1st Annual Report
Borrego Springs Groundwater Subbasin:
Covering Water Years 2016 through 2019

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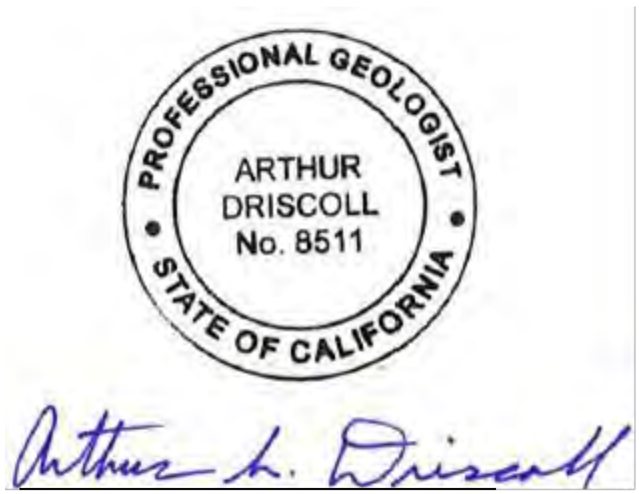
This draft Annual Report for the Borrego Springs Groundwater Subbasin has been prepared under the direction of a professional geologist licensed in the State of California consistent with professional standards of practice.



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Acronyms and Abbreviations

Acronym/Abbreviation	Definition
ABDSP	Anza-Borrego Desert State Park
AF	acre-feet
AFY	acre-feet per year
amsl	above mean sea level
BWD	Borrego Water District
Basin	Borrego Valley Groundwater Basin
BVHM	Borrego Valley Hydrologic Model
CCP	Code of Civil Procedure
CFS	Cubic feet per second
CMA	Central Management Area
COC	contaminant of concern
County	County of San Diego
CWC	California Water Code
CIMIS	California Irrigation Management Information System
DWR	California Department of Water Resources
ETo	Reference evapotranspiration
GDE	Groundwater Dependent Ecosystem
GIS	geographic information system
GMP	Groundwater Management Plan
GPM	Gallons per Minute
GSA	Groundwater Sustanability Agency
GSP	Groundwater Sustainability Plan
NMA	North Management Area
SGMA	Sustainable Groundwater Management Act
SMA	South Management Area
SWID	State Well Identification
Subbasin	Borrego Springs Groundwater Subbasin
TAC	Technical Advisory Committee
TDS	total dissolved solids
USGS	U.S. Geological Survey

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Executive Summary

The first Annual Report for the Borrego Springs Groundwater Subbasin has been prepared for submittal to the California State Department of Water Resources (DWR) per Article 7, Section 356.2—Annual Reports, of the California Code of Regulations.[1] This report has been prepared for the Borrego Water District (BWD) on behalf of the stipulating parties to the proposed groundwater rights adjudication for the Borrego Springs Groundwater Subbasin (Subbasin) (DWR Basin No. 7.024.01) of the Borrego Valley Groundwater Basin (Figure 1). BWD and other stipulating parties submitted to DWR a proposed Stipulated Judgment including a groundwater management plan (GMP), constituting a "Physical Solution" for DWR's review and approval to serve as an alternative to a Groundwater Sustainability Plan (GSP) for the Subbasin in compliance with the Sustainable Groundwater Management Act (SGMA). The alternative to a GSP was submitted to DWR on January 30, 2020. SGMA regulations require that an annual report be submitted to the DWR by April 1 of each year following the adoption of the GSP. This annual report provides an update on the groundwater conditions in the Subbasin for water years 2016 through 2019 (October 1, 2015 through September 30, 2019).

1 Title 23, Division 2, Chapter 1.5, Subchapter 2 of the California Code of Regulations, which is commonly referred to as the Groundwater Sustainability Plan Regulations (GSP Regulations).

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1 Introduction

1.1 Background

The County of San Diego (County) and the Borrego Water District (BWD), acting together as the groundwater sustainability agency (GSA) for the Borrego Springs Groundwater Subbasin (Subbasin) (California Department of Water Resources (DWR) Basin No. 7.024.01) of the Borrego Valley Groundwater Basin, collectively developed a draft final Groundwater Sustainability Plan (GSP). This GSP complies with the 2014 Sustainable Groundwater Management Act (SGMA) (California Water Code Section 10720–10737.8, et al.) and the DWR GSP Regulations (California Code of Regulations, Title 23, Section 350 et seq.). Information regarding the GSP including stakeholder process is available from the County's website:

https://www.sandiegocounty.gov/content/sdc/pds/SGMA/borrego-valley.html

On January 30, 2020, pursuant to California Water Code (CWC) Sections 10733.6 and 10737.4, BWD submitted to the DWR a proposed Stipulated Judgment including a groundwater management plan (GMP), constituting a "Physical Solution" for DWR's review and approval to serve as an alternative to a GSP for the Subbasin in compliance with the SGMA. A complaint, seeking a comprehensive adjudication of the groundwater rights of the Subbasin, was filed by BWD in the Superior Court for San Diego County, pursuant to Code of Civil Procedure (CCP) sections 830, et seq. The comprehensive adjudication seeks to sustainably manage the entirety of the Subbasin under SGMA. (*Borrego Water District v. All Persons Who Claim a Right to Extract Groundwater in the Borrego Valley Groundwater Subbasin, et al.*, San Diego Superior Court case no. 37-2020-00005776 CU-OR-CTL.). The draft final GSP was modified to conform its terms to the Stipulated Judgment proposed in the comprehensive adjudication and repurposed as a GMP, an integral part of the proposed Stipulated Judgment. Both the original draft final GSP and modified GMP cover the entirety of the Subbasin as defined by DWR. BWD, together with the stipulating parties, intend that the GMP, together with the Physical Solution embodied in the Stipulated Judgment, fulfill all of the substantive requirements for sustainable management of the Subbasin as prescribed in SGMA. Adjudication Action documents are available from the DWR's SGMA Portal website:

https://sgma.water.ca.gov/portal/alternative/print/37

The County withdrew from the Borrego Valley GSA effective December 31, 2019. The Borrego Valley GSA will continue to exist with BWD as the sole entity of the GSA, but will remain dormant during the period of the lawsuit and will be dissolved and replaced by the Watermaster once the Final Judgment is issued.

1.2 Plan Area

For purposes of the GMP and this Annual Report, the Plan Area is defined as the Borrego Springs Groundwater Subbasin, which has surface area of approximately 98 square miles or 62,776 acres (Figure 1). The western and southwestern boundary of the Borrego Springs Groundwater Subbasin is defined by the contact of poorly to moderately consolidated sediments with the plutonic and metamorphic basement of Pinyon Ridge and the San Ysidro Mountains. The northern and eastern boundaries are defined by the mapped trace of the Coyote Creek fault that trends northwest–southeast. East of the Coyote Creek fault lies Coyote Mountain, the Borrego Badlands, and the Ocotillo-Clark Valley Groundwater Basin. The southeastern boundary of the Plan Area is defined by the location of San Felipe Creek, as mapped by the U.S. Geological Survey (USGS) National Hydrography Dataset, which also marks the northern boundary of the Ocotillo Wells Groundwater Subbasin (DWR Basin No. 7.024.02).

