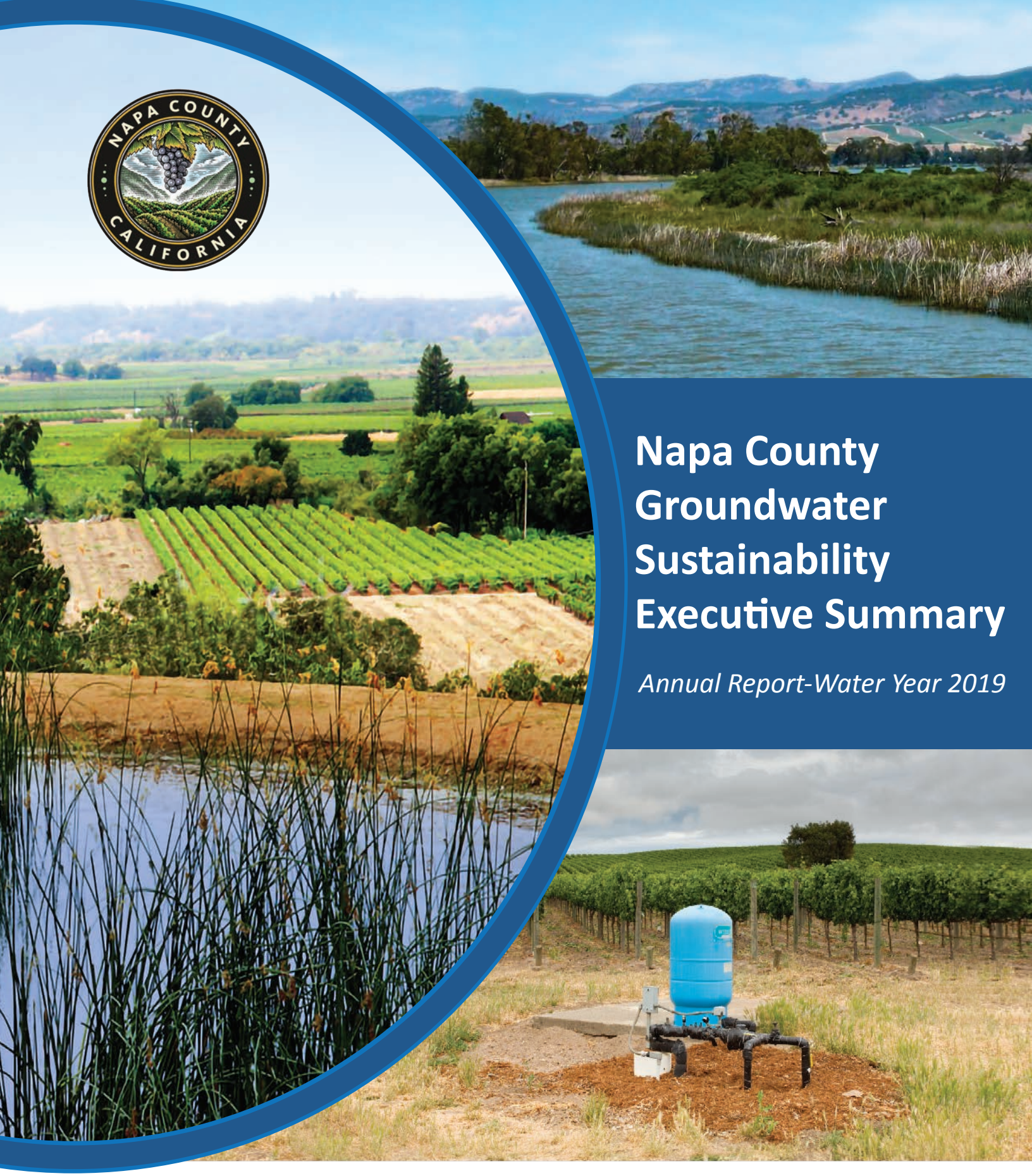


Napa County Groundwater Sustainability Executive Summary

Annual Report-Water Year 2019

Luhdorff & Scalmanini
Consulting Engineers

Prepared for:
Napa County Groundwater Sustainability Agency and
Napa County Department of Public Works
April 2020

ES 1 Introduction

This Report, Napa County Groundwater Sustainability Annual Report – Water Year 2019, presents an update on groundwater conditions and water use in the Napa Valley Subbasin (Subbasin).[1] As in the past, the Report includes an update on groundwater conditions elsewhere in the county. This Report also provides an update on the recommended Sustainable Groundwater Management Act (SGMA) implementation actions presented in the 2016 Basin Analysis Report (or Alternative) and 2018 Basin Analysis Report Amendment developed to maintain groundwater sustainability.[2] The complete Report is available at www.cityofnapa.org/1238/groundwater-sustainability-planning.

Groundwater and surface water are highly important natural resources in Napa County. Together, the County and other municipalities, water districts, public water system operators, commercial and industrial operations, the agricultural community, and the public, are stewards of available water resources. Everyone living and working in Napa County has a stake in protecting the county's groundwater resources, including groundwater supplies, groundwater quality, and associated watersheds (GRAC, 2014).

For many decades, Napa County and its citizens have acted to conserve and preserve groundwater resources and protect beneficial uses and users throughout the county. In 1966, Napa County restricted development and land use conversion in Napa Valley, with similar restrictions added for remaining parts of the Napa River Watershed beginning in 1973. Groundwater management actions taken by Napa County since 1991 have also aligned land use permitting with best-available data consistent with the objectives of SGMA. County actions have included setting objective criteria to avoid undesirable results by avoiding overdraft, maintaining historic groundwater levels, protecting against water quality degradation and land subsidence, preventing increased surface water flow reductions, and other adverse environmental impacts (see **Section 1.2.1**).

[1]Although Napa County began groundwater conditions reporting in 2011, the first required SGMA Annual Report submittal for the Napa Valley Subbasin is due April 1, 2022, for Water Year 2021 (GSP Regulations Section 356.2).

[2]The 2018 Amendment to the Basin Analysis Report is also referenced as the Northeast Napa Management Area Report. See **Section 1.2.2** for more information.

As part of its overall land use and groundwater management actions, Napa County also recognizes that long-term, systematic monitoring programs are essential to provide data and the scientific analyses that allow for improved evaluation of water resources conditions and to facilitate effective water resources planning and management. Napa County has been monitoring groundwater conditions since the 1960s, when it collaborated with the U.S. Geological Survey on a study of groundwater resources in Napa Valley (Faye, 1973).

Since 2008, the County has implemented additional groundwater management actions to better understand groundwater conditions, conduct education and outreach, modify land use permitting, and develop other programs to assess and maintain groundwater sustainability. These efforts included the adoption of Goals and Policies in Napa County's 2008 General Plan, commencing new studies of the County's groundwater resources in 2009, and creation of a Groundwater Resources Advisory Committee (GRAC; 2011 to 2014) to spearhead management implementation and community outreach. In 2019, the County took the additional step of forming the Napa County Groundwater Sustainability Agency as provided for under the Sustainable Groundwater Management Act (SGMA).

A Napa County Groundwater Monitoring Plan 2013 (Plan) was prepared to formalize and augment groundwater monitoring efforts conducted as part of a Comprehensive Groundwater Monitoring Program (LSCE, 2013a). The Plan recommended annual reports on groundwater conditions and modifications to the countywide groundwater monitoring program as needed. To date, five Annual Reports have been prepared (LSCE, 2015, 2016a, 2017a, 2018b, 2019). This is the sixth Annual Report and the third report prepared to meet additional annual reporting requirements of the Groundwater Sustainability Plan (GSP) Regulations.[3]

Napa Valley Subbasin Sustainability Goal

To protect and enhance groundwater quantity and quality for all the people who live and work in Napa County, regardless of the source of their water supply. The County and everyone living and working in the county will integrate stewardship principles and measures in groundwater development, use, and management to protect economic, environmental, and social benefits and maintain groundwater sustainability indefinitely without causing undesirable results, including unacceptable economic, environmental, or social consequences.

[3]References to GSP Regulations in this report refer to Title 23 of the California Code of Regulations originally developed and adopted by the California Department of Water Resources in 2016, as required by the 2014 Sustainable Groundwater Management Act (SGMA). SGMA is published in California Water Code Section 10733.2.

ES 2 Groundwater Resources Goals and Management Objectives

The Department of Water Resources (DWR) has identified the major groundwater basins and subbasins in and around Napa County (DWR, 2016).[4] The basins include the Napa-Sonoma Valley (which includes the Napa Valley and Napa-Sonoma Lowlands Subbasins), Berryessa Valley, Pope Valley, and a small part of the Suisun-Fairfield Valley Groundwater Basins (**Figure ES-1**). DWR-designated groundwater basins and subbasins do not cover all of Napa County. For purposes of local planning, understanding, and studies, the County has additionally defined groundwater subareas to track and report on groundwater conditions more comprehensively. These subareas were delineated based on major watersheds, groundwater basins, and the County's environmental resource planning areas (**Figure ES-2**).

