	**Years with Corresponding WY Type Classification**
Critical	3	1990, 2007, 2014
Dry	13	1970, 1972, 1977, 1985, 1987, 1989, 1994, 1999, 2002, 2004, 2009, 2012, 2013
Below	8	1971, 1974, 1976, 1981, 1982, 1984, 1988, 2008
Above Normal	14	1973, 1975, 1979, 1980, 1986, 1991, 1992, 1996, 1997, 2000, 2001, 2003, 2006, 2010
Wet	7	1978, 1983, 1993, 1998, 2005, 2011

Table G-7
Historical (WY 1970-2014) Surface Water Supplies to the Montecito Groundwater Basin

Water Year	Water Year Type	Local and Regional Surface Water Supplies							Imported Water Supplies[a]	Total Surface Water Supplies
		Fox Creek Diversions	Cachuma Reservoir	Alder Creek Diversions	Doulton	Juncal Seepage	Jameson Reservoir	Subtotal	SWP	
1970	Dry	138	2,043	183	250	NR	2,630	*5,244*		**5,244**
1971	Below Normal	NR	2,251	216	383	NR	2,176	*5,026*		**5,026**
1972	Dry	57	3,849	99	285	NR	1,572	*5,863*		**5,863**
1973	Above Normal	938	1,373	354	253	NR	1,116	*4,034*		**4,034**
1974	Below Normal	453	1,909	319	261	NR	1,082	*4,025*		**4,025**
1975	Above Normal	86	1,595	345	586	NR	1,113	*3,725*		**3,725**
1976	Below Normal	263	2,723	153	254	NR	867	*4,261*		**4,261**
1977	Dry	NR	1,527	115	272	NR	1,322	*3,236*		**3,236**
1978	Wet	NR	1,516	160	820	NR	908	*3,403*		**3,403**
1979	Above Normal	NR	1,033	654	551	NR	1,834	*4,072*		**4,072**
1980	Above Normal	NR	1,148	344	691	NR	1,898	*4,081*		**4,081**
1981	Below Normal	NR	1,804	231	341	NR	2,086	*4,463*		**4,463**
1982	Below Normal	NR	1,601	50	353	NR	1,573	*3,577*		**3,577**
1983	Wet	NR	1,202	628	1,016	NR	1,013	*3,859*		**3,859**
1984	Below Normal	NR	2,201	321	849	NR	1,923	*5,294*		**5,294**
1985	Dry	NR	2,478	198	519	NR	1,676	*4,871*		**4,871**
1986	Above Normal	NR	2,452	241	794	NR	1,180	*4,667*		**4,667**
1987	Dry	NR	2,704	126	685	NR	1,663	*5,178*		**5,178**
1988	Below Normal	NR	3,006	196	536	NR	1,352	*5,089*		**5,089**
1989	Dry	NR	2,889	210	484	NR	1,524	*5,107*		**5,107**
1990	Critical	NR	2,143	111	553	NR	1,309	*4,116*		**4,116**
1991	Above Normal	NR	1,782	51	382	NR	914	*3,129*		**3,129**
1992	Above Normal	NR	1,945	631	395	NR	929	*3,900*		**3,900**
1993	Wet	NR	1,687	478	932	154	753	*4,004*		**4,004**
1994	Dry	NR	1,771	251	146	196	1,830	*4,194*		**4,194**
1995	Wet	NR	1,646	33	783	142	1,302	*3,906*		**3,906**
1996	Above Normal	NR	2,163	NR	209	129	2,039	*4,540*		**4,540**
1997	Above Normal	NR	2,800	NR	244	103	2,306	*5,453*		**5,453**
1998	Wet	NR	2,202	NR	1,141	100	1,042	*4,485*		**4,485**
1999	Dry	NR	2,777	NR	264	87	1,862	*4,990*	301	**5,291**
2000	Above Normal	NR	2,522	NR	291	84	1,929	*4,826*	701	**5,527**
2001	Above Normal	NR	2,974	NR	389	46	1,549	*4,958*	0	**4,958**
2002	Dry	NR	2,927	NR	201	36	1,873	*5,037*	621	**5,658**
2003	Above Normal	NR	2,458	NR	297	18	1,397	*4,170*	1,403	**5,573**
2004	Dry	NR	3,273	NR	171	10	1,377	*4,831*	1,395	**6,226**
2005	Wet	NR	2,979	NR	791	86	931	*4,787*	590	**5,377**
2006	Above Normal	NR	3,456	NR	564	90	1,229	*5,339*	0	**5,339**
2007	Critical	NR	2,425	NR	247	51	1,778	*4,500*	2,146	**6,646**
2008	Below Normal	NR	2,245	NR	476	71	1,444	*4,237*	2,582	**6,819**
2009	Dry	NR	3,498	NR	347	52	1,249	*5,145*	1,196	**6,341**
2010	Above Normal	NR	3,123	NR	430	77	1,432	*5,061*	500	**5,561**
2011	Wet	NR	2,751	NR	604	91	1,365	*4,811*	218	**5,029**
2012	Dry	NR	3,610	NR	285	62	1,988	*5,945*	0	**5,945**
2013	Dry	NR	3,209	NR	137	13	864	*4,223*	661	**4,884**
2014	Critical	NR	1,171	NR	187	NR	618	*1,975*	2,501	**4,476**
1970-2014 Avg		**323**	**2,330**	**258**	**459**	**81**	**1,463**	***4,481***	**926**	**4,810**
Critical WY Type Avg		NR	1,913	111	329	51	1,235	3,530	2,323	5,079
Dry WY Type Avg		98	2,812	169	311	65	1,648	4,913	696	5,234
Below Normal WY Type Avg		358	2,218	212	432	71	1,563	4,496	2,582	4,819
Above Normal WY Type Avg		512	2,202	374	434	78	1,490	4,425	521	4,611
Wet WY Type Avg		NR	1,998	325	870	115	1,045	4,179	404	4,295