The Plan Area consists primarily of private land under County jurisdiction, which is surrounded on nearly all sides by land owned by the State of California. The developed land uses in the Plan Area include residential, agricultural, recreational, and commercial (County of San Diego 2011). The public water district serving the Plan Area is the BWD, which provides water and sewer service to the developed portions of Borrego Valley within its service area.

Within the Plan Area, the majority of the land is undeveloped open space. The primary developed land uses in the Plan Area are agriculture, residential, transportation infrastructure, and recreational (including golf course).

1.2.1 Climate

1.2.1.1 Precipitation

Within the Plan Area, average annual precipitation ranges from up to 8 inches per year along the northwest edge of the valley, to less than 4 inches per year to the southeast (SDCFCD 2004). Average yearly precipitation is greater outside the plan area in the mountains to the west, north, and northeast of the Borrego Valley.

Precipitation patterns in the Plan Area are influenced by two distinct sources. The first source is Pacific frontal systems that bring regional rain bands to Southern California, typically between October and April. The second source is isolated and scattered thunderstorms that occur when moisture from the Gulf of California travels from south to north through the Plan Area. This phenomenon, commonly referred to as the “monsoon” season, is strongest in the summer months, but is not a regular or consistent occurrence. Occasionally, the decaying remnants of former tropical storms or hurricanes can pass through the area and in some years these further enhance the precipitation totals during the monsoon season. As a consequence of these disparate influences, the precipitation record is highly variable both seasonally and annually. This makes defining the parameters of “wet” or “dry” years difficult (e.g., one thunderstorm may drop half of the yearly total in an otherwise dry season). For the purpose of defining the water year type, years with precipitation within one standard deviation (3.45 inches) of the long-term average precipitation are defined as “normal”, years with above “normal” precipitation are considered “wet,” and years with below “normal” precipitation are considered “dry”.

The weather station in the Plan Area with the longest and most complete precipitation record is the Borrego Desert Park Station, which spans the period from water year 1942 to present. Based on this record, the mean annual precipitation at Borrego Desert Park Station is approximately 5.65 inches (NOAA 2020).

1.2.1.2 Temperature

The climate of the Borrego Valley is arid with hot summers and cool winters. Based on the Borrego Desert Park Station, the average annual high (daytime) temperature is 87.6°F, ranging from a low of 68.9°F in December to a high of 107.4°F in July. The average annual low (nighttime) temperature is 58.3°F, ranging from a low of 43.3°F in December, to a high of 75.8°F in July (NOAA 2020).

1.2.1.3 Evapotranspiration

Reference evapotranspiration (ETo) in the Plan Area has been calculated from the data collected at California Irrigation Management Information System Station (CIMIS) Station 207 on a daily basis since 2008 (Figure 2; Table 1-1). The average ETo measured at CIMIS Station 207 between 2008 and 2019 is 71.11 inches per year or 5.93 feet per year (Table 1-1). In contrast, the average annual precipitation in the Plan Area is 5.65 inches per year (NOAA 2020). 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 ET rate for a specific crop or native vegetation, the ETo is multiplied by a crop coefficient that adjusts the water consumption for each crop relative to the water consumption for alfalfa.

Table 1-1
Monthly and Yearly Reference Evapotranspiration (ETo) Totals for CIMIS Station No. 207 from 2008 to 2019 (Inches)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Total
2008[a, b]	0.46	3.43	6.16	7.60	9.30	10.02	9.07	6.76	6.77	5.13	3.36	2.27	70.33
2009[b]	2.68	5.16	5.69	7.07	8.76	8.28	8.87	8.71	7.21	5.00	3.08	1.96	72.47
2010[b]	2.41	3.21	8.81	9.84	8.58	9.22	9.51	9.11	7.44	4.36	2.88	1.98	77.35
2011[b]	2.68	3.35	5.55	7.12	8.77	8.23	7.98	8.47	6.43	4.92	2.72	2.11	68.33
2012[b]	2.85	3.56	5.33	6.77	7.66	9.47	8.77	8.04	7.09	5.04	3.20	2.23	70.01
2013[b]	2.54	3.57	5.75	7.56	8.64	9.02	8.01	7.57	6.46	5.05	3.00	2.27	69.44
2014[b]	2.67	3.66	5.94	7.23	8.66	9.72	9.24	8.38	6.97	4.70	3.14	1.58	71.89
2015[b]	2.17	3.54	5.83	7.23	7.95	8.52	8.76	8.74	6.55	5.16	3.35	2.43	70.23
2016[b]	2.42	4.15	6.35	7.44	8.97	9.79	10.17	8.91	6.51	5.17	3.37	1.99	75.24
2017[b]	2.33	3.28	6.27	8.18	9.14	10.20	9.70	9.43	6.99	5.38	3.16	2.47	76.53
2018[b]	2.75	3.46	5.43	7.66	8.63	9.13	8.65	8.00	6.48	4.20	2.96	1.65	69.00
2019[b]	2.00	2.38	4.68	6.56	6.82	7.61	8.19	7.67	6.10	4.60	2.94	2.21	61.76
11-Year Average	**2.50**	**3.57**	**5.97**	**7.51**	**8.42**	**9.02**	**8.90**	**8.46**	**6.75**	**4.87**	**3.07**	**2.08**	**71.11**

Source: CIMIS 2020.
Notes:
a. 2008 is excluded from the average as the record for that year is not complete.
b. Values reported herein were downloaded from CIMIS daily data and compiled on 3/22/2020.

According to the State of California Reference Evapotranspiration Map developed by CIMIS, the Plan Area is located within Evapotranspiration Zone 18, with an annual average ETo of 71.6 inches or 5.97 feet (DWR 2012). This regional average annual ETo estimate is comparable to the ETo measured at CIMIS Station 207 (Table 1-1).

1.2.2 Surface Water and Drainage Features

There are no water deliveries to the Plan Area from external sources, and surface water imports are not available for managed recharge. In addition, there are currently no managed stormwater recharge facilities in the Plan Area. Thus, recharge is limited to natural infiltration of stormwater, and return flows of applied irrigation water and septic recharge.