The countywide groundwater level monitoring program includes the following objectives:

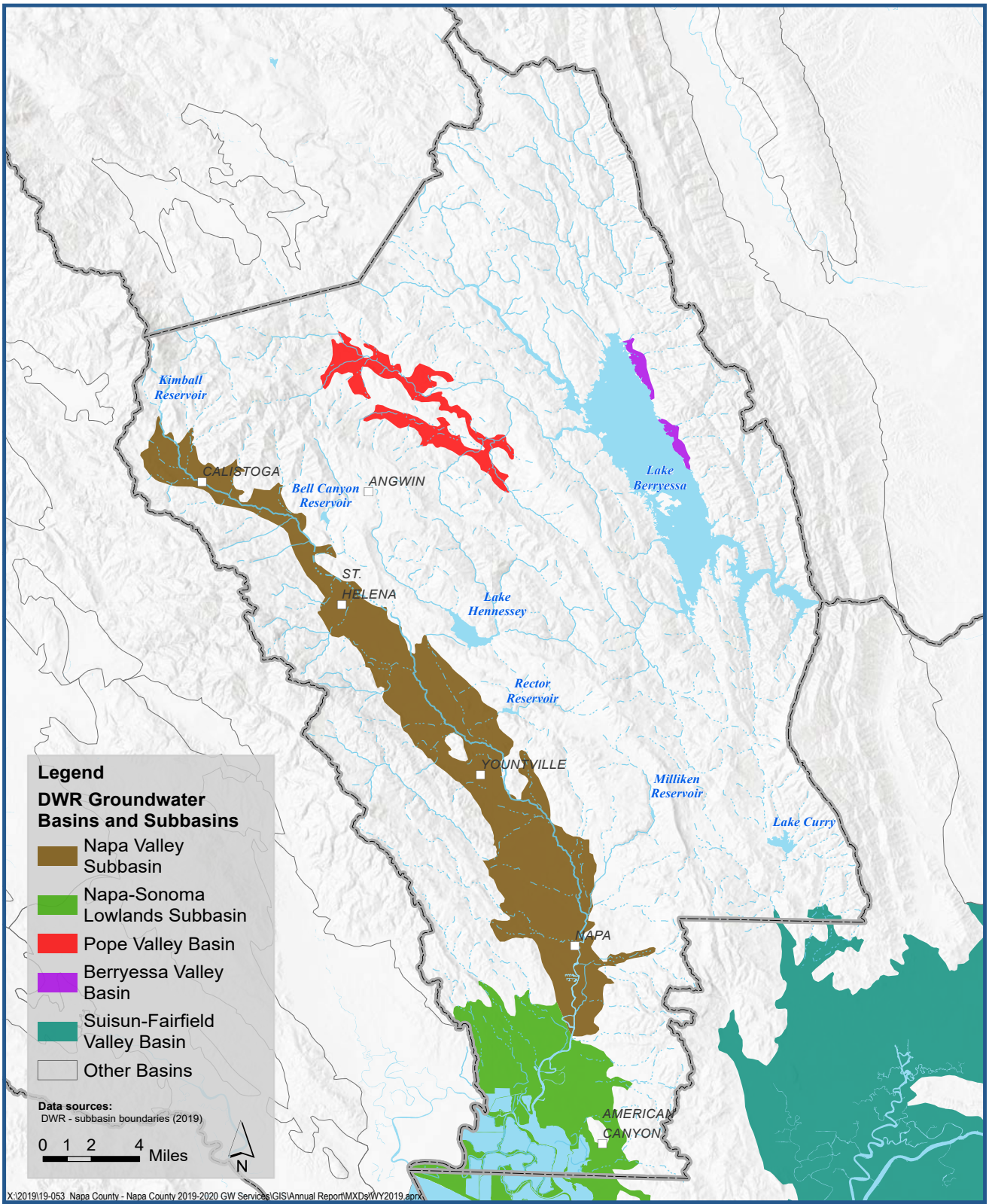
- Expand groundwater level monitoring in priority County subareas to improve the understanding of the occurrence and movement of groundwater; monitor local and regional groundwater levels including seasonal and long-term trends; and identify hydraulic connections in aquifer systems and aquifer-specific groundwater conditions, especially in areas where short- and long-term development of groundwater resources are planned;
- Detect the occurrence of natural or induced factors that affect groundwater levels and trends;
- Identify appropriate monitoring sites to further evaluate groundwater/surface water interaction and recharge/discharge mechanisms, including whether groundwater utilization is affecting surface water flows;
- Establish a monitoring network to aid in the assessment of changes in groundwater storage; and
- Generate data to better estimate groundwater basin conditions and assess local current and future water supply availability and reliability; and update these analyses as additional data become available.

Based on the analysis of existing groundwater data and conditions described in the report Napa County Groundwater Conditions and Groundwater Monitoring Recommendations (LSCE, 2011a) and with input received from the Groundwater Resources Advisory Committee (GRAC), the key objectives for future groundwater level monitoring for each subarea are summarized in LSCE (2013a) and in **Section 3** of this Report.

ES 2.1 Sustainable Groundwater Management Act

In September 2014, the California Legislature passed the Sustainable Groundwater Management Act (SGMA). SGMA changes how groundwater is managed in the state and includes certain requirements of local agencies managing groundwater basins or subbasins that DWR designates as medium priority or high priority. Previously under the California Statewide Groundwater Elevation Monitoring Program[5] (CASGEM), DWR classified California's groundwater basins and subbasins as either high, medium, low, or very low priority. The CASGEM priority classifications were made based on eight criteria that include the overlying population, the reliance on groundwater, and the number of wells in a basin or subbasin.

[4] https://water.ca.gov/Programs/Groundwater-Management/Bulletin-118
[5] CASGEM is the California Statewide Groundwater Elevation Monitoring program implemented under Water Code Part 2.11 Groundwater Monitoring and administered by DWR.



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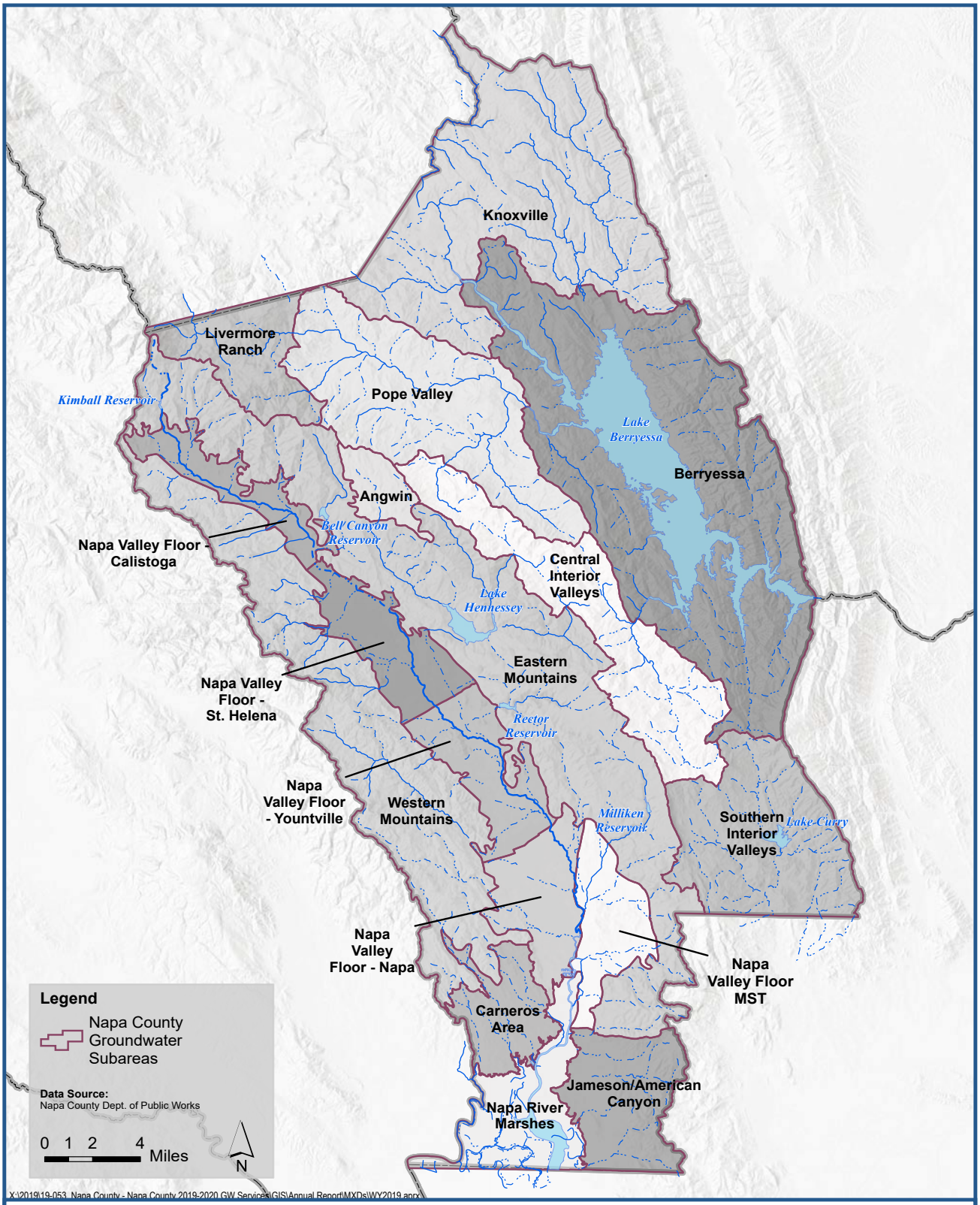
Groundwater Basins in Napa County

Napa County Groundwater Sustainability Annual Report - Water Year 2019

Figure ES-1



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Napa County Groundwater Subareas

Napa County Groundwater Sustainability Annual Report - Water Year 2019

Figure ES-2

In 2018, DWR began a statewide process to revise the SGMA priority designations that it assigns to groundwater basins.[6] Through that process, DWR changed the designation for the Napa Valley Subbasin from medium priority to high priority (**Figure ES-3**). The increase in priority designation for the Napa Valley Subbasin in 2018 was due primarily to revised projections of future population for the Subbasin, an increased assessment of the total number of wells in the Subbasin, and a revised approach to evaluating water quality in the Subbasin compared to the previous prioritization analysis performed in 2014. The change from medium priority to high priority does not affect requirements for the Napa Valley Subbasin under SGMA. The changed priority designation is also not a determination by DWR that the Subbasin has groundwater conditions of concern; to the contrary, the Subbasin is operating within its sustainable yield. Information about DWR's prioritization process and results can be found on DWR's website: https://water.ca.gov/Programs/Groundwater-Management/Basin-Prioritization.