[a]Average values represent averages computed over the period from water year 1999 to water year 2014.
"NR" refers to "not recorded."

Table G-8

Surface Water Supplies to the Montecito Groundwater Basin under Current Conditions (WY 2015-2019)

Water Year	Water Year Type	Local and Regional Surface Water Supplies							Imported Water Supplies	Total Surface Water Supplies
		Fox Creek Diversions	Cachuma Reservoir	Alder Creek Diversions	Doulton	Juncal Seepage	Jameson Reservoir	Subtotal	SWP	
2015	Critical	NR	473	NR	159	NR	352	*984*	2,151	**3,134**
2016	Dry	NR	2,309	NR	138	NR	303	*2,750*	472	**3,222**
2017	Above Normal	NR	332	NR	298	44	156	*831*	2,039	**2,870**
2018	Critical	NR	0	NR	215	104	104	*422*	3,542	**3,964**
2019	Above Normal	NR	737	NR	533	120	542	*1,932*	1,368	**3,300**
2015-2019 Avg		**NR**	**770**	**NR**	**269**	**89**	**291**	***1,384***	**1,914**	**3,298**

"NR" refers to "not recorded."

Table G-9
Current Conditions (WY 2015-2019) Water Budget for the Montecito Groundwater Basin

		Inflows to Groundwater System (Acre-Feet)										Outflows from Groundwater System (Acre-Feet)										Change in Storage (Acre-Feet)	
					Subsurface Inflows										Subsurface Outflows								
Water Year	**Water Year Type**	Precipitation Recharge	Creek Recharge	Return Flows	From Santa Barbara Basin	From Carpinteria Basin	Mountain Front Recharge	Bedrock	Subtotal	Ocean	Total Inflows	Groundwater Production	Groundwater Discharges to Creeks	Surface Leakage	To Santa Barbara Basin	To Carpinteria Basin	Underflows to Mountain Front	Bedrock	Subtotal	Ocean	Total Outflows	**Annual**	**Cumulative Change since the start of WY 1970**
2015	Critical	1,969	4,247	501	3	67	198	575	*843*	240	7,799	**1,506**	**1,801**	**1,116**	**150**	**163**	**174**	**393**	*881*	**3,344**	8,648	**-849**	**-6,742**
2016	Dry	2,362	4,048	343	3	66	196	543	*807*	271	7,831	**1,434**	**1,674**	**964**	**149**	**158**	**173**	**409**	*888*	**3,136**	8,096	**-265**	**-7,007**
2017	Above Normal	10,385	6,121	326	9	89	368	491	*957*	128	17,917	**1,623**	**2,852**	**2,246**	**237**	**217**	**243**	**806**	*1,503*	**5,556**	13,780	**4,137**	**-2,870**
2018	Critical	1,597	4,868	381	2	76	228	642	*948*	71	7,865	**1,289**	**2,166**	**1,497**	**195**	**182**	**178**	**299**	*854*	**4,570**	10,377	**-2,512**	**-5,382**
2019	Above Normal	7,119	6,224	343	7	84	335	505	*931*	73	14,690	**1,233**	**2,710**	**2,047**	**212**	**197**	**235**	**639**	*1,284*	**5,443**	12,717	**1,973**	**-3,409**
2015-2019 Avg		**4,687**	**5,102**	**379**	**5**	**76**	**265**	**551**	***897***	**157**	**11,221**	**1,417**	**2,241**	**1,574**	**189**	**184**	**201**	**509**	***1,082***	**4,410**	**10,724**	**497**	