The Coyote Creek Watershed, which drains the Santa Rosa Mountains to the north of the Borrego Springs Subbasin, provides most of the recharge to the Subbasin through infiltration of streamflow into the shallow alluvial sediments. Mountain front recharge that occurs at the interface between surrounding bedrock and unconsolidated sediments is the primary source of recharge along the smaller tributaries that enter the Subbasin, largely comprising the Borrego Valley-Borrego Sink Wash Watershed (Figure 2). These include Borrego Palm Creek, and washes exiting the San Ysidro Mountains, Pinyon Ridge, Yaqui Ridge, Coyote Mountains, and the Borrego Badlands. The other, though less voluminous, source of recharge are return flows from agricultural irrigation. Septic tank treatment and disposal systems also constitute a source of recharge to the basin, but is considered negligible when compared to natural recharge.

Only one drainage entering the Subbasin is currently monitored with an active streamgage. USGS Station Number 10255810, is located on Borrego Palm Canyon downstream on the palm oasis. This streamgage has a 59-year period of record with sub-daily data (15 minute) from 2015 to 2019, and daily data from 1950 to 2003 (USGS 2020). The data indicate little to no flow over most of the period of record punctuated by higher flows associated with individual precipitation events. During wet years, prolonged stream flow after individual precipitation events is often recorded, but in most years little to no base flow is recorded in the summer months. Brief runoff events occur during occasional thunderstorms. Exhibit 1 shows the daily discharge from Borrego Palm Canyon USGS streamgage 10255810 for the period from 1950 to 2003, and 2015 to 2019.

There are two historical streamgages along Coyote Creek located at the northernmost boundary of the Subbasin, one of which stopped recording streamflow in 1983 and the other stopped recording flow in 1993. USGS Station Number 10255800 (Upper–Northern) recorded daily discharge data from 1950–1983; at this station, annual average stream flow was measured to be 1,831 acre-feet per year (USGS 2020b). USGS Station Number 10255805 (Lower–Southern) recorded daily discharge data from 1983–1993; at this station, annual average stream flow was measured to be 1,774 acre-feet per year (USGS 2020b).

1.2.2.1 Manual Stream Flow Measurements

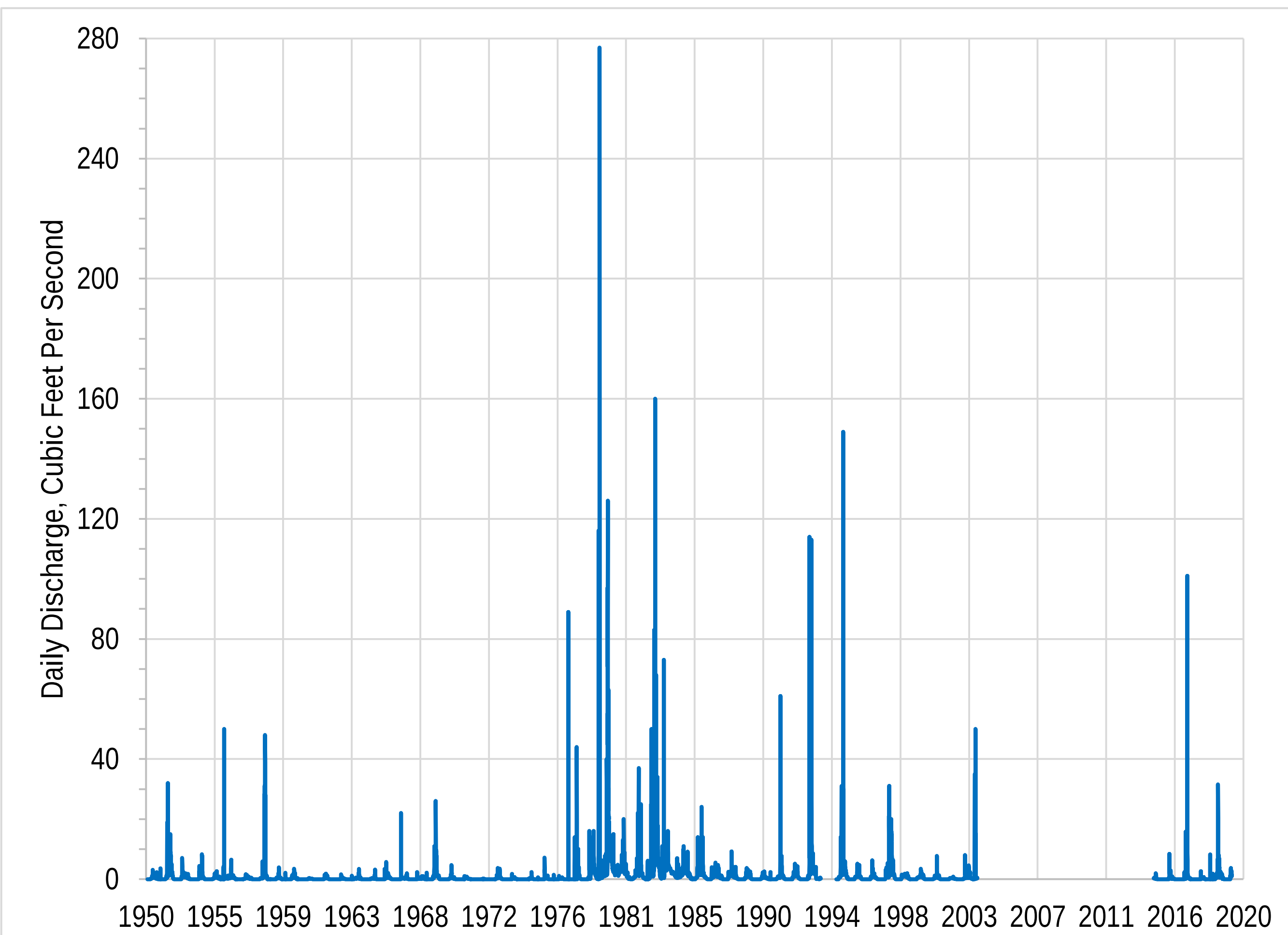
To evaluate the potential groundwater dependent ecosystems (GDEs) associated with Coyote Creek, the GSA has investigated whether the perennial and ephemeral creek segments are gaining water or losing water to the underlying aquifer system. To complete this analysis, the GSA has commenced mapping the perennial extent of flow in to the Subbasin on a semi-annual basis (spring and fall). The upper historical streamgage is the GSA's manual monitoring point for Coyote Creek. At this location, the GSA manually measured an instantaneous stream flow of 0.46 cubic feet per second (CFS) in the spring 2018, which converts to 206.5 gallons per minute (GPM). At that time, the former lower historical USGS streamgage station was observed to be dry. In the fall 2018, the upper historical streamgage location was not accessible due to excessive vegetative growth. Stream flow was measured downstream of the historical streamgage at "third crossing" in the fall 2018 at 0.52 CFS (232.6 GPM). At that time, instantaneous stream flow at the former lower historical USGS streamgage station was 0.08 CFS (34.3 GPM).