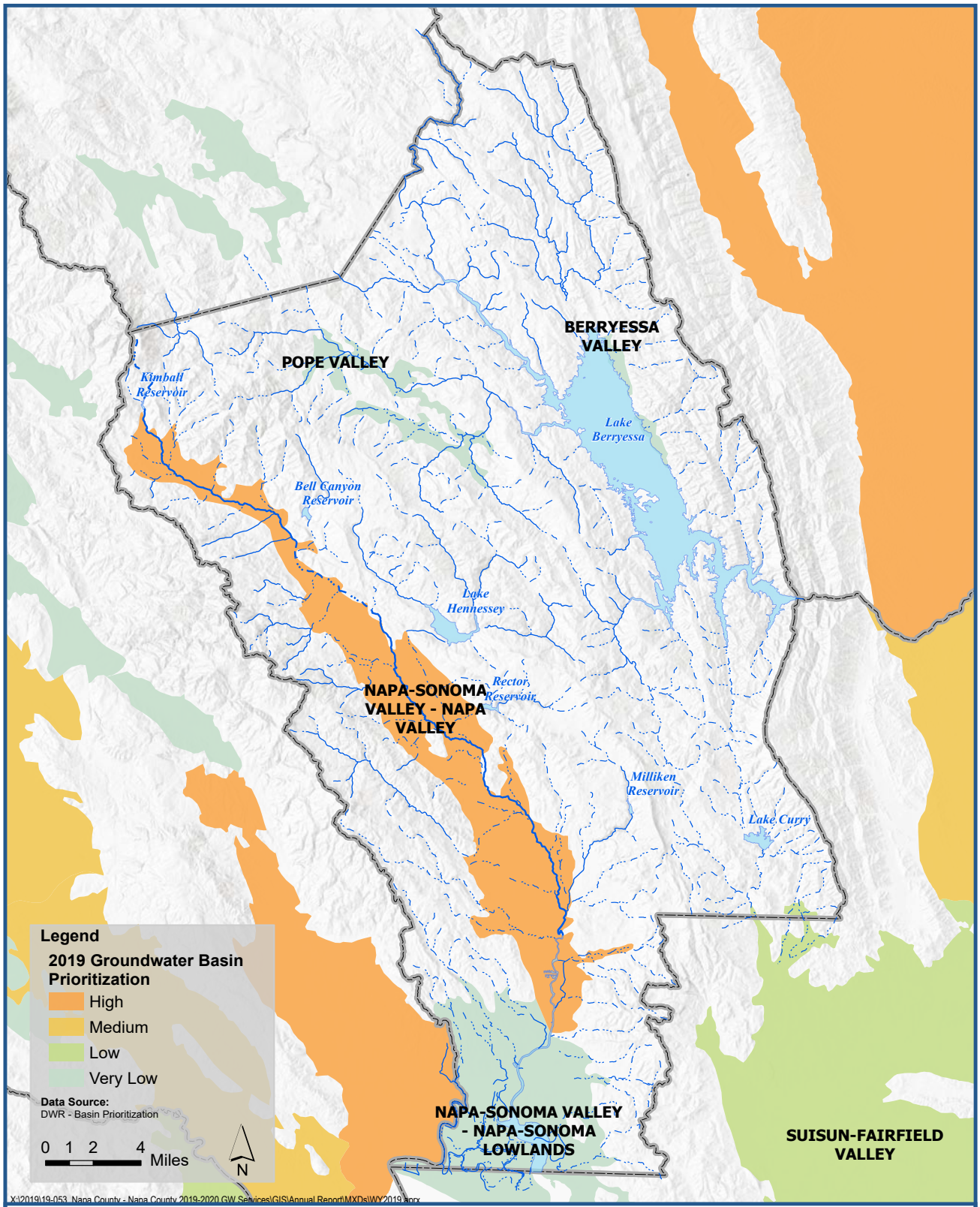
For most basins designated by DWR as medium priority or high priority, SGMA requires the formation of groundwater sustainability agencies (GSA) and the adoption of a GSP; or development of an alternative to a GSP, provided that the local entity (entities) can meet certain requirements. Under SGMA, a local entity (or entities) can pursue an alternative to a GSP provided that certain sustainability objectives are met. An alternative to a GSP may include "An analysis of basin conditions that demonstrates that the basin has operated within its sustainable yield over a period of at least 10 years" (Water Code Section 10733.6(b)(3)). In response to SGMA, Napa County prepared a Basin Analysis Report for the Napa Valley Subbasin per the requirements of Water Code Section 10733.6 (b)(3). While the Basin Analysis Report analyzed areas outside the Subbasin to determine how those areas affect recharge and runoff in the Subbasin, the areas outside the Subbasin are not subject to SGMA. The Basin Analysis Report (LSCE, 2016c) was submitted to DWR on December 16, 2016 in compliance with SGMA. On July 17, 2019, DWR released a tentative determination to not approve the Basin Analysis Report. On November 13, 2019, DWR issued a final determination consistent with the draft determination.

Although the Basin Analysis Report was not approved, DWR's Staff Report to Napa County stated that DWR "did not consider and does not conclude that the Napa Valley Subbasin is, or has been, managed unsustainably" (DWR, 2019). Rather, DWR's decision focused on DWR's interpretation that the County had not implemented SGMA-equivalent metrics to define sustainable groundwater management prior to the passage of SGMA in 2014. Despite its final determination on the Basin Analysis Report, DWR found the County to be "proactively managing groundwater" and noted that the Alternative submittal positioned the County for successful development of a GSP for the Napa Valley Subbasin (DWR, 2019).

Following DWR's decision to not approve the Basin Analysis Report, the Napa County Board of Supervisors acted on December 17, 2019 to become a GSA for the Napa Valley Subbasin and declare their intent to develop a GSP for the Subbasin by January 31, 2022.[7]

In December 2019, DWR released another round of SGMA basin prioritizations, which maintained the very low priority designation for the Napa-Sonoma Lowlands Subbasin (**Figure ES-3**).[8] The Lowlands Subbasin occurs along the lower Napa River, including the Carneros Subarea and American Canyon, and includes areas within Solano County (**Figure ES-1**). An earlier draft of the reprioritization released in 2018 had shown the Lowlands Subbasin designation increasing from very low priority to medium priority.

[6]The California Water Code (Sections 10933 and 12924) requires DWR to prioritize California's groundwater basins and subbasins statewide. Details are available at https://water.ca.gov/Programs/Groundwater-Management/Basin-Prioritization
[7]More information on the formation of the Napa County Groundwater Sustainability Agency is available at https://sgma.water.ca.gov/portal/gsa/print/488
[8]More information on DWR Basin Prioritization is available at https://water.ca.gov/Programs/Groundwater-Management/Basin-Prioritization



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Groundwater Basin Prioritizations

Napa County Groundwater Sustainability Annual Report - Water Year 2019

Figure ES-3

All other basins and subbasins located in Napa County continue to be designated as very low or low priority according to DWR's revised 2018 and 2019 designations (**Figure ES-3**). None of the basins and subbasins designated as very low or low priority are subject to additional requirements under SGMA, such as the development of a GSP.

During the past ten years, Napa County has made significant progress towards executing groundwater-related studies and implementing recommendations provided by those studies to improve local understanding of groundwater conditions and ensure resource sustainability. In conformance with SGMA, the recommendations of the GRAC, and the direction of the Napa County Board of Supervisors (April 2014), the Napa Valley Subbasin SGMA Sustainability Goal is:

> To protect and enhance groundwater quantity and quality for all the people who live and work in Napa County, regardless of the source of their water supply. The County and everyone living and working in the county will integrate stewardship principles and measures in groundwater development, use, and management to protect economic, environmental, and social benefits and maintain groundwater sustainability indefinitely without causing undesirable results, including unacceptable economic, environmental, or social consequences.

The Basin Analysis Report (LSCE, 2016c) comprised a first step in the implementation of SGMA monitoring and reporting requirements. Consistent with the requirements of Section 356.2 of the GSP Regulations, this Report, Napa County Groundwater Sustainability Annual Report – Water Year 2019, presents:

- An update on groundwater conditions both in the Napa Valley Subbasin and in other areas across the county (see **Section 5**),
- An update on water use in the Napa Valley Subbasin (see **Section 6**),
- An update on the implementation of management actions presented in the 2016 Basin Analysis Report and 2018 Basin Analysis Report Amendment developed to maintain groundwater sustainability (see **Section 7**), and
- An update on planned near-term activities, consistent with the Basin Analysis Report management recommendations, to maintain or improve groundwater conditions and ensure overall water resources sustainability in the Napa Valley Subbasin (see **Section 8**).

SGMA implementation activities underway or completed in 2019, in addition to the monitoring efforts and analyses presented in this Report, include:

A. Providing tools and training to Napa County well owners to support monitoring and awareness of groundwater conditions in wells that they own,
B. Developing best available water use data to track water use in the Napa Valley Subbasin and in other areas across the county,
C. Expansion of the streamflow monitoring network,
D. Evaluation of water use by Groundwater Dependent Ecosystems in the Napa Valley Subbasin,
E. Coordination with other water management and planning programs,
F. Ongoing development of the Napa Valley Integrated Hydrologic Model (NV-IHM) of the Napa Valley Subbasin,
G. Publishing a groundwater stakeholder survey for stakeholders to provide input to the County and inform development of an updated Communication and Education Plan,
H. Formation of a Groundwater Sustainability Agency for the Napa Valley Subbasin, and
I. Development of a grant application to support Groundwater Sustainability Plan Development.