Table G-10
Average Annual Water Budget Components by Subarea in the Montecito Groundwater Basin

Water Budget Component			1970-2014 Average						2015-2019 Average					
			Storage Unit 1	Storage Unit 2	Storage Unit 3	Toro Canyon	Summerland Area	Entire B118 Basin	Storage Unit 1	Storage Unit 2	Storage Unit 3	Toro Canyon	Summerland Area	Entire MGB
Inflows to Groundwater System (Acre-Feet)		Precipitation Recharge	2,935	593	1,345	859	235	***5,966***	2,162	553	1,059	688	224	**4,687**
		Creek Recharge	1,963	403	3,652	797	75	***6,891***	1,678	202	2,455	698	68	**5,102**
		Return Flows	299	69	132	124	18	***641***	174	38	75	80	12	**379**
	Subsurface Inflows	From Santa Barbara Basin	0	-	5	-	-	***5***			5			**5**
		From Carpinteria Basin	-	-	-	88		***88***				76		**76**
		Mountain Front Recharge	118	133	97	85	4	***437***	93	32	73	64	3	**265**
		Bedrock	297	116	61	102	21	***597***	268	113	57	93	20	**551**
		From Adjacent Storage Units	591	3,249	3,133	52	71	-	479	2,307	2,583	44	64	-
		Subtotal	1,006	3,498	3,296	327	70	***1,127***	840	2,452	2,718	277	87	**898**
		Ocean			39	0	1	***41***			153	2	1	**157**
		Total Inflows	***6,203***	***4,562***	***8,463***	***2,107***	***426***	***14,665***	***4,853***	***3,246***	***6,460***	***1,745***	***393***	**11,221**
Outflows from Groundwater System (Acre-Feet)		Groundwater Production	286	90	284	57	0	***717***	420	169	649	179	0	**1,417**
		Groundwater Discharges to Creeks	522	1,235	1,205	418	4	***3,385***	275	661	976	325	3	**2,241**
		Surface Leakage	793	822	934	235	11	***2,794***	389	319	699	158	10	**1,574**
	Subsurface Outflows	To Santa Barbara Basin			248			***248***			189			**189**
		To Carpinteria Basin				230		***230***				184		**184**
		Outflows to Mountain Front	122	54	51	54	8	***289***	105	3	40	45	7	**200**
		Bedrock	257	93	29	75	21	***475***	278	97	31	79	24	**510**
		To Adjacent Storage Units	4,289	2,289	401	56	52		3,102	1,923	352	48	50	
		Subtotal	4,668	147	328	359	30	***5,531***	382	100	260	308	31	**1,082**
		Ocean			5,441	884	329	***6,654***			3,516	611	283	**4,410**
		Total Outflows	6,269	4,583	8,592	2,010	426	***14,793***	4,569	3,172	6,453	1,629	377	**10,724**
Storage Change			**-66**	**-21**	**-129**	**97**	**0**	***-128***	**285**	**74**	**7**	**116**	**16**	**497**

Table G-11
Future Baseline (WY 2020-2069) Water Budget for the Montecito Groundwater Basin