In the spring of 2018, the perennial extent of flow in Coyote Creek was documented to cease downstream of the third-crossing and upstream of the second crossing. No flow was observed in the spring of 2018 at the lower inactive USGS streamgage, which is one of the permanent locations for manual flow readings. In the fall of 2017, stream flow extended almost half-way from the second crossing to the first crossing. The crossings refer to where an unimproved trail crosses the creek bed, and are shown in Figure 2. In the fall of 2017, there was a precipitation event in the Coyote Creek watershed that produced runoff in Coyote Creek; however, no stream flow measurements are available for this event. Flow in the stream was observed to decrease incrementally from the upper inactive USGS streamgage to two locations measured downstream.

Table 1-2
Manual Stream Flow Measurements Coyote Creek

Location	Latitude	Longitude	Spring 2018 (CFS)	Fall 2018 (CFS)	Spring 2019 (CFS)	Fall 2019 (CFS)
Upper Historical Stream Gage Site	33.3728	-116.4257	0.46	1.06	0.64	Not Accessible
Third Crossing	33.3714	-116.4245	0.27	0.85	0.57	0.52
Locking Gate (South of Third Crossing)	33.3685	-116.4214	0.17	0.94	0.44	0.36
Second Crossing (At Lower Historical Stream Gage)	33.3655	-116.4164	Dry	0.65	0.14	0.08
First Crossing	33.3601	-116.4022	Dry	0.34	Dry	Dry

Exhibit 1
USGS 10255810 Borrego Palm Canyon Stream Flow 1950 to 2019



Source: USGS 2020a
Notes: Streamgage was inactive September 30, 2003 to January 6, 2015. The GMP included provisional streamgage data for 2018 and 2019. This figure has been updated with data approved by the USGS for publication.

1.2.3 Principal Aquifer and Aquitards

The groundwater system within the Borrego Springs Groundwater Subbasin has been subdivided into upper, middle, and lower aquifers. The differentiation between the three aquifers is based on a textural analysis of driller's lithologic logs and geophysical logs. The basin fill sediments of the Borrego Valley consist of unconsolidated to poorly consolidated mixtures of gravel, sand, silt, and clay. As there are no regionally extensive aquitards (e.g., a thick clay layer), the upper aquifer behaves in a predominantly unconfined manner, and the lower and middle aquifer exhibit leaky confined or semi-confined characteristics based on limited aquifer testing. The lower aquifer is the most fine-grained unit, containing higher amounts of silt and clay. For the purpose of this Annual Report and calculation of change in groundwater storage, the three aquifers are considered to comprise a single unconfined aquifer.

1.3 Annual Report Organization

This is the first Annual Report prepared since the GMP for the Subbasin was submitted to DWR. The report is organized to provide all of the required components of an annual report as per Article 7, Section 356.2—Annual Reports, including groundwater elevation, groundwater extraction, and surface water supply data, and an evaluation of change in groundwater in storage. A discussion of the monitoring network and implementation progress is also provided.

2 Groundwater Monitoring

2.1 Monitoring Network

The groundwater monitoring network in the Subbasin was established for the draft final GSP and will also be used to implement the GMP. The monitoring network was designed to collect sufficient data to demonstrate short-term, seasonal, and long-term trends in groundwater conditions, and provide representative information about Subbasin-wide groundwater conditions as necessary to evaluate GMP implementation. The location and type of monitoring for wells in the Subbasin are shown on Figure 4 and listed in Table 2-1. Water wells included in the groundwater monitoring network were incorporated from previous monitoring networks established by the BWD and consultants, County, DWR, and USGS. The Borrego Springs Groundwater Subbasin monitoring network currently consists of 50 groundwater wells owned by BWD, the County, Anza-Borrego Desert State Park (ABDSP), and private parties; some are strictly observation wells (no pumping), while others are used for municipal, recreation (e.g., golf courses and ABDSP), and rural residential purposes. Two additional monitoring wells, Nel Well (State Well Identification (SWID) 012S007E03L001S) and State Well (SWID 012S007E04R001S), are located immediately outside of the Subbasin, but are used to monitor groundwater levels. The groundwater level monitoring network includes 23 dedicated monitoring wells and 27 extraction wells. Of the 50 wells in the network, 46 are monitored for groundwater levels, 30 are monitored for water quality, and 19 are monitored for production. Groundwater levels are measured manually in the majority of the wells in the monitoring network, although the BWD and the Rams Hill Golf Course collectively have 17 wells equipped with pressure transducers that collect groundwater level data at frequencies as high as every 15 minutes.

The GMP establishes three management areas for the Subbasin: the North Management Area (NMA), the Central Management Area (CMA), and the South Management Area (SMA) (Figure 4). The management areas are utilized to monitor the status of SGMA parameters and measure the progress towards achieving sustainability goals. Subbasin monitoring wells are listed by management area in Table 2-1.

Table 2-1
Monitoring Network

Common Well Name [a]	State Well Identification (SWID)	Latitude	Longitude	Use	Groundwater Monitoring Type		
					Elevation	*Quality*	*Production*
North Management Area							
Horse Camp	009S006E31E003S	33.349264	-116.400345	Other	X	X	—
Private Well (Fortiner)	010S006E09N001S	33.314535	-116.366688	Residential	X	X	—
ID4-4	010S006E29K002S	33.277136	-116.374327	Public Supply	X	X	X
ID4-18	010S006E18J001S	33.306751	-116.384715	Public Supply	X	X	X
ID4-3	010S006E18R001S	33.298040	-116.384339	Public	X	—	—

Table 2-1
Monitoring Network

Common Well Name [a]	State Well Identification (SWID)	Latitude	Longitude	Use	Groundwater Monitoring Type		
					Elevation	Quality	Production
				Supply			
MW-1	010S006E21A002S	33.300634	-116.349471	Observation	X	X	—
Evans	010S006E21E001S	33.29429300	-116.36194000	Observation	X	—	—
Central Management Area							
County Yard (SD DOT)	011S006E15G001S	33.220966	-116.337613	Industrial	X	X	X
BSR Well 6	011S006E09B002S	33.23906	-116.35567	Irrigation - Recreation	—	X	X
BSR Well 3	011S006E04P001S	33.24559	-116.35875	Irrigation - Recreation	—	—	X
Hanna (Flowers)	010S006E14G001S	33.306115	-116.323982	Observation	X	—	—
Gabrych No. 2	011S006E01C001S	33.257255	-116.304700	Observation	X	—	—
ID4-1	010S006E32R001S	33.257486	-116.371035	Observation	X	—	—
ID4-5	010S006E33Q001S	33.257428	-116.355899	Observation	X	—	—
Airport 2	010S006E35N001S	33.257385	-116.326102	Observation	X	—	—
MW-4	010S006E35Q001S	33.257561	-116.313108	Observation	X	X	—
ID4-2	011S006E07K003S	33.231602	-116.388737	Observation	X	—	—
Palleson	010S006E33J001S	33.26156287	-116.34875075	Observation	X	—	—
Abandon Motel-1	011S006E10N001S	33.23.359532	-116.34704679	Observation	X	—	—
Abandon Motel-2	011S006E10N004S	33.23048074	-116.34689137	Observation	X	—	—
State Park No. 3	010S005E25R002S	33.27038000	-116.40354600	Other	X	X	X
Anzio/Yaqui Pass	011S006E22E001S	33.206040	-116.347150	Observation	X	—	—
Paddock	011S006E22B001S	33.211593	-116.334036	Observation	X	—	—
Cameron 2	011S006E04F001S	33.249652	-116.357102	Observation	X	—	—
ID5-5	011S006E09E001S	33.237067	-116.364304	Public Supply	—	X	X
ID1-10	011S006E22D001S	33.211790	-116.346813	Public Supply	X	X	X
ID1-16	011S006E16N001S	33.216557	-116.362440	Public Supply	X	X	X
Wilcox	011S006E20A001S	33.210910	-116.364826	Public Supply	X	X	X
ID1-12	011S006E16A002S	33.226030	-116.348317	Public Supply	X	X	X