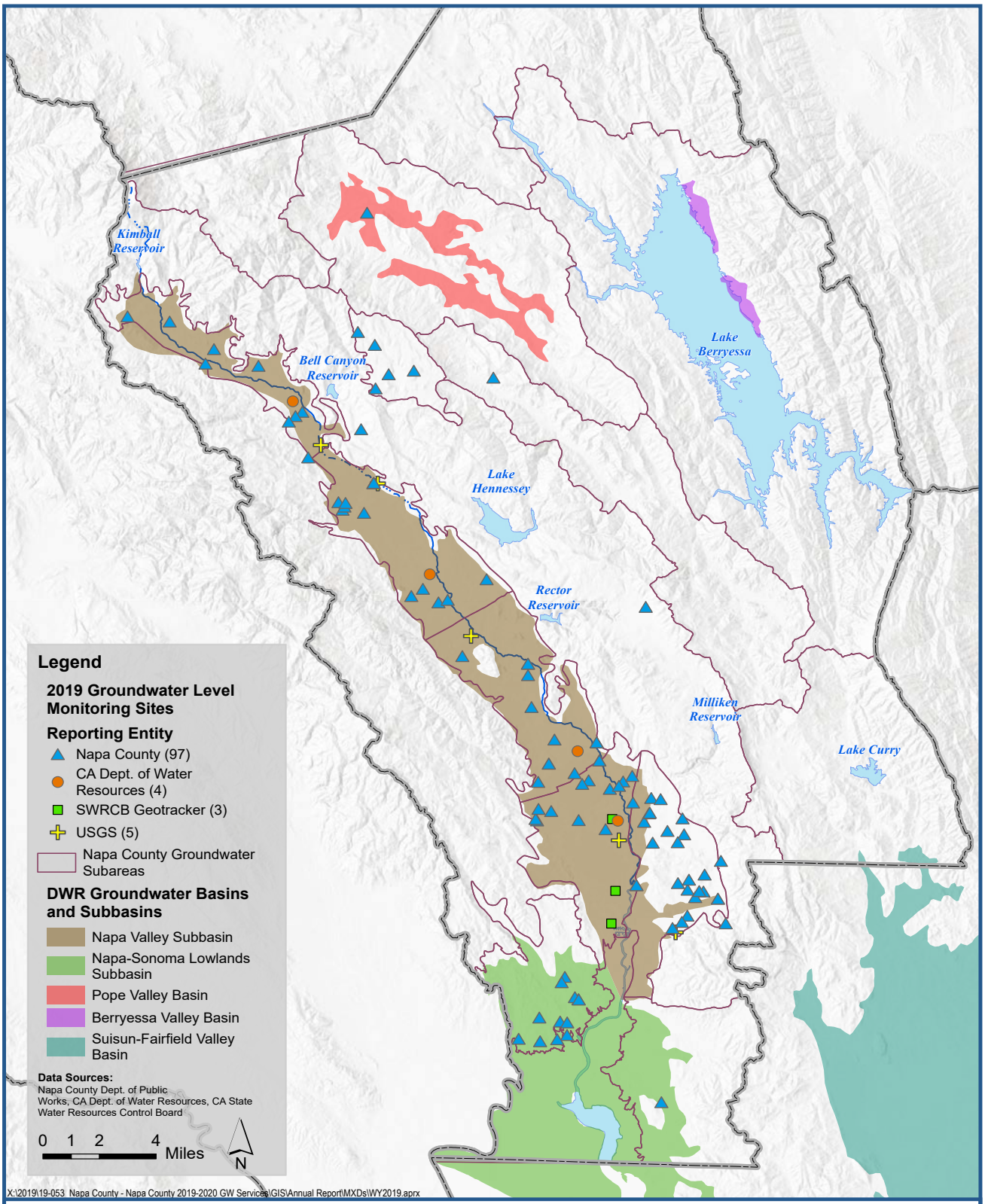
ES 3 Groundwater Monitoring Network

Groundwater level monitoring was conducted at a total of 109 sites across Napa County in water year 2019. These included 64 sites within the Napa Valley Subbasin (**Table ES-1**). **Figure ES-4** shows the distribution of sites monitored in 2019 by data reporting entity. Out of the total 109 sites monitored in 2019, 97 were wells monitored by Napa County. Four were wells monitored by DWR and five were monitored by the U.S. Geological Survey (USGS). The remaining three sites are regulated facilities with multiple wells with data reported as part of the State Water Resources Control Board (SWRCB) Geotracker Program.

Table ES-1 Groundwater Level Monitoring Sites in the Napa Valley Subbasin and Napa County Groundwater Subareas[1]

Groundwater Basin or Groundwater Subarea	Number of Monitored Sites, Fall 2015	Number of Monitored Sites,Fall 2016	Number of Monitored Sites,Fall 2017	Number of Monitored Sites, Fall 2018	Number of Monitored Sites, Fall 2019
Napa-Sonoma Valley – Napa Valley Subbasin	56	57	61	61	64
Napa Valley Floor-Calistoga	9	7	7	8	9
Napa Valley Floor-MST	27	26	25	24	24
Napa Valley Floor-Napa	20	21	21	21	22
Napa Valley Floor-St. Helena	14	14	14	14	15
Napa Valley Floor-Yountville	14	13	13	13	14
Carneros	12	12	12	12	12
Jameson/American Canyon	1	1	1	1	1
Napa River Marshes	-	-	-	-	-
Angwin	5	5	5	5	5
Berryessa	3	1	1	2	-
Central Interior Valleys	2	2	2	2	1
Eastern Mountains	4	3	3	3	3
Knoxville	-	-	-	-	-
Livermore Ranch	-	-	-	-	-
Pope Valley	1	1	1	1	1
Southern Interior Valleys	-	-	-	-	-
Western Mountains	1	2	2	2	2
Total Sites	**113**	**108**	**107**	**108**	**109**

1. DWR Basins are depicted in **Figure ES-1**. Napa County groundwater subareas are depicted in **Figure ES-2**. Wells summarized in this table, DWR groundwater basins and Napa County groundwater subareas are depicted in **Figure ES-4**.



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Current Groundwater Level Monitoring Sites by Reporting Entity

Napa County Groundwater Sustainability Annual Report - Water Year 2019

Figure ES-4

ES 4 SUMMARY AND RECOMMENDATIONS

ES 4.1 Groundwater Conditions

Groundwater level trends in the alluvial aquifer system[9] of the Napa Valley Subbasin are stable in the majority of wells with long-term groundwater level records (see **Sections 5.1.1 and 5.1.2**). Groundwater levels showed continued stable conditions in water year 2019, with most wells experiencing an increase in water levels relative to drier precipitation conditions that occurred in 2018.[10] In spring 2019, depths to water in the alluvial aquifer of the Napa Valley Subbasin ranged from 1.1 feet to 29.4 feet below ground surface (**Figure ES-5**).

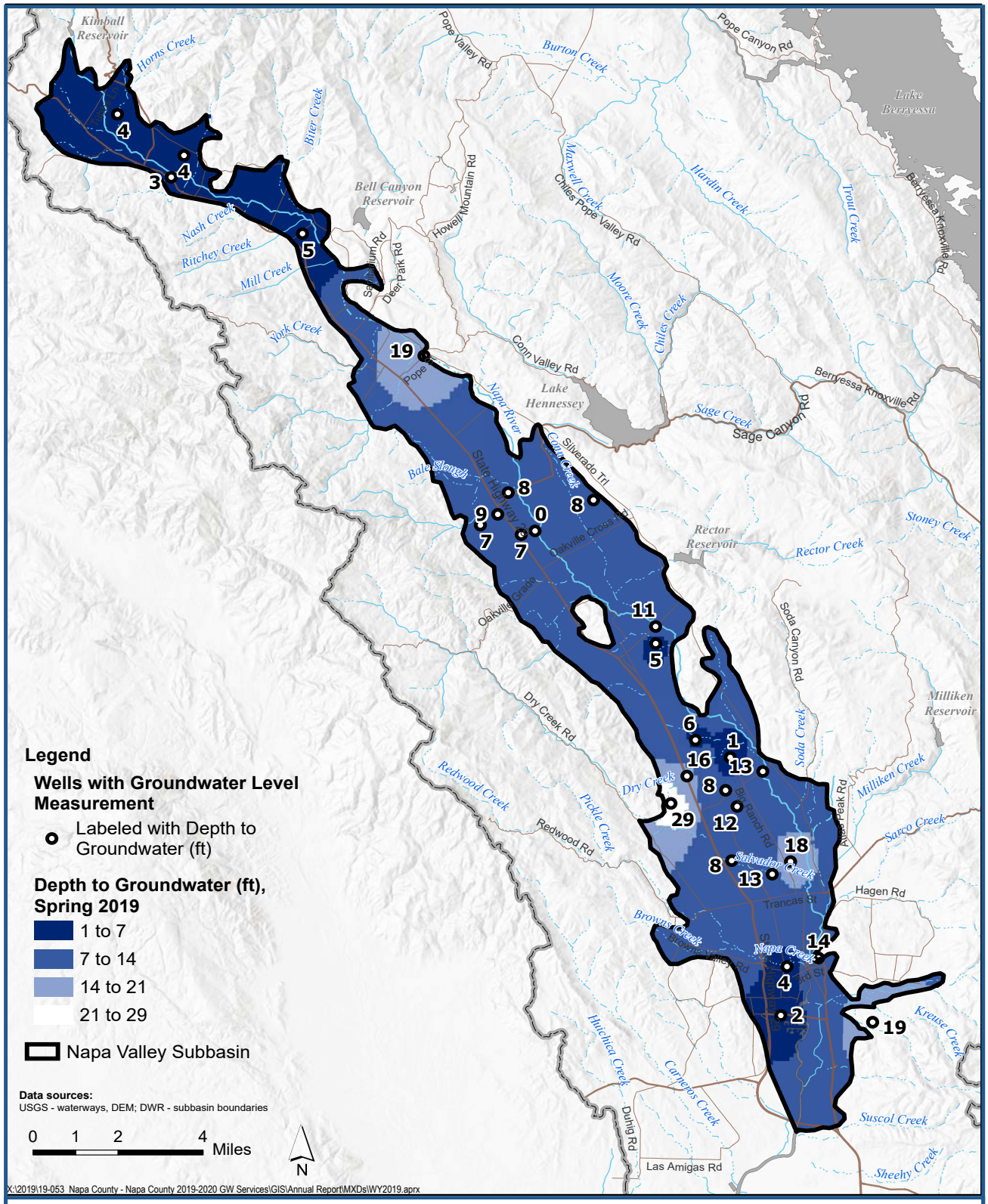
Water year 2019 was categorized as a Wet year (33.29 inches) at a representative precipitation gauge with the longest period of record in the Subbasin (see **Section 5**). Spring 2019 groundwater levels were generally stable or higher than levels measured in spring 2018, which was a Dry year. Overall, groundwater levels in fall 2019 remained comparable to levels in recent years. Groundwater levels in spring and fall 2019 were also generally above levels recorded in 2011, the most recent water year with a similar annual precipitation total.

Water year 2020 precipitation, as of the date of this report, has trended below the long-term average. Through April 2020 the Napa State Hospital precipitation gauge received about 40% of average rainfall for the first six months of the water year, when the majority of precipitation typically occurs.