	Inflows to Groundwater System (Acre-Feet)										Outflows from Groundwater System (Acre-Feet)										Change in Storage (Acre-Feet)	
				Subsurface Inflows										Subsurface Outflows								
Water Year	Precipitation Recharge	Creek Recharge	Return Flows	From Santa Barbara Basin	From Carpinteria Basin	Mountain Front Recharge	Bedrock	Subtotal	Ocean	Total Inflows	Groundwater Production	Groundwater Discharges to Creeks	Surface Leakage	To Santa Barbara Basin	To Carpinteria Basin	Underflows to Mountain Front	Bedrock	Subtotal	Ocean	Total Outflows	Annual	Cumulative
2020	3,822	5,749	517	5	81	274	566	*927*	81	11,095	1,433	2,463	1,773	219	196	212	407	1,035	*5,234*	11,937	**-842**	**-842**
2021	4,464	5,986	516	4	81	288	555	*928*	91	11,985	1,439	2,510	1,812	212	195	219	461	1,087	*5,259*	12,107	**-122**	**-964**
2022	3,426	5,376	516	4	76	260	561	*901*	126	10,345	1,438	2,282	1,601	187	184	206	433	1,009	*4,558*	10,888	**-543**	**-1,508**
2023	8,912	7,294	516	7	85	448	487	*1,028*	79	17,829	1,491	3,197	2,584	246	202	282	655	1,385	*6,332*	14,989	**2,840**	**1,332**
2024	5,017	7,187	517	5	88	420	581	*1,094*	61	13,875	1,465	3,229	2,549	232	205	285	431	1,152	*6,185*	14,580	**-705**	**628**
2025	6,080	7,294	516	6	87	441	535	*1,069*	59	15,018	1,478	3,214	2,537	231	204	285	478	1,198	*6,228*	14,655	**363**	**990**
2026	2,632	6,073	516	3	78	313	607	*1,001*	86	10,307	1,447	2,557	1,838	202	190	230	363	985	*5,088*	11,916	**-1,609**	**-619**
2027	3,041	5,415	516	4	73	249	556	*882*	120	9,973	1,446	2,192	1,550	185	181	203	394	963	*4,505*	10,656	**-683**	**-1,302**
2028	15,692	7,543	517	8	106	570	563	*1,248*	60	25,060	1,516	4,358	4,165	316	256	363	934	1,868	*7,860*	19,767	**5,292**	**3,990**
2029	4,056	7,755	516	5	91	508	667	*1,271*	32	13,630	1,482	3,611	3,009	278	212	329	371	1,190	*7,233*	16,526	**-2,896**	**1,094**
2030	7,703	7,306	516	6	92	487	568	*1,153*	47	16,724	1,496	3,513	2,940	263	218	305	536	1,323	*6,777*	16,049	**675**	**1,769**
2031	3,274	6,533	516	3	82	382	613	*1,079*	65	11,466	1,473	2,880	2,145	221	195	261	377	1,054	*5,586*	13,139	**-1,673**	**96**
2032	2,413	5,533	517	1	73	292	585	*952*	114	9,528	1,461	2,269	1,587	189	179	214	367	950	*4,513*	10,780	**-1,252**	**-1,155**
2033	9,643	7,815	516	3	72	598	527	*1,201*	126	19,301	1,536	3,699	3,232	174	174	365	760	1,472	*5,550*	15,490	**3,811**	**2,656**
2034	3,414	7,482	516	4	73	538	618	*1,233*	93	12,738	1,504	3,578	2,918	178	178	336	364	1,056	*5,732*	14,788	**-2,050**	**606**
2035	2,960	6,290	516	4	72	354	592	*1,022*	118	10,905	1,473	2,717	1,995	172	175	247	398	991	*4,904*	12,081	**-1,175**	**-569**
2036	7,879	7,001	517	7	86	417	521	*1,031*	79	16,506	1,510	3,188	2,577	232	208	272	590	1,302	*6,097*	14,674	**1,832**	**1,263**
2037	2,148	5,257	516	3	79	286	646	*1,015*	85	9,021	1,466	2,461	1,769	202	188	210	326	926	*4,877*	11,499	**-2,478**	**-1,215**
2038	4,122	5,587	516	6	75	261	538	*881*	112	11,218	1,472	2,289	1,630	198	179	206	455	1,037	*4,669*	11,098	**119**	**-1,095**
2039	2,334	4,548	516	4	73	236	584	*897*	155	8,449	1,464	2,000	1,352	176	175	181	374	906	*3,994*	9,717	**-1,268**	**-2,363**
2040	4,003	4,774	517	2	68	283	528	*881*	228	10,403	1,492	2,118	1,408	156	167	207	524	1,055	*3,707*	9,780	**623**	**-1,740**
2041	5,401	5,115	516	4	69	296	527	*898*	179	12,109	1,501	2,308	1,610	179	177	221	541	1,118	*4,431*	10,967	**1,141**	**-599**
2042	8,775	6,801	516	6	87	448	528	*1,069*	87	17,247	1,534	3,255	2,670	238	209	277	633	1,357	*6,189*	15,005	**2,242**	**1,643**
2043	13,286	8,257	516	9	112	672	627	*1,420*	32	23,510	1,560	4,897	4,654	331	259	405	718	1,713	*8,507*	21,331	**2,179**	**3,822**