Table 2-1
Monitoring Network

Common Well Name [a]	State Well Identification (SWID)	Latitude	Longitude	Use	Groundwater Monitoring Type		
					Elevation	Quality	Production
ID4-10	011S006E18L001S	33.218319	-116.392226	Public Supply	X	—	—
ID4-11	010S006E32D001S	33.267499	-116.383357	Public Supply	—	X	X
White Well	010S006E29A001S	33.280900	-116.367011	Residential	X	—	—
South Management Area							
RH-5	011S006E26B001S	33.195428	-116.319088	Irrigation - Recreation	X	X	X
RH-6	011S006E26H001S	33.194778	-116.314273	Irrigation - Recreation	X	X	X
RH-2	011S006E25C001S	33.195655	-116.304156	Irrigation - Recreation	X	X	X
RH-4	011S006E24Q002S	33.199973	-116.303654	Irrigation - Recreation	X	X	X
RH-1	011S006E25A001S	33.198121	-116.295854	Irrigation - Recreation	X	X	X
RH-3	011006E25C002S	33.197950	-116.307563	Irrigation - Recreation	X	X	X
WWTP	011S006E23H001S	33.207400	-116.315199	Observation	X	X	—
MW-5A	011S007E07R001S	33.226557	-116.279352	Observation	X	X	—
MW-5B	011S007E07R002S	33.226557	-116.279352	Observation	X	X	—
Bakko	011S006E22A001S	33.210901	-116.330845	Observation	X	—	—
Army Well	011S006E34A001S	33.184156	-116.332830	Observation	X	X	—
Hayden (32Q1)	011S007E32Q001S	33.173998	-116.264318	Observation	X	—	—
Bing Crosby Well	011S007E20P001S	33.199489	-116.267939	Observation	X	—	—
MW-3	011S006E23J002S	33.203481	-116.314252	Observation	X	X	—
ID1-8	011S006E23J001S	33.203160	-116.314343	Public Supply	X	X	X
Air Ranch Well 4	011S007E30L001S	33.190830	-116.286730	Public Supply	X	X	—
JC Well	011S006E24Q001S	33.201936	-116.303268	Residential	X	X	—
La Casa	011S006E23E001S	33.208044	-116.328359	Unknown	X	X	—
Outside Subbasin							
Nel Well	012S007E03L001S	33.160949006	-116.237237226	Observation	X	—	—
State Well	012S007E04R001S	33.156788	-116.243727	Observation	X	X	—

Notes: X = Monitored; — = Not Monitored; SD DOT = San Diego County Department of Transportation; BSR = Borrego Springs Resort.

[a] Common names beginning in "ID" are Borrego Water District (BWD) wells, common names beginning in "RH" area Ram's Hill Country Club Wells, and common names consisting of pronouns refer to the well owner or small water system.

Wells were selected for monitoring based on a combination of factors, including geographic location, screen interval relative to the three principal aquifers, accessibility, well condition, and continuity of historical data. The groundwater level monitoring program incorporated all feasible wells in the Subbasin at the time of draft final GSP preparation; however, the network is expected to be further refined as access is gained to additional wells or new wells are drilled in the Subbasin and as the GMP is implemented.

2.2 Frequency of Monitoring

Groundwater levels, quality, and production data are collected at frequencies to provide data of sufficient accuracy and quantity to demonstrate short-term, seasonal, and long-term trends in groundwater conditions.

Groundwater level measurements are collected from wells in the groundwater level monitoring network established for the draft final GSP (Table 2-1, Figure 4). Manual groundwater level measurements are collected in the spring and fall of each year to track seasonal groundwater trends. On average, manual groundwater levels are measured in 46 wells during each semi-annual monitoring event. In addition, short-term trends are tracked by pressure transducers installed and maintained in 17 wells that record groundwater levels at intervals of 15 minutes to 1 hour (sub-daily). Long-term trends are tracked by analysis of data from key indicator wells monitored semi-annually and with data dating back to the mid-1950s.

Groundwater quality monitoring includes sampling, on average, 30 wells on a semi-annual basis to determine and track groundwater quality trends. Wells are monitored for potential contaminants of concern (COCs) that were previously identified in part by the USGS and DWR, and a review of the historical data by the GMP. The COCs include arsenic, fluoride, nitrate, sulfate and total dissolved solids (TDS). In Fall 2017, general minerals were analyzed to establish baseline water quality and for comparison of water quality type for all wells monitored. Radionuclides were also analyzed to determine baseline conditions but are not currently considered a COC.

Groundwater production is recorded monthly for 11 active BWD wells and 12 golf course wells. Many private pumpers record groundwater production at monthly or annual intervals. Additionally, each Party to the Stipulated Judgment is to install a meter by March 31, 2020 for the purpose of accurately measuring water use and report to the Watermaster on an annual basis. The Interim Watermaster for the Subbasin approved the installations of various types of specific meters at its meeting of March 31, 2020.

3 Groundwater Conditions

3.1 Groundwater Elevations

The following sections provide a description of the Subbasin groundwater elevation contour maps and hydrographs developed using monitoring well groundwater elevation data for the period from 2015 through 2019 (Water Years 2016 – 2019).

3.1.1 Groundwater Elevation Contour Maps

Groundwater elevation data for wells in the monitoring network were compiled and reviewed for accuracy and completeness. Extraction wells were excluded from the dataset to ensure that the contours generated are generally representative of static conditions (i.e., not influenced by active pumping of a water well). Groundwater elevation data for a given year and season (i.e., spring or fall) were then selected for contouring. Groundwater elevation contours were generated in Surfer 17.1.288 (Golden Software, LLC) using the groundwater elevation data and triangulation with linear interpolation. The triangulation with linear interpolation method uses Delaunay triangulation to compute a series of triangles from the data points and then interpolates the grid nodes from the slopes of the triangles. Groundwater elevation contours were generated to show the seasonal high (spring) and seasonal low (fall) groundwater conditions for the period from 2015 through 2019 (Figures 5 – 14).