Groundwater levels recorded in 2019 were above the minimum thresholds established as sustainability criteria in 19 of 20 SGMA Representative Wells with water level criteria (see **Section 5.1.3**). Groundwater levels were reduced below the minimum threshold at SGMA Representative Well 08N06W10Q001M. The water level in that well was two feet below the minimum threshold in September 2019; however, subsequent measurements at the same well were above the minimum threshold in November and December 2019. The reduction of groundwater levels below the minimum threshold at one of twenty SGMA Representative Wells, 08N06W10Q001M, is likely the result of a short-term localized groundwater condition and does not reflect a changed condition in the Napa Valley Subbasin.

Although designated as a groundwater subarea for local planning purposes, the majority of the Milliken-Sarco-Tulucay (MST) Subarea is not part of a groundwater basin as mapped by DWR. Groundwater level declines observed in the MST Subarea as early as the 1960s and 1970s have stabilized since about 2009 (see **Section 5.2**). Groundwater level responses differ within the MST Subarea in the north, central, and southern sections of this subarea, indicating localized conditions. The localized goundwater conditions are considered to be primarily influenced by the geologic setting or anthropogenic sources specific to the subarea. An expanding recycled water distribution system in the MST subarea, supplied by the Napa Sanitation District, delivered 297 acre-feet of recycled water to users in the MST Subarea in water year 2019. Increased distribution and use of this new source of water along with continued land use permitting constraints are expected to aid in maintaining stable groundwater level conditions in the MST subarea.

[9]The alluvial aquifer system of the Quaternary Alluvial Deposits is the principal aquifer supplying water to wells in the Napa Valley Subbasin (LSCE, 2016c).
[10]Consistent with the GSP Regulation, the term "water year" is used in this report to refer to the period from October 1 through the following September 30, with the year designated according to the calendar year in which it ends (i.e., water year 2018 spanned from October 1, 2017 through September 30, 2018).



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Napa Valley Subbasin Spring 2019
Interpolated Depth to Groundwater

Napa County Groundwater Sustainability Annual Report - Water Year 2019

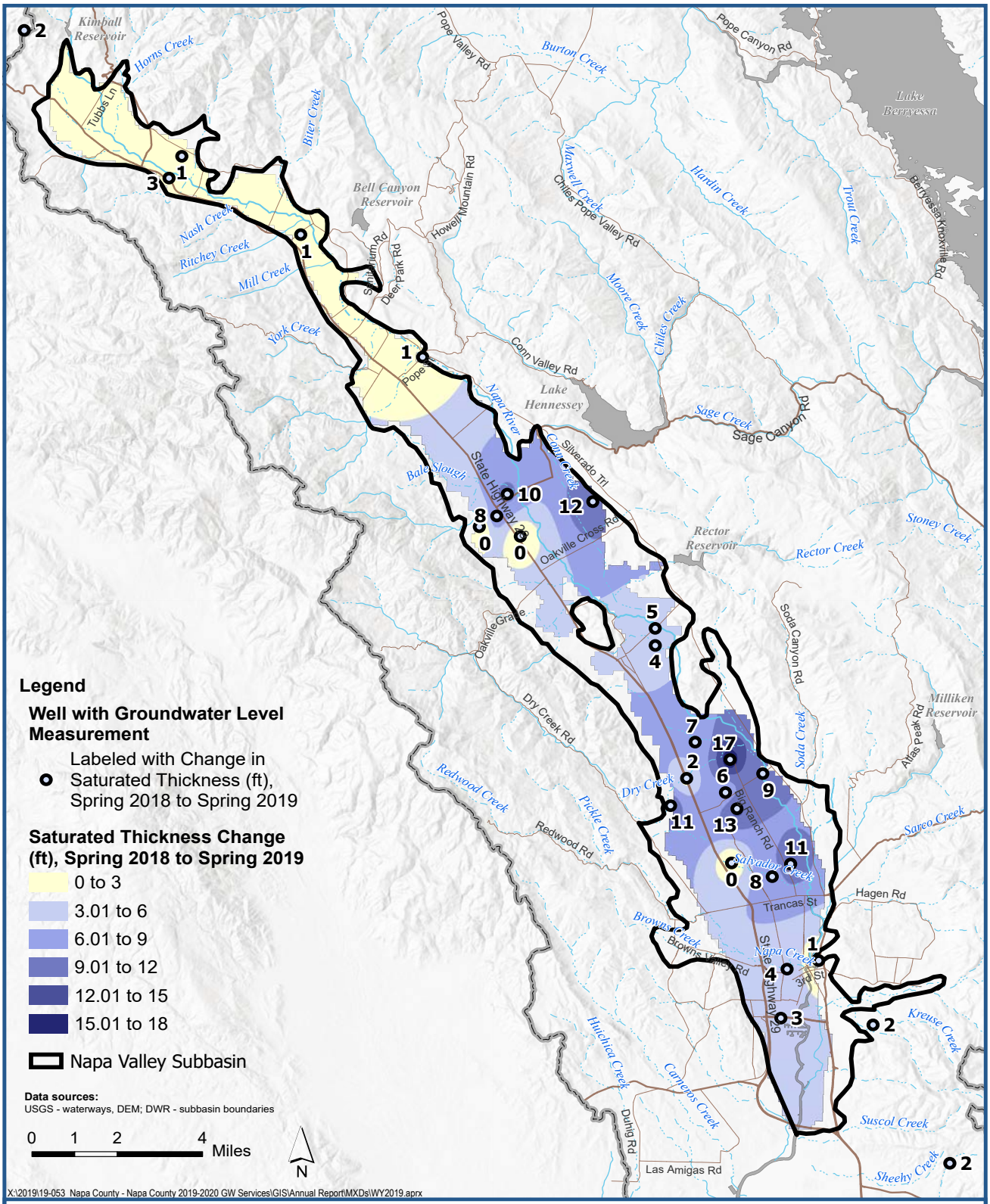
Figure ES-5

ES 4.2 Napa Valley Subbasin Groundwater Storage Changes

In the principal aquifer system of the Napa Valley Subbasin, the volume of groundwater in storage increased in spring 2019 (a Wet year) relative to spring 2018 (a Dry year) (see **Section 5.1.4**) based on an analysis of groundwater levels measured throughout the Subbasin. The volume of groundwater in storage increased in 2019 by 11,374 acre-feet to a total of 221,358 acre-feet. From 1988 through 2019, the cumulative annual storage change was 15,762 acre-feet in the Subbasin; this reflects a basin in balance and the absence of long-term depletions of groundwater storage within the Subbasin (**Table ES-2**).

Maps of saturated thickness and groundwater storage changes in the principal aquifer system show increases in saturated thickness and groundwater storage throughout most of the Subbasin between spring 2018 and spring 2019 (**Figures ES-6 and ES-7**). These increases are consistent with the increase in precipitation between 2018 and 2019. Larger increases in saturated thickness occurred along Dry Creek and in the vicinity of Oak Knoll Avenue. Notably, the increases in groundwater storage were variable over that area. For example, near the dedicated monitoring well at Dry Creek near Highway 29, accumulations were much smaller than in the active supply well monitored to the west near the Subbasin margin. This latter observation highlights the value of dedicated monitoring wells.

Changes in saturated thickness of the primary aquifer and groundwater storage volume changes were also evaluated for the period from spring 2011 to spring 2019, for comparison with the most recent year with a similar precipitation total. Saturated thickness and groundwater storage volumes were slightly greater in spring 2019 compared to spring 2011 (**Figures ES-8 and ES-9**). Groundwater storage volumes were generally equivalent to or 0.5 acre-feet per acre greater in spring 2019 than in spring 2011 (**Figure ES-9**). Saturated thickness in spring 2019 was generally 0 to 6 feet greater than conditions measured in spring 2018.



Napa Valley Subbasin Principal Aquifer Change in Saturated Thickness, Spring 2018 to Spring 2019

Figure ES-6

Napa County Groundwater Sustainability Annual Report - Water Year 2019

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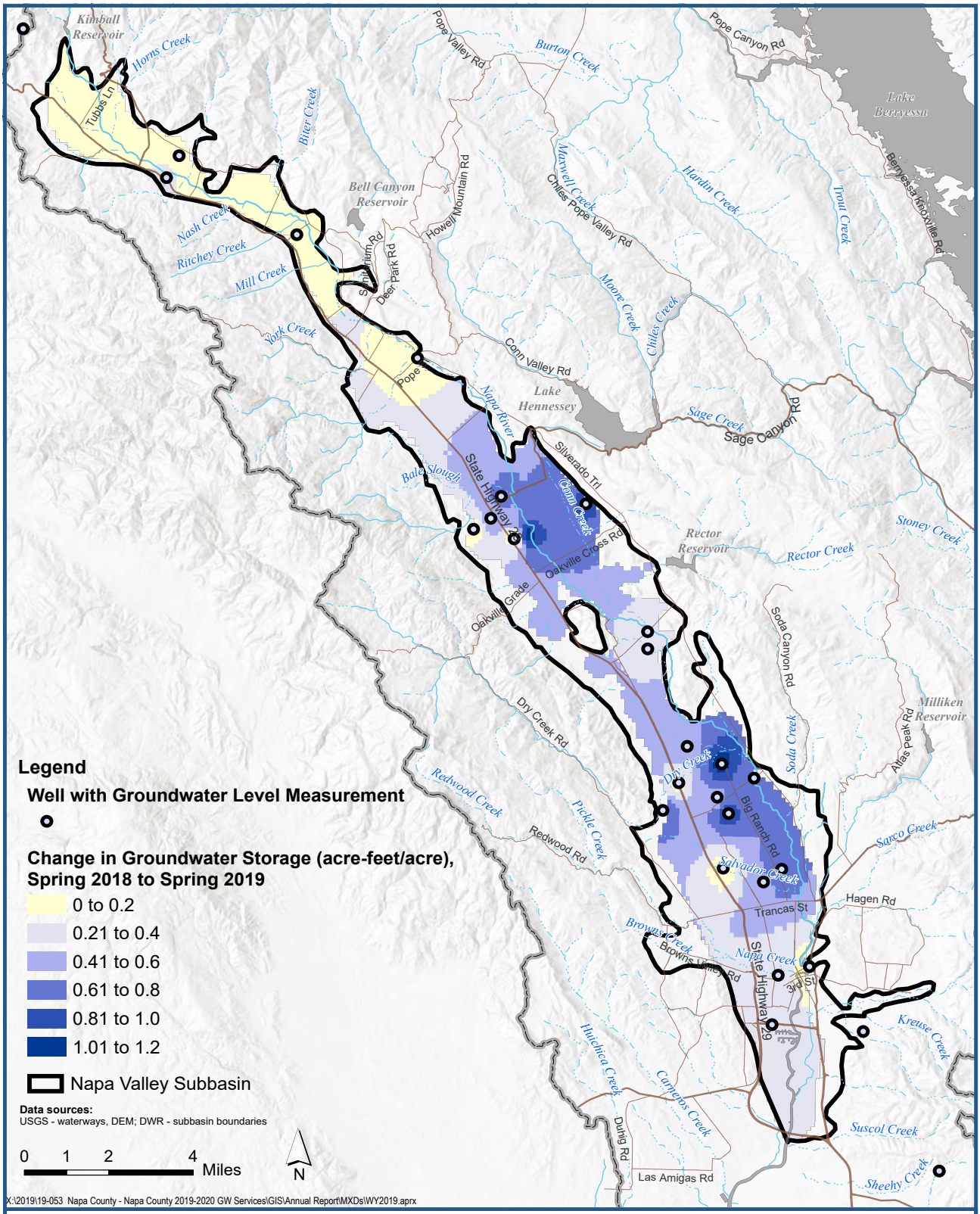