2044	3,935	7,445	517	4	87	534	663	*1,288*	45	13,230	1,535	3,668	3,002	239	199	338	381	1,157	*6,510*	15,873	**-2,643**	**1,178**
2045	15,167	8,026	516	8	114	685	629	*1,436*	34	25,180	1,570	5,102	4,912	331	272	411	783	1,797	*8,642*	22,023	**3,156**	**4,335**
2046	4,188	7,498	516	5	94	494	699	*1,292*	30	13,524	1,525	3,631	3,025	284	220	331	366	1,200	*7,336*	16,718	**-3,194**	**1,141**
2047	7,966	7,767	516	7	104	524	586	*1,222*	33	17,504	1,544	3,760	3,276	297	239	314	507	1,357	*7,455*	17,392	**112**	**1,253**
2048	18,359	8,393	517	9	138	703	689	*1,539*	22	28,831	1,571	5,676	5,747	464	323	417	869	2,073	*10,285*	25,351	**3,479**	**4,732**
2049	1,464	6,552	516	4	86	416	754	*1,260*	42	9,834	1,514	3,175	2,525	249	197	284	278	1,009	*6,179*	14,403	**-4,568**	**164**
2050	6,109	6,576	516	7	83	386	563	*1,039*	63	14,303	1,528	2,992	2,332	236	198	266	528	1,228	*5,954*	14,034	**269**	**433**
2051	9,430	7,259	516	8	102	473	540	*1,124*	37	18,366	1,562	3,569	3,058	299	239	297	581	1,416	*7,263*	16,868	**1,498**	**1,931**
2052	2,320	5,759	517	4	84	327	670	*1,084*	65	9,745	1,515	2,688	2,031	228	192	232	330	982	*5,396*	12,612	**-2,867**	**-936**
2053	7,951	7,420	516	6	90	414	497	*1,006*	60	16,953	1,556	3,177	2,495	243	208	273	581	1,305	*6,392*	14,926	**2,028**	**1,091**
2054	4,003	6,392	516	5	84	365	571	*1,024*	69	12,004	1,542	2,818	2,095	224	196	254	392	1,066	*5,535*	13,055	**-1,051**	**41**
2055	16,595	8,348	516	9	113	669	619	*1,410*	34	26,904	1,600	5,213	5,126	347	271	414	872	1,905	*8,885*	22,728	**4,176**	**4,216**
2056	5,353	7,984	517	6	93	540	660	*1,299*	30	15,183	1,564	3,853	3,287	282	215	347	410	1,254	*7,482*	17,439	**-2,256**	**1,960**
2057	1,383	5,437	516	2	80	324	680	*1,086*	79	8,501	1,523	2,509	1,828	207	188	225	299	919	*4,863*	11,642	**-3,141**	**-1,181**
2058	6,835	6,450	516	5	81	381	540	*1,007*	91	14,899	1,568	2,873	2,240	219	193	260	596	1,267	*5,517*	13,465	**1,434**	**253**
2059	2,652	5,884	516	3	76	294	589	*962*	118	10,131	1,537	2,424	1,725	190	184	220	374	968	*4,731*	11,385	**-1,254**	**-1,001**
2060	7,717	7,552	517	7	81	436	490	*1,013*	83	16,883	1,585	3,157	2,547	226	194	283	597	1,301	*6,027*	14,617	**2,265**	**1,264**
2061	10,270	7,957	516	6	91	602	536	*1,234*	43	20,019	1,618	4,089	3,561	270	211	378	614	1,473	*7,258*	17,999	**2,020**	**3,284**
2062	1,959	6,706	516	2	79	458	675	*1,214*	80	10,474	1,566	3,140	2,429	191	187	297	334	1,008	*5,426*	13,570	**-3,096**	**188**
2063	1,685	5,027	516	3	70	263	625	*961*	114	8,303	1,531	2,142	1,489	180	172	196	314	862	*4,294*	10,319	**-2,015**	**-1,827**
2064	3,398	5,371	517	5	71	250	541	*867*	136	10,289	1,542	2,069	1,402	191	173	201	454	1,018	*4,392*	10,423	**-134**	**-1,961**
2065	1,471	4,559	516	1	68	203	569	*842*	225	7,613	1,528	1,785	1,093	160	167	170	351	847	*3,520*	8,773	**-1,159**	**-3,120**
2066	5,406	5,942	516	5	67	313	474	*859*	251	12,974	1,580	2,313	1,604	158	166	231	629	1,183	*4,128*	10,809	**2,165**	**-955**
2067	13,450	7,813	516	11	106	527	522	*1,166*	71	23,016	1,624	4,074	3,769	295	256	335	804	1,690	*7,506*	18,662	**4,354**	**3,399**
2068	6,039	7,942	517	5	87	647	592	*1,330*	42	15,870	1,627	4,036	3,437	243	202	371	425	1,240	*6,837*	17,177	**-1,307**	**2,092**
2069	6,957	7,662	516	8	88	487	584	*1,167*	41	16,342	1,608	3,580	2,974	281	212	322	464	1,280	*7,236*	16,678	**-336**	**1,755**
2020-2069 Avg	**6,131**	**6,674**	**516**	**5**	**86**	**421**	**585**	***1,096***	**85**	**14,502**	**1,523**	**3,166**	**2,578**	**235**	**204**	**280**	**500**	***1,219***	***5,981***	**14,467**	**35**	