The predominant direction of groundwater flow within the Subbasin is away from mountain front regions, and away from San Felipe Creek, toward the center of the valley. In general, groundwater contours indicate that groundwater elevations over the period 2015 through 2019 ranged from a high of over 500 feet above mean sea level (amsl) in the extreme northern and southern portions of the Subbasin to a low of about 375 feet amsl in the CMA and southern portion of the NMA.

3.1.2 Groundwater Elevation Hydrographs

Groundwater elevation hydrographs were produced for each groundwater level monitoring well in the monitoring network. Available data for each well were plotted for the period from 2015 through 2019 (Appendix A).

Since the early 1950s, groundwater extraction in the Subbasin has exceeded recharge, and the direction of flow has been altered in all areas of the valley to the current period. The human influence on groundwater levels within the Plan Area is most pronounced in the northern part of the basin, generally decreasing in intensity towards the southeast. Measured groundwater elevations for non-pumping wells measured in spring 2015 ranged from a high of 476.36 feet amsl in the SMA (SWID 011S006E23H001S (WWTP-1 Well)) to a low of 383.14 feet amsl in the NMA (SWID 010S006E21A002S (MW-1)). Measured groundwater elevations for non-pumping wells measured in fall 2019 ranged from a high of 499.71 feet amsl in the SMA (SWID 011S007E32Q001S (Hayden Well)) to a low of 375.01 feet amsl in the NMA (SWID 010S006E21A002S (MW-1)). Measured groundwater elevations over the 5-year period showed a similar spatial pattern of static groundwater level elevations. Comparison of groundwater elevations measured at the same monitoring wells over the 5-year period indicate that, on average, measured groundwater elevations were 6.74 feet lower in fall 2019 than spring 2015, with a maximum increase of 1.73 feet amsl (SWID 011S006E07Q003S (ID4-2)) and maximum decrease of -20.14 feet amsl (SWID 011S006E23J002S (MW-3)). However, it should be noted that in certain wells and at certain times of the year, particularly the irrigation season, near-by pumping can influence groundwater level elevation in monitored wells.

3.1.3 Key Indicator Wells

Key indicator wells were established in the GMP to establish minimum thresholds and measurable objectives in each management area of the Subbasin as shown in Figure 15. A subset of key indicator wells were established for BWD wells to be protective of municipal use (see Table 3-4 of the GMP for details regarding BWD wells). Water Year 2019 groundwater elevations, minimum thresholds, measurable objectives, and interim milestones for key monitoring wells are presented in Table 3-1.

Table 3-1
Water Year 2019 Groundwater Elevations, Minimum Thresholds, Measurable Objectives, and Interim Milestones for Key Monitoring Wells

Well Number	Local Well Name	Management Area	Fall 2018 Groundwater Elevation[a] (feet MSL)	Fall 2019 Groundwater Elevation (feet MSL)	Minimum Threshold[b] (feet MSL)	Measurable Objective (feet MSL)	2025 Interim Milestone (feet MSL)	Historical Groundwater Level Trend[c] (feet per year)
010S006E21A002S	MW-1	NMA	376.11	375.01	-39	363	367	-2.14
010S006E18R001S	ID4-3	NMA	379.52	376.46	-42	368	371	-2.09
010S006E09N001S	Fortiner	NMA	373.35	NM	-46	365	367	-2.48
010S006E18J001S	ID4-18	NMA	375.65	NM	-44	367	369	-2.31
010S006E32R001S	ID4-1	CMA	392.34	391.66	-33	370	381	-1.39
010S006E35N001S	Airport 2	CMA	406.81	405.58	-25	382	394	-1.67
011S006E16N001S	ID1-16	CMA	388.38	NM	-33	370	384	-0.95
011S007E07R001S	MW-5A	SMA	410.44	409.67	-14	384	400	-0.74
011S007E07R002S	MW-5B	SMA	410.49	409.87	-14	384	400	-0.74
011S006E23J002S	MW-3	SMA	454.59	451.23	-12	433	440	-5.84
011S007E30L001S	Air Ranch[d]	SMA	469.32	467.52	-9	458	462	-0.5
011S006E25A001S	RH-1	SMA	468.06	468.03	-9	456	463	-0.94
010S006E29K002S	ID4-4	BWD	307.23	NM	NA	284	291	-2.73
010S006E32D001S	ID4-11	BWD	NM	NM	NA	355	366	-2.29
011S006E16A002S	ID1-12	BWD	387.06	NM	NA	368	377	-1.51
011S006E09E001S	ID5-5	BWD	NM	387.53	NA	377	384	-0.85

Notes: MSL = mean sea level; NMA = North Management Area; CMA = Central Management Area; SMA = South Management Area; BWD = Borrego Water District; NA = Not Applicable; NM = Not Measured

a. Fall 2018 Groundwater Elevation has been recalculated to take into account wellhead stick-up and is reportedly different than in the GSP.
b. Minimum Threshold: Maximum allowable decline in groundwater levels as measured at the beginning of GSP Implementation through 2040.
c. Historical groundwater level trend based on pre-fall 2018 groundwater levels as reported in the GMP.
d. Fall 2018 groundwater elevation for the Air Ranch Well is an estimated value based on the Spring 2018 and Spring 2019 measured depth to water values of 91.20 on 5/1/2018 and 88.80 on 4/30/2019.

Methodologies: The 2025 measurable objective are based on the results of the BVHM estimates of change in groundwater in storage and corresponding change in groundwater head at each model node with linear fixed reduction to the estimated sustainable yield target of 5,700 acre-feet per year and the applied 2030 DWR climate change factors.

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4 Water Use

4.1 Groundwater Extractions

Three primary sectors extract the majority of groundwater in the Subbasin: (1) agriculture use; (2) municipal use, consisting of BWD; and (3) recreational use, which consists of six golf courses—Borrego Springs Resort, Club Circle, De Anza Country Club, Rams Hill Country Club, Road Runner Golf and Country Club, and The Springs at Borrego RV Resort and Golf Course.[2] Other groundwater users include two active small water systems and two non-potable irrigators. The two small water systems are the ABDSP and the Borrego Air Ranch Water Co. The two non-potable irrigators are the Borrego Springs Unified School District (Elementary School) and La Casa Del Zorro Resort and Spa. Industrial service supply includes use for two utility scale solar facilities, a redi-mix plant, a County service yard and the Republic Services Borrego Landfill. Private groundwater users who extract less than 2 acre-feet per year (AFY) are considered de minimis users under SGMA and the Physical Solution. There are an estimated 53 active de minimis users within the Subbasin. Well users are generally considered to be de minimis users unless those properties contain irrigated areas in excess of about 0.5 acres, which would result in more than 2 AFY of water use.