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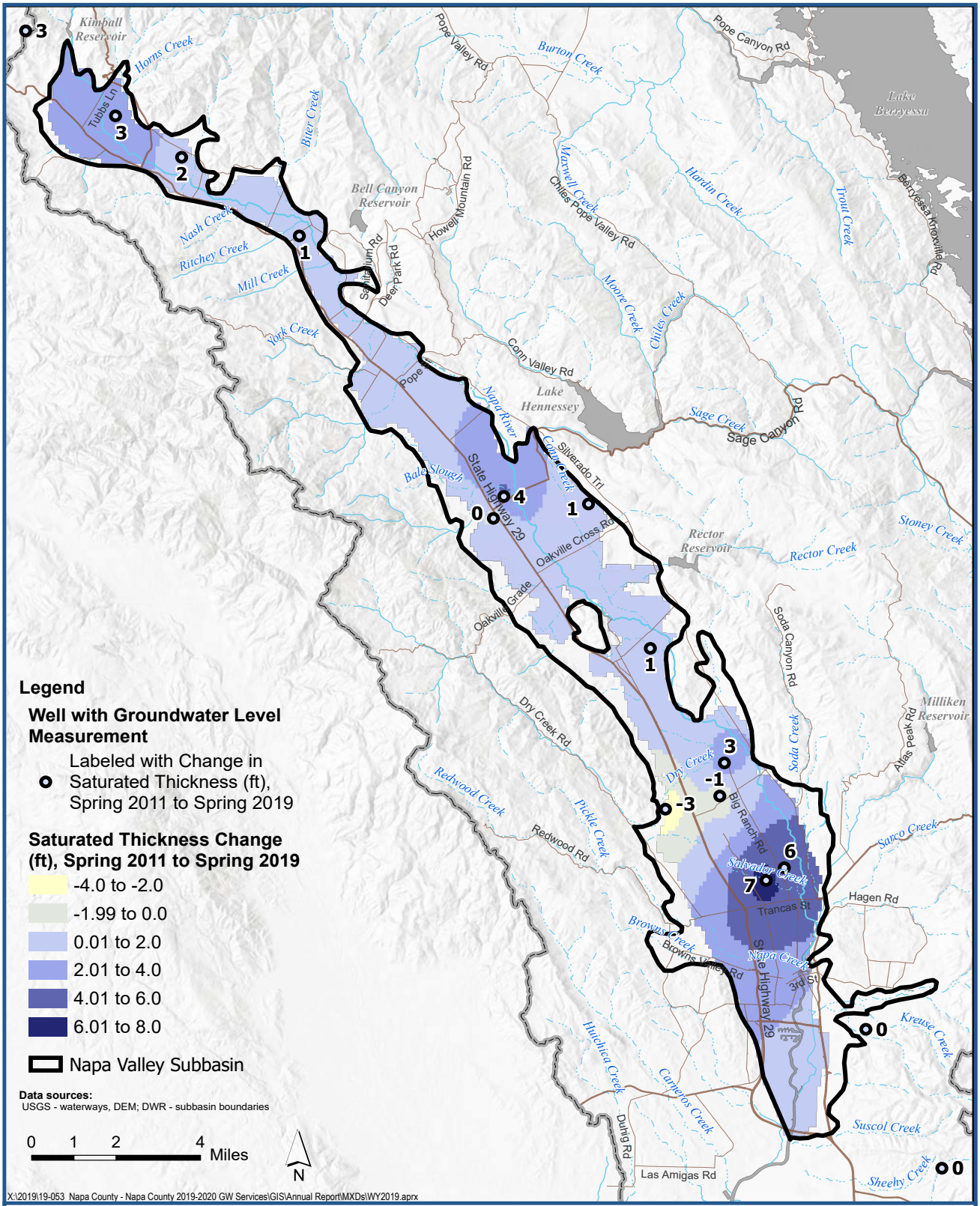
Napa Valley Subbasin Principal Aquifer Change in Groundwater Storage, Spring 2018 to Spring 2019

Figure ES-7

Napa County Groundwater Sustainability Annual Report - Water Year 2019



Napa Valley Subbasin Principal Aquifer Change in Saturated Thickness, Spring 2011 to Spring 2019

Figure ES-8

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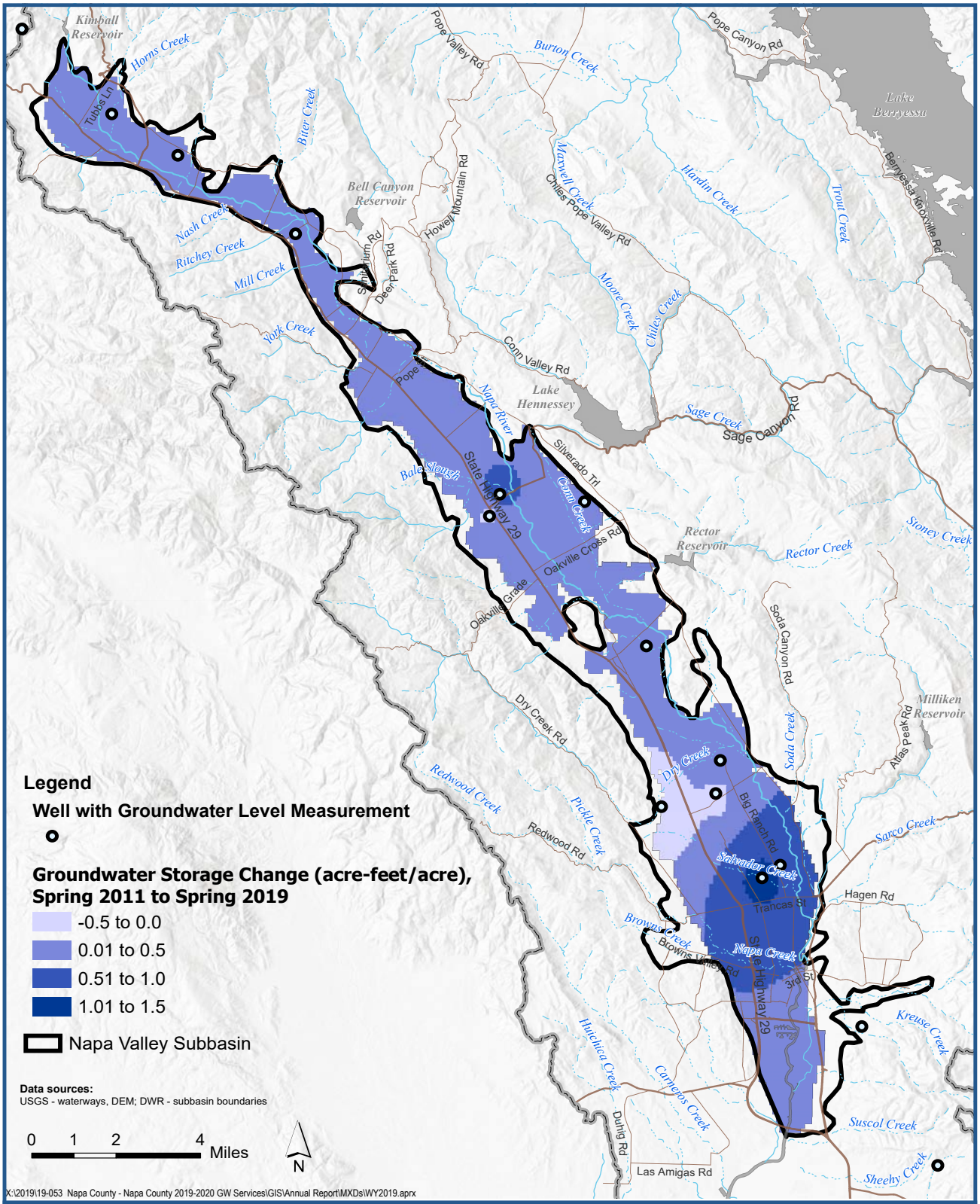

Napa Valley Subbasin Principal Aquifer Change in Groundwater Storage, Spring 2011 to Spring 2019

Figure ES-9

Napa County Groundwater Sustainability Annual Report - Water Year 2019

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ES 4.3 Napa Valley Subbasin Water Use

Total water use in the Napa Valley Subbasin, including groundwater extracted from the Subbasin, surface water from sources within the Napa River Watershed, and imported surface water delivered through the State Water Project, is estimated to have been 36,941 acre-feet in water year 2019 (see **Section 6.1.4**).