Table G-12
Climate Change (WY 2020-2069 w/ DWR 2070 Climate Change Factors) Water Budget for the Montecito Groundwater Basin

	Inflows to Groundwater System (Acre-Feet)										Outflows from Groundwater System (Acre-Feet)										Change in Storage (Acre-Feet)	
				Subsurface Inflows										Subsurface Outflows								
Water Year	Precipitation Recharge	Creek Recharge	Return Flows	From Santa Barbara Basin	From Carpinteria Basin	Mountain Front Recharge	Bedrock	Subtotal	Ocean	Total Inflows	Groundwater Production	Groundwater Discharges to Creeks	Surface Leakage	To Santa Barbara Basin	To Carpinteria Basin	Underflows to Mountain Front	Bedrock	Subtotal	Ocean	Total Outflows	Annual	Cumulative
2020	3,692	5,541	517	11	81	266	574	*931*	85	10,766	1,544	2,385	1,703	215	192	206	408	1,020	*5,055*	11,707	**-941**	**-941**
2021	4,176	5,813	516	11	79	279	558	*927*	100	11,531	1,541	2,422	1,733	207	190	214	453	1,064	*5,068*	11,828	**-297**	**-1,238**
2022	2,990	5,004	516	12	74	240	567	*893*	150	9,553	1,539	2,112	1,449	179	177	193	418	967	*4,198*	10,265	**-712**	**-1,950**
2023	9,733	7,213	516	13	85	445	485	*1,029*	87	18,576	1,581	3,191	2,592	249	204	284	712	1,448	*6,329*	15,142	**3,435**	**1,484**
2024	4,706	7,004	517	10	87	404	593	*1,094*	63	13,384	1,564	3,160	2,474	228	203	278	422	1,132	*6,043*	14,372	**-989**	**496**
2025	5,848	7,072	516	11	86	420	540	*1,056*	64	14,556	1,578	3,099	2,409	228	200	274	480	1,183	*5,991*	14,259	**296**	**792**
2026	3,465	6,275	516	9	79	320	584	*993*	84	11,333	1,530	2,636	1,892	205	190	237	394	1,026	*5,224*	12,308	**-975**	**-183**
2027	4,757	6,470	516	9	82	342	518	*951*	79	12,773	1,542	2,672	1,971	217	201	250	426	1,094	*5,589*	12,868	**-95**	**-278**
2028	16,769	7,903	517	11	110	622	604	*1,347*	44	26,579	1,606	4,921	4,756	341	266	392	916	1,914	*8,521*	21,719	**4,860**	**4,582**
2029	4,139	7,795	516	10	92	529	690	*1,321*	29	13,800	1,573	3,748	3,133	286	212	338	367	1,203	*7,390*	17,046	**-3,247**	**1,335**
2030	7,926	7,359	516	10	94	504	581	*1,190*	43	17,033	1,611	3,615	3,087	270	221	312	536	1,339	*6,937*	16,590	**443**	**1,779**
2031	3,150	6,489	516	8	82	378	620	*1,088*	65	11,307	1,562	2,817	2,106	224	194	259	373	1,049	*5,574*	13,108	**-1,802**	**-23**
2032	2,455	5,386	517	8	73	279	586	*946*	124	9,427	1,569	2,183	1,516	186	175	207	368	937	*4,337*	10,542	**-1,115**	**-1,138**
2033	9,998	7,869	516	11	72	609	532	*1,224*	128	19,734	1,630	3,785	3,330	175	173	373	782	1,502	*5,539*	15,786	**3,949**	**2,810**
2034	2,509	7,143	516	11	71	500	639	*1,220*	103	11,491	1,595	3,356	2,644	170	174	320	343	1,007	*5,410*	14,011	**-2,519**	**291**
2035	2,167	5,581	516	12	68	305	606	*991*	141	9,395	1,573	2,412	1,718	160	165	221	377	924	*4,323*	10,951	**-1,556**	**-1,265**
2036	7,910	6,544	517	13	83	375	517	*987*	99	16,057	1,609	2,925	2,294	225	200	253	629	1,307	*5,691*	13,826	**2,231**	**966**
2037	2,270	5,064	516	10	78	270	634	*992*	94	8,936	1,548	2,367	1,671	198	185	201	336	921	*4,695*	11,202	**-2,266**	**-1,300**
2038	3,674	5,197	516	14	72	245	548	*879*	130	10,395	1,573	2,124	1,491	190	172	198	442	1,003	*4,359*	10,549	**-154**	**-1,454**
2039	2,111	4,169	516	13	70	219	584	*885*	190	7,871	1,561	1,858	1,201	167	165	173	372	877	*3,644*	9,140	**-1,269**	**-2,723**
2040	4,583	4,812	517	13	67	285	519	*884*	264	11,059	1,608	2,137	1,430	150	160	215	570	1,095	*3,641*	9,912	**1,147**	**-1,575**
2041	5,902	5,214	516	13	70	307	521	*911*	183	12,727	1,591	2,377	1,682	183	179	226	562	1,149	*4,554*	11,353	**1,374**	**-202**
2042	9,817	6,907	516	11	90	465	546	*1,112*	77	18,429	1,643	3,461	2,914	253	216	293	672	1,434	*6,518*	15,969	**2,460**	**2,258**