Groundwater extraction data provided by the various non-de minimis and de minimis users for the period from 2015 through 2019 were compiled and tabulated by calendar year. Aerial imagery analysis was performed in a geographic information system (GIS) for all agriculture, golf courses, and other non-de minimis users for which pumping records were not available. In addition, for the years 2015 and 2019 where high-resolution aerial imagery were not available to estimate groundwater extraction, data from the preceding year were used.[3] Groundwater Extractions by sector and calendar year are provided in Table 4-1. Additionally, the magnitude of groundwater extractions by sector for 2019 are shown in Figure 16.

Table 4-1
Groundwater Extractions

Groundwater User Type	*Annual Groundwater Extraction (Acre-Feet)*				
	2015[a]	2016	2017	2018	*2019[a]*
Agricultural[b]	15,093.73	15,007.35	13,668.09	13,006.45	13,006.45
Golf Course	3,137.39	3,045.22	3,058.91	2,973.94	2,814.21
Municipal	1,719.91	1,610.42	1,568.04	1,593.74	1,466.48
Other Non-De Minimis	50.40	49.72	47.93	52.51	52.51
De Minimis[c]	26.50	26.50	26.50	26.50	26.50
Total Water Use	**20,028**	**19,739**	**18,369**	**17,653**	**17,366**

Source: Borrego Water District; Borrego Springs Resort; Rams Hill Golf Course.
Notes:
a 2015 and 2019 pumping extrapolated from preceding year aerial imagery for all sites without metered production records.
b Water credit sites assumed to have ceased irrigation either on date of issuance of water credits or based on review of mid-2014 aerial imagery.
c Water use factor of 0.5 acre-feet per dwelling unit utilized to calculate de minimis groundwater use.

2 The Borrego Springs Resort golf course ceased operation and irrigation of the course in 2019.
3 Most agriculture in the Borrego Valley consists of perennial crops such as citrus orchards and date farms that have fixed water demands from year to year.

As shown in Table 4-1, the total annual volume of groundwater extracted in the Subbasin steadily decreased over the 5-year period from 20,028 AFY in 2015 to 17,366 AFY in 2019. This is a reduction in groundwater extractions of approximately 665.5 AFY and 2,662 AF in total. The observed reduction in groundwater extractions is a result of reduced pumping by the three primary sectors (agricultural, municipal, and recreational) that extract the majority of groundwater in the Subbasin.

4.2 Surface Water Use

Currently, there is no surface water supply used or available for use, for groundwater recharge or in-lieu, in the Subbasin.

4.3 Total Water Use

Given that there is no surface water use in the Subbasin, total water use is equivalent to the sum of all groundwater extractions (see Section 4.1—Groundwater Extractions).

5 Change in Groundwater Storage

Change in the volume of groundwater stored in the Subbasin alluvial deposits is not a parameter that can be directly measured; rather, change in storage can be estimated using aquifer properties and groundwater elevation data collected at monitoring wells. The annual difference in groundwater elevation measured at monitoring wells (e.g., spring of a given year to spring of the following year) and aquifer specific yield were used to estimate change in groundwater storage in the Subbasin for the period from 2015 through 2019.

A numerical groundwater model for the Subbasin, referred to as the Borrego Valley Hydrologic Model (BVHM), was produced by the USGS in 2015. The BVHM has a period of simulation of 1945 through 2010, with model updates through water year 2016. The BVHM model domain is defined by a finite-difference grid of uniform cells, or nodes, with each cell being 2,000-feet by 2,000-feet, or approximately 92 acres in area. The model domain includes 30 rows and 75 columns with 2,250 active cells. The total area simulated in the model is 73,876 acres, which is greater than the draft final GSP Plan Area, extending further southeast into the northwestern portion of the Ocotillo Wells Groundwater Subbasin. The USGS subdivided the groundwater system within the Borrego Springs Groundwater Subbasin into three layers, corresponding to the upper, middle, and lower aquifers. The differentiation between the three aquifers is based on a textural analysis of driller's lithologic logs and geophysical logs. Differences in overall texture were determined by analyzing the fraction of coarse material like sand and gravel with depth for available logs. All the lithologic descriptions indicate that the basin fill sediments of the Borrego Valley consist of unconsolidated to poorly consolidated mixtures of gravel, sand, silt, and clay. As there are no regionally extensive aquitards, the upper aquifer behaves in a predominantly unconfined manner, and the lower and middle aquifer exhibit leaky confined or semi-confined characteristics based on limited aquifer testing. Estimated specific yield values within the aquifer system range from 0.7 percent to 28 percent with the upper and middle aquifers having the highest specific yield and the lower aquifer having the lowest specific yield. The estimated average specific yield of the upper aquifer is 15 percent, the middle aquifer is 17.5 percent, and the lower aquifer is 3 percent (USGS 2015). Since the entire Subbasin behaves in a predominantly unconfined to semi-confined manner, specific yield values for the three aquifers developed for use in the BVHM were averaged by model grid cell for use in the calculation of change in groundwater storage.

A regular-spaced grid with each cell being 1,000 feet by 1,000 feet oriented in a north-south direction and of sufficient area to cover the entire Subbasin was generated in GIS. The grid domain included 103 rows and 72 columns with a total of 7,416 cells. The grid was then refined to only include cells that intersect the Subbasin for a total of 3,054 active cells (Figure 17). The BVHM grid, with an average specific yield assigned to each grid cell, was then overlain by the change in storage grid. A one-to-one spatial join using a closest match option was then performed to join the BVHM averaged specific yield values to the change in storage grid. Change in storage grid cells that were outside of the BVHM model domain were assigned a specific yield value of zero (0).

The calculation of change in storage using measured groundwater elevation data requires taking the difference between groundwater elevations. In this case, measurements taken during the spring months were used since the aquifer has had time to recover from the previous year's pumping and groundwater levels are closer to static conditions (i.e., not influenced by increased pumping that may be occurring during the fall measurements). To calculate the change in storage, measured groundwater elevations from a given year were subtracted from the previous year. The change in groundwater elevation (head) expressed in units of feet for an individual grid cell was multiplied by the cross-sectional area and specific yield of the grid cell to produce an estimate of the change in groundwater storage by grid cell. The sum of the change in groundwater storage by grid cell provides an estimate of the total storage change across the entire Subbasin.

Change in the volume of groundwater stored in the Subbasin for the period from 2015 through 2019 is shown spatially in Figures 18 through 21. In addition, total annual change in storage and cumulative change in groundwater storage, as well as total annual groundwater production, are provided in Table 5-1 and shown graphically in Figure 22.