Table ES-2 Napa Valley Subbasin Principal Aquifer Groundwater Storage Changes, Water Years 1988 - 2019

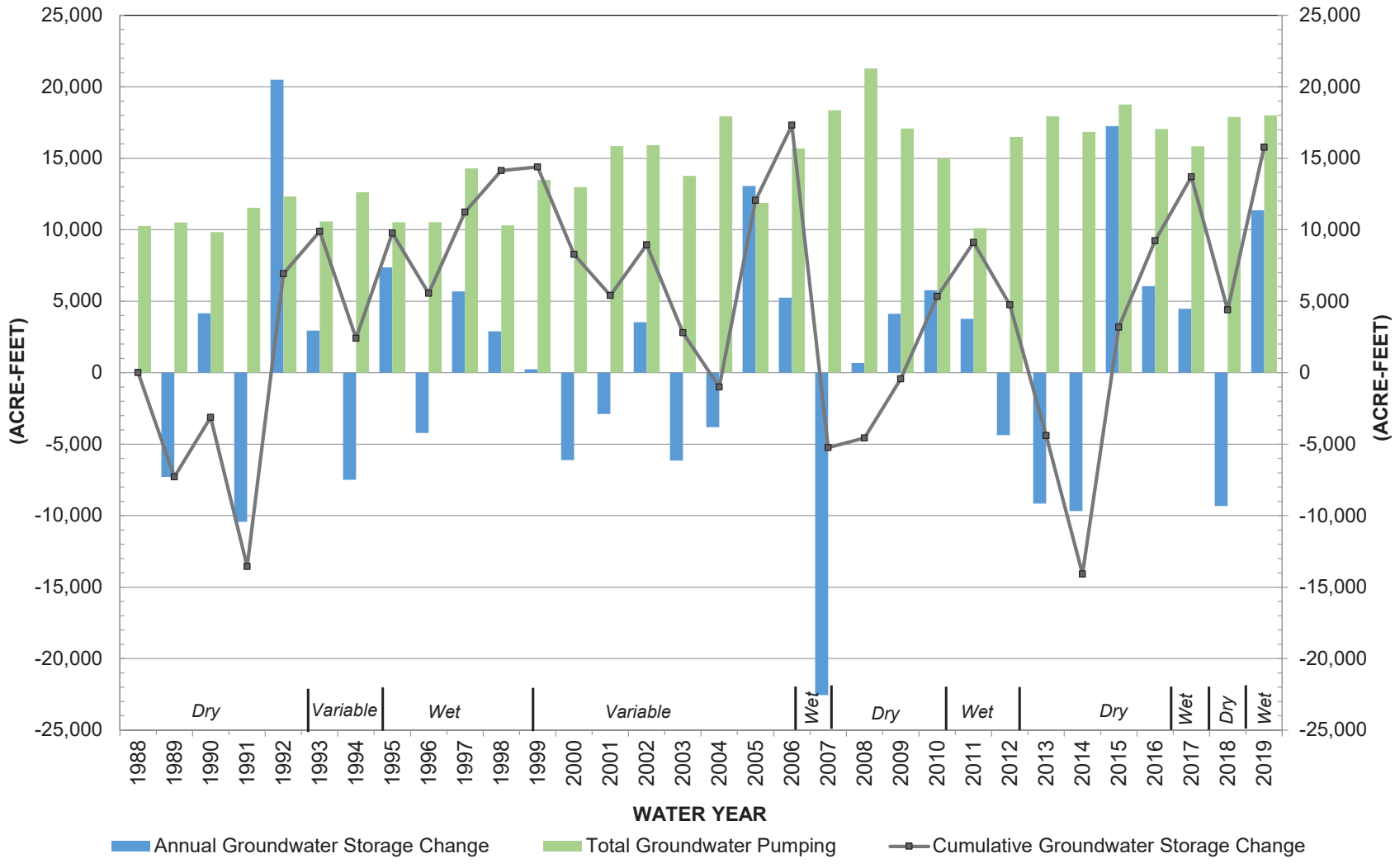
Water Year	Water Year Classification	Napa Valley Subbasin Alluvial Aquifer Storage	Annual Storage Change	Cumulative Storage Change
1988	Normal (below average)	205,596	-	-
1989	Normal (below average)	198,305	(7,290)	(7,290)
1990	Dry	202,469	4,164	(3,126)
1991	Dry	192,046	(10,424)	(13,550)
1992	Normal (below average)	212,532	20,486	6,936
1993	Wet	215,486	2,953	9,890
1994	Dry	208,000	(7,486)	2,404
1995	Very Wet	215,361	7,361	9,765
1996	Wet	211,141	(4,220)	5,545
1997	Wet	216,835	5,695	11,239
1998	Very Wet	219,733	2,898	14,138
1999	Normal (above average)	219,981	247	14,385
2000	Normal (above average)	213,878	(6,103)	8,282
2001	Dry	210,997	(2,881)	5,401
2002	Normal (above average)	214,534	3,537	8,938
2003	Wet	208,394	(6,140)	2,798
2004	Normal (below average)	204,592	(3,802)	(1,004)
2005	Wet	217,650	13,058	12,054
2006	Very Wet	222,904	5,254	17,308
2007	Very Dry	200,359	(22,545)	(5,237)
2008	Normal (below average)	201,029	670	(4,567)
2009	Normal (below average)	205,160	4,132	(436)
2010	Wet	210,929	5,769	5,333
2011	Wet	214,705	3,776	9,109
2012	Normal (below average)	210,338	(4,367)	4,742
2013	Normal (below average)	201,193	(9,145)	(4,403)
2014	Dry	191,523	(9,670)	(14,073)
2015	Normal (below average)	208,771	17,248	3,175
2016	Normal (below average)	214,827	6,056	9,232
2017	Very Wet	219,298	4,470	13,702
2018	Dry	209,984	(9,314)	4,388
2019	**Wet**	**221,358**	**11,374**	**15,762**
	Average (1988 – 2019)	**209,997**	**508**	
	Median (1988 – 2019)	**210,963**	**2,898**	

Total estimated groundwater use in the Subbasin was 17,949 acre-feet. Groundwater use for water year 2019 is presented along with values for 1988 – 2018 developed previously (LSCE, 2016c, LSCE, 2018b, and LSCE, 2019) in **Figure ES-10**. The figure also includes calculated annual and cumulative changes in groundwater storage in the alluvial aquifer system of the Subbasin. As noted above, groundwater storage volume increased in 2019 by 11,374 acre-feet. Cumulative changes in groundwater storage show a net increase of 15,762 acre-feet from 1988 – 2019 in the principal aquifer of Napa Valley Subbasin (**Table ES-2**).

Groundwater use in water year 2019 was comparable to amounts used in recent years dating back to 2004 (**Figure ES-10**). Over the full 30-year period, annual storage changes in the aquifer system have fluctuated between positive and negative values, generally in accordance with the water year type. Cumulative changes in groundwater storage have also fluctuated between positive and negative values, indicating long-term stable groundwater storage conditions, the absence of chronic depletions of groundwater storage, and an overall condition of a basin in balance. Groundwater use in the Subbasin in water year 2019 remained within the sustainable yield range of 17,000 to 20,000 acre-feet per year identified in the Basin Analysis Report (LSCE, 2016c). Together, the findings presented in this report regarding groundwater conditions at representative monitoring sites, changes in groundwater storage, and groundwater use demonstrate that the Napa Valley Subbasin has continued to be managed sustainably through 2019.

For water year 2019, an additional analysis of groundwater use by Groundwater Dependent Ecosystems (GDEs)[11] was conducted to improve the understanding of their groundwater use relative to other users in the Subbasin (see **Section 6.1.4**). Estimates of groundwater use by GDEs for water year 2019 were developed using spatial evapotranspiration datasets developed using LandSat imagery and processed according to the METRIC Evapotranspiration (ET) method.[12] This method is among several approaches for quantifying water use by vegetation described in draft guidance released by DWR in early 2020 (DWR, 2020).

[11]Groundwater Dependent Ecosystems were initially identified in the Basin Analysis Report based on a review of a draft dataset of potential groundwater dependent ecosystems under development by The Nature Conservancy, in collaboration with DWR and California Department of Fish and Wildlife (DFW), as the Basin Analysis Report was being developed. The Napa Valley Subbasin GDEs include a variety of wetland and vegetation communities that may rely on groundwater as a water supply.
[12]Mapping EvapoTranspiration at high Resolution with Internalized Calibration (METRIC) is an analytical method that applies an energy balance method to calculate field-scale evapotranspiration using energy flux data collected by satellites, paired with data from ground reference points.



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Napa Valley Subbasin Groundwater Use and Groundwater Storage Changes, Water Years 1988 - 2019

FIGURE ES-10

Napa County Groundwater Sustainability:
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The GDE ET analysis found that total groundwater use by GDEs, as determined from evapotranspiration data, was between 4,110 acre-feet and 4,924 acre-feet during the months when groundwater would be the dominant source of water available to GDEs. The result indicates that groundwater use by GDEs in water year 2019 was approximately 23% to 27% of the total groundwater use of 17,949 acre-feet by other uses and users in the Subbasin. This analysis provides a numerical point of comparison that will be useful going forward, along with updated GDE mapping, to understand the distribution and health of GDEs over time.

The results from the GDE ET analysis are not additive for the purposes of evaluating annual use of groundwater relative to the sustainable yield for the Subbasin. The prior analysis of sustainable yield addressed "withdrawals" from the Subbasin due to groundwater pumping and not outflows due to ET or subsurface outflows to the Lowland Subbasin, though the latter two components were explicitly addressed and the water budget analysis presented in the Basin Analysis Report (LSCE, 2016c). GDEs are among the beneficial users of groundwater in the Subbasin. The use of groundwater by GDEs represents one indication of the health of GDEs. The County is working to better understand and account for these uses of groundwater, per recommendations in the Basin Analysis Report.