2043	13,577	8,229	516	12	113	684	654	*1,463*	28	23,813	1,672	5,035	4,819	343	263	409	722	1,737	*8,700*	21,963	**1,850**	**4,108**
2044	4,120	7,394	517	10	88	536	670	*1,304*	43	13,378	1,637	3,706	3,039	244	201	341	385	1,171	*6,539*	16,092	**-2,714**	**1,394**
2045	15,663	7,944	516	11	115	684	639	*1,449*	34	25,606	1,702	5,155	4,970	339	273	414	800	1,826	*8,721*	22,373	**3,234**	**4,627**
2046	4,459	7,509	516	10	95	499	705	*1,309*	29	13,822	1,618	3,692	3,092	289	222	335	375	1,220	*7,434*	17,056	**-3,234**	**1,394**
2047	7,356	7,629	516	11	102	502	594	*1,210*	36	16,747	1,642	3,639	3,117	289	231	307	493	1,319	*7,222*	16,939	**-193**	**1,201**
2048	18,839	8,191	517	11	138	688	704	*1,541*	25	29,112	1,683	5,619	5,768	473	326	411	897	2,107	*10,283*	25,460	**3,652**	**4,853**
2049	1,346	6,447	516	10	85	408	758	*1,260*	43	9,612	1,620	3,119	2,466	252	194	279	275	1,000	*6,061*	14,267	**-4,655**	**198**
2050	6,486	6,501	516	14	84	388	564	*1,050*	64	14,617	1,645	2,993	2,344	240	199	265	549	1,252	*5,986*	14,220	**397**	**595**
2051	10,101	7,234	516	12	104	482	546	*1,144*	38	19,033	1,665	3,639	3,155	299	241	299	610	1,449	*7,321*	17,229	**1,804**	**2,399**
2052	1,722	5,327	517	10	81	307	695	*1,094*	73	8,732	1,621	2,567	1,896	217	185	222	310	934	*5,038*	12,056	**-3,324**	**-925**
2053	6,562	6,890	516	12	84	355	511	*961*	72	15,001	1,652	2,864	2,136	229	196	252	547	1,224	*5,844*	13,721	**1,280**	**356**
2054	4,042	5,879	516	10	81	309	557	*958*	91	11,485	1,649	2,521	1,808	213	191	228	414	1,045	*5,062*	12,087	**-602**	**-246**
2055	17,431	8,229	516	12	114	656	623	*1,404*	39	27,619	1,715	5,199	5,151	352	272	407	926	1,957	*8,863*	22,885	**4,734**	**4,488**
2056	4,053	7,710	517	10	89	500	681	*1,281*	33	13,595	1,677	3,617	2,980	268	205	331	377	1,181	*7,044*	16,499	**-2,904**	**1,584**
2057	1,397	5,217	516	9	77	301	667	*1,054*	93	8,277	1,624	2,364	1,686	198	181	214	315	907	*4,545*	11,126	**-2,849**	**-1,265**
2058	7,135	6,314	516	12	82	380	539	*1,012*	96	15,073	1,674	2,826	2,205	220	194	257	615	1,286	*5,470*	13,461	**1,613**	**348**
2059	2,345	5,556	516	10	76	272	605	*962*	126	9,505	1,645	2,295	1,613	188	181	206	368	944	*4,517*	11,015	**-1,510**	**-1,162**
2060	7,991	7,338	517	13	81	421	489	*1,005*	92	16,942	1,692	3,066	2,475	225	193	276	623	1,317	*5,868*	14,418	**2,523**	**1,361**
2061	9,426	7,796	516	10	88	566	533	*1,196*	47	18,981	1,737	3,848	3,268	262	204	357	591	1,414	*6,951*	17,218	**1,764**	**3,125**
2062	1,648	6,291	516	9	77	421	675	*1,182*	96	9,732	1,691	2,923	2,221	181	182	278	327	968	*5,011*	12,815	**-3,083**	**42**
2063	1,603	4,817	516	11	69	245	621	*945*	131	8,012	1,637	2,025	1,375	173	166	186	319	844	*4,039*	9,920	**-1,908**	**-1,865**
2064	2,780	4,981	517	12	69	223	548	*851*	167	9,296	1,650	1,903	1,218	180	165	188	429	962	*3,965*	9,698	**-402**	**-2,267**
2065	1,353	3,977	516	12	65	190	569	*835*	283	6,963	1,627	1,641	927	150	154	165	354	822	*3,123*	8,140	**-1,177**	**-3,444**
2066	4,402	5,384	516	15	64	278	474	*830*	319	11,451	1,664	2,036	1,300	150	159	216	592	1,117	*3,648*	9,766	**1,685**	**-1,758**
2067	14,458	7,321	516	16	105	506	526	*1,153*	99	23,547	1,728	3,907	3,594	291	256	325	914	1,785	*7,140*	18,155	**5,392**	**3,633**
2068	4,545	7,411	517	9	84	566	608	*1,268*	47	13,788	1,727	3,595	2,918	238	198	335	386	1,157	*6,388*	15,785	**-1,997**	**1,636**
2069	7,273	7,382	516	13	85	461	567	*1,126*	48	16,345	1,716	3,422	2,796	274	207	305	496	1,281	*6,882*	16,097	**249**	**1,885**
2020-2069 Avg	**6,137**	**6,494**	**516**	**11**	**85**	**409**	**589**	***1,094***	**94**	**14,336**	**1,626**	**3,100**	**2,511**	**234**	**201**	**274**	**507**	***1,216***	***5,846***	**14,298**	**38**	