ES 4.4 Recommendations for Continued SGMA Implementation[13]

The following paragraphs provide an update on planned near-term activities, consistent with management recommendations supported by the Napa County Board of Supervisors in the Basin Analysis Report (LSCE, 2016c) and Northeast Napa Management Area Report (LSCE, 2018a) to maintain or improve groundwater conditions and ensure overall sustainability in the Napa Valley Subbasin. On December 17, 2019, the Napa County Board of Supervisors formed the Napa County Groundwater Sustainability Agency (GSA). The Napa County GSA is now responsible to provide for the sustainable management of groundwater within the Napa Valley Subbasin. The Napa County GSA must develop and implement a Groundwater Sustainability Plan (GSP) with participation from beneficial users of groundwater, interested parties, define undesirable results, set measurable objectives and minimum thresholds and establish monitoring programs, and prepare and submit annual reports to DWR. Although they have separate duties and responsibilities, the Napa County Board of Supervisors and the Napa County GSA have a shared obligation in taking actions to implement the SGMA, thereby managing and ensuring the long-term sustainability of Napa County's groundwater resources.

ES 4.4.1 Update the Napa County Groundwater Program Communication and Education Plan (SGMA Implementation Recommendation 5.1b and 5.2a)

Update and revise the 2012 Communications and Education Plan developed by the Groundwater Resources Advisory Committee to incorporate recent guidance from DWR regarding public outreach and stakeholder engagement consistent with the requirements of SGMA. As part of the review, the Napa County GSA will receive input from its GSP Advisory Committee, groundwater stakeholders, and the general public on ways to improve communications and engagement related to SGMA implementation activities. The GSA will prepare an updated Stakeholder Communications and Engagement Plan based on the input received.

ES 4.4.2 Data Gap Refinement (SGMA Implementation Recommendations 11, 13, and 14)

Outreach to solicit wells for voluntary inclusion in the groundwater monitoring network will

[13]The Basin Analysis Report for the Napa Valley Subbasin includes a comprehensive list of monitoring and management recommendations developed since 2011. Additional recommendations developed as part of the Basin Analysis Report and the Northeast Napa Management Area Report were added to the list in sequence, beginning at number 13. Recommendations 1 – 12 are referenced in this Section where applicable to ongoing activities.

continue through the Napa County GSA, County, and Watershed Information and Conservation Council (WICC) websites, groundwater listserv emails, public presentations regarding groundwater conditions, and other means. Napa County will also continue to review discretionary projects recently approved by the County with conditions of approval requiring that project wells be made available for inclusion in the groundwater monitoring network.

Coordination with other County departments and other agencies that collect or utilize groundwater data could also provide additional data in areas of interest. Several local agencies, including the Town of Yountville, City of St. Helena, and City of Napa, already monitor groundwater levels at locations around the county.

ES 4.4.3 Ongoing Water Quality Sampling (SGMA Implementation Recommendation 15)

Groundwater quality sampling is recommended to continue at wells throughout the Napa Valley Subbasin and Napa-Sonoma Lowlands Subbasin in 2020. Additional water quality sampling for a reduced set of constituents, including nitrate and chloride, is also recommended for the five dual-completion monitoring wells constructed in 2014 at surface water-groundwater monitoring sites. These sites were previously sampled in 2015 and 2018.

ES 4.4.4 Improve Data Collection and Evaluation from Discretionary Permittees Required to Monitor Groundwater Conditions and Groundwater Use (SGMA Implementation Recommendations 16 and 25)

Through coordination between the Napa County Public Works Department and Planning, Building, and Environmental Services Department, continue to improve procedures for receiving data reported by permittees required to report groundwater data and regularly incorporate that data into the Napa County Groundwater Data Management System (DMS).

ES 4.4.5 Evaluate Strategic Recharge and Water Conservation Opportunities (SGMA Implementation Recommendations 8 and 19)

While additional data are being utilized to improve the understanding of water use by public water systems throughout the county, data gaps remain regarding water use on vineyards and other irrigated crops. As part of continued refinements of the water budget analysis for the Napa Valley Subbasin, it is recommended that the Napa County GSA hold workshops with agricultural industry representatives to develop a shared understanding of water use practices applied across the Subbasin, including irrigation, frost and heat protection, and tile drainage operations. In addition to providing shared information, the workshops would be held to further improve the calibration and parameterization of the Napa Valley Integrated Hydrologic Model (NV-IHM) and the water budget analysis being developed for the Napa Valley Subbasin GSP.

ES 4.4.6 Evaluate Distribution of Groundwater Dependent Ecosystems; Coordinate Evaluation with Guidance Developed by DWR, The Nature Conservancy, California Native Plant Society or Others (SGMA Implementation Recommendations 11 and 20)

With technical assistance from the Napa County Resource Conservation District (Napa RCD) and other local experts, the Napa County GSA will continue to review and implement guidance

on evaluating GDEs released by The Nature Conservancy (Rhode et al., 2018 and Rhode et al., 2019), to refine the mapping and assessment of GDEs in the Napa Valley Subbasin. The GDE mapping and analysis included in the Napa Valley Subbasin GSP will also reflect guidance from TNC, CADFW, and others on approaches to considering the dependence on groundwater by endangered, threatened, and sensitive species present in the Subbasin (Rohde et al., 2019).

Part of this effort will include data collection using a custom-built website, with data collection occurring at 26 sites. Through this approach, the GSA will collect standardized information and photographs documenting streamflow conditions at priority sites multiple times throughout the year. This information will complement existing stream gaging station data collected by Napa County, the Napa RCD, and U.S. Geological Survey.[14]

ES 4.4.7 Update the Napa County Groundwater Ordinance for the Northeast Napa Management Area (SGMA Implementation Recommendation 28)

On October 24, 2017, the Napa County Board of Supervisors directed County staff to update the Napa County Groundwater Ordinance to reflect the additional requirements for project-specific analysis and to incorporate water use criteria and water use reporting requirements for the Northeast Napa Management Area using an approach similar to what has already been implemented in the MST Subarea. In response, Napa County Public Works Department and Planning, Building, and Environmental Services Department staff are coordinating resources to develop an update to the Groundwater Ordinance. The Planning, Building, and Environmental Services Department has developed specific mapping data to assist and alert its land use planners when a project is located in the Northeast Napa Management Area. For discretionary projects in the Northeast Napa Management Area, additional project-specific analyses (Napa County Water Availability Analysis-Tier 2) will be required to ensure that the proposed project location or planned use of groundwater does not cause an undesirable result (e.g., locate proposed wells at appropriate distances from surface water [or consider well construction approaches that avoid streamflow effects] and avoid mutual well interference to neighboring wells) (Napa County, 2015).

ES 4.4.8 Continue to Implement Improvements to Napa County's Data Management System (SGMA Implementation Recommendation 1.1b)

GSP regulations developed by DWR require GSAs to develop and maintain a data management system (DMS) to store and report information relevant to GSP development (GSP Regulations Section 352.6). Napa County developed a DMS for its groundwater program in 2012 and has used the DMS since that time to support groundwater conditions monitoring and reporting. In 2020 and continuing in future years, additional DMS development is recommended to further incorporate additional data used for GSP development and to enable interactive visualizations of those data by SGMA stakeholders.

ES 4.4.9 Develop Well Testing Standards (SGMA Implementation Recommendation 30)

Consistent with the recommendation approved by the Board of Supervisors in the January 2018 Amendment to the Basin Analysis Report, it is recommended that the Napa County GSA develop appropriate well testing standards and require that the standards be applied under certain circumstances. Testing standards will provide well owners and the Napa County GSA with improved data on aquifer properties and well productivity.

[14] See https://napa.onerain.com/

It is recommended that the new well testing standards be required when new production wells are constructed in areas where hydraulic conductivity and other aquifer parameters are less well known, including the Northeast Napa Management Area east of the Napa River and in deeper geologic units throughout the rest of the Napa Valley Subbasin. Because older and less productive geologic formations occur near ground surface in the northeast Napa Area east of the Napa River, it is likely that pump tests will need to be performed for all new production wells in that area (**Figure ES-1**). Similar pump testing will be required for non-domestic production wells, and for wells that are completed in deeper geologic units below the Quaternary alluvium throughout the Napa Valley Subbasin.

ES 4.4.10 Napa Valley Groundwater Model Development

To support ongoing water management within a watershed framework, a mathematical model of groundwater and surface water processes is under development that will cover the entire Napa River Watershed, including the Napa Valley Subbasin. Funded in part by a grant from DWR, the Napa Valley Integrated Hydrologic Model (NV-IHM) will provide a robust tool to inform management actions and advance the understanding and management of groundwater, including interconnected groundwater and surface water resources. Utilizing open-source software developed by the USGS, the NV-IHM will be used to assess historical, current, and projected water budgets and to assess sustainable yield, especially for the Napa Valley Subbasin. The NV-IHM will be used to analyze and implement recommendations that were included in the Basin Analysis Report, based in part on stakeholder comments and Napa County GSA's desire to develop a more robust and integrated tool to inform management actions.

Public meetings and stakeholder/focus group meetings will occur periodically throughout the model development process and will provide a platform to exchange information regarding model datasets and progress. Future model scenarios, including variable climate and future land uses will be tested with the support of input from stakeholders. Additionally, the effects of climate change, potential projects and management actions will be tested, including actions such as increasing use of recycled water, increasing groundwater recharge, and potential controls on groundwater use.

ES 4.4.11 Groundwater Sustainability Plan (GSP) Development

The Napa County GSA is developing a GSP for the Napa Valley Subbasin to be submitted to DWR by January 31, 2022. GSP development will be supported by a grant from DWR and will build on existing groundwater studies and plans developed by the County and others over many decades. Additionally, new groundwater-surface water monitoring wells are planned to be installed to inform GSP development, also with funding from a DWR grant. Progress regarding GSP development will be presented at public meetings, including meetings of the Napa County GSA and its GSP Advisory Committee (to be formed in May 2020). Those public meetings will allow for stakeholder and public input on the GSP as it is being developed. Draft GSP chapters will also be released for public input and comment as they are developed in 2020 and 2021 and prior to consideration for approval by the Napa County GSA. The GSA has published a schedule for GSA meetings and GSP development on its website. A schedule for the GSP Advisory Committee meetings will be posted after the committee is formed. GSP development updates will also be communicated to stakeholders and the public through the Napa County GSA, County, and WICC websites, groundwater listserv emails, and other means.

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