Table G-13
Average Annual Historical, Current, and Projected Water Budget Components in the MGB

Water Budget Component			Historical (1970-2014)	Current (2015-2019)	Projected (2020-2069)	
					Future Baseline	Climate Change
Inflows to Groundwater System (Acre-Feet)		Precipitation Recharge	5,966	4,687	6,131	6,137
		Creek Recharge	6,891	5,102	6,674	6,494
		Return Flows	641	379	516	516
	Subsurface Inflows	From Santa Barbara Basin	5	5	5	11
		From Carpinteria Basin	88	76	86	85
		Mountain Front Recharge	434	265	421	409
		Bedrock	597	551	585	589
		Subtotal	1,123	897	1,096	1,094
		Ocean	41	157	85	94
		Total Inflows	***14,661***	**11,221**	**14,502**	**14,336**
Outflows from Groundwater System (Acre-Feet)		Groundwater Production	717	1,417	1,523	1,626
		Groundwater Discharges to Creeks	3,385	2,241	3,166	3,100
		Surface Leakage	2,794	1,574	2,578	2,511
	Subsurface Outflows	To Santa Barbara Basin	248	189	235	234
		To Carpinteria Basin	230	184	204	201
		Outflows to Mountain Front	288	201	280	274
		Bedrock	475	509	500	507
		Subtotal	1,241	1,082	1,219	1,216
		Ocean	6,654	4,410	5,981	5,846
		Total Outflows	**14,792**	**10,724**	**14,467**	**14,298**
Storage Change			-131	497	35	38