Table 5-1
Change in Groundwater Storage, Groundwater Extraction, and Water Year Type

Year	Change in Storage (AF)	Cumulative Change in Storage (AF)	Annual Groundwater Extraction (AF)	*Water Year Type*
2016	-11,516.68	-11,516.68	19,739.21	Normal
2017	-5,544.31	-17,060.99	18,369.48	Normal
2018	-8,875.97	-25,936.96	17,653.14	Dry
2019	-4,545.19	-30,482.15	17,366.16	Normal

Notes: AF = acre-feet

As shown in Figures 18 through 21, the magnitude of change in storage varies spatially from year to year. In general, the areas of the Subbasin where the greatest changes in storage occur are the regions with the highest rates of groundwater withdrawal including in the vicinity of the golf courses and agricultural lands. Additionally, Figure 22 and Table 5-1 indicate that change in storage is influenced by water year type with significantly greater reductions in storage during dry years as compared to wet years. From 2016 to 2019, the total change in groundwater storage in the Subbasin was estimated to be approximately -30,482 AF.

6 GSP Implementation Progress

The GMP for the Subbasin was submitted to DWR in January 2020. This is the first annual report to be prepared since the GMP was submitted. The GMP implementation progress reported in this report covers work begun during development of the GSP as well as work conducted over the three months since the GMP was submitted. During development of the GSP and subsequent adoption of the GMP, several areas were identified where additional work needs to be conducted over the next 20 years. These areas include filling spatial and temporal data gaps, conducting basin optimization studies, developing project feasibility studies, updating the numerical groundwater model, and updating the existing data management system.

The Subbasin has made substantial implementation progress to date. The Subbasin has developed a "Physical Solution" through the proposed Stipulated Judgment including a GMP that addresses water rights and provides a path toward sustainable management of the Subbasin. Semi-annual monitoring of groundwater levels, stream flow and water quality has been completed for the monitoring network for events starting in the fall 2017 through fall 2019. Groundwater extraction monitoring has been ongoing for municipal wells, most golf course wells and select agricultural wells. The Stipulated Judgment requires installation of flow meters on all non-*de minimis* wells in 2020 and annual reporting of groundwater extraction to the Watermaster. Installation of flow meters has commenced and is expected to be completed in 2020.

Pursuant to Water Code sections 10733.6 and 10737.4, on January 30, 2020, BWD submitted to DWR a proposed Stipulated Judgment, including the GMP, constituting a "Physical Solution," for DWR's review and approval to serve as an alternative to a GSP for the Borrego Springs Subbasin in compliance with SGMA. Also on January 30, 2020, a complaint seeking a comprehensive adjudication of the groundwater rights of the Basin was filed by BWD in the Superior Court for San Diego County, pursuant to Code of Civil Procedure (CCP) sections 830, *et seq*. The comprehensive adjudication also seeks to sustainably manage the entirety of the Basin under SGMA. (*Borrego Water District v. All Persons Who Claim a Right to Extract Groundwater in the Borrego Valley Groundwater Subbasin, et al.*, San Diego Superior Court case no. 37-2020-00005776 CU-OR-CTL.). While the case remains officially designated in San Diego County Superior Court, on March 9, 2020, the California Judicial Council assigned Orange County Superior Court Judge Melissa R. McCormick to hear the case.

The final draft GSP was modified to conform its terms to the Stipulated Judgment proposed in the comprehensive adjudication and repurposed as a GMP, an integral part of the proposed Stipulated Judgment. Both the original draft GSP and modified GMP cover the entirety of the Basin as defined by DWR. BWD, together with the stipulating parties, intend that the GMP, together with the Physical Solution embodied in the Stipulated Judgment, fulfill all of the substantive requirements for sustainable management of the Basin prescribed by SGMA.

The complaint makes reference to the proposed Stipulated Judgment, GMP, and other documents described herein. Also, BWD submitted the following documents to DWR in support of the alternative submission:

1. Settlement Agreement – Agreement entered into by BWD, agricultural, and recreational interests in the Basin, collectively pumping more than 90% of Basin groundwater, to resolve disputes regarding water rights in the Basin and to agree to the Stipulated Judgment. Among other topics, the Settlement Agreement provides for the formation and funding of an interim Watermaster to manage the Basin during the pendency of the comprehensive adjudication, with court approval of such management via issuance of a preliminary injunction and other appropriate interlocutory orders. The GSA will continue to exist with BWD as the sole GSA, but will remain dormant during the pendency of the lawsuit and will be dissolved and replaced by

the Watermaster once final Judgment issues. The Settlement Agreement includes the following exhibits:

A. Party List / Pumping volumes 2014 to 2018 (with 2018 being the last year when pumping data is currently available)
B. Form Answer
C. Stipulated Judgment (see below)
D. Stipulation
E. Interim Watermaster Budget
F. Proposed Stipulated Judgment, to be approved as part of the comprehensive adjudication, including the following exhibits:
   1. Proposed GMP
   2. Stipulation
   3. Minimum Fallowing Standards
   4. Baseline Pumping Allocations
   5. Watermaster Rules and Regulations
   6. Water Rights Restrictive Covenant Forms
   7. Processes for Selecting Watermaster Representatives
   8. Entry Agreement Form
G. Elements Guide (Coordination Document) – Prepared to describe and cross-reference SGMA's regulatory requirements with the provisions of the Stipulated Judgment and GMP to assist DWR with its evaluation of these documents.
H. Resolution No. 2020-01-01 – Executed by BWD's Board of Directors authorizing (1) the Board President to execute the Settlement Agreement; (2) legal counsel to file the complaint to initiate the comprehensive adjudication; and (3) BWD staff to submit this GSP alternative to DWR.
I. CEQA Notice of Exemption for Resolution No. 2020-01-01.
J. Complaint seeking a comprehensive adjudication of Basin groundwater rights.

As part of implementation of the GMP and Physical Solution, the stipulating parties held the first Interim Watermaster Board meeting on March 31, 2020. That meeting was conducted in compliance with the Brown Act and was open to the public, as all Watermaster Board meetings will be. At that meeting the Watermaster Board moved forward with a process to seek a permanent executive director for the Watermaster, the hiring of legal counsel to the Watermaster, the scheduling of the first meeting of the Technical Advisory Committee (TAC) to the Watermaster Board of Directors, Brown Act training for Watermaster Board meetings, discussion of the status of the adjudication litigation, installation of meters by all pumpers, and the timing for the collection of Watermaster administrative fees, the amount of which was previously approved by the settling parties.

In the coming months, the TAC and Watermaster are scheduled to undertake the variety of data collection, groundwater basin analyses, and other activities required by the GMP and Physical Solution. The TAC will also provide recommendations on the development of the groundwater monitoring program for the Subbasin, including water quality monitoring

As part of the litigation, the settling parties also intend to file a motion for preliminary injunction to bring the entirety of the Subbasin and all Subbasin pumping formally within the management of the Superior Court and the Watermaster. The timing of the hearing and issuance of that injunction will be dependent upon court scheduling in light of the COVID-19 crisis and emergency declarations by the California Governor.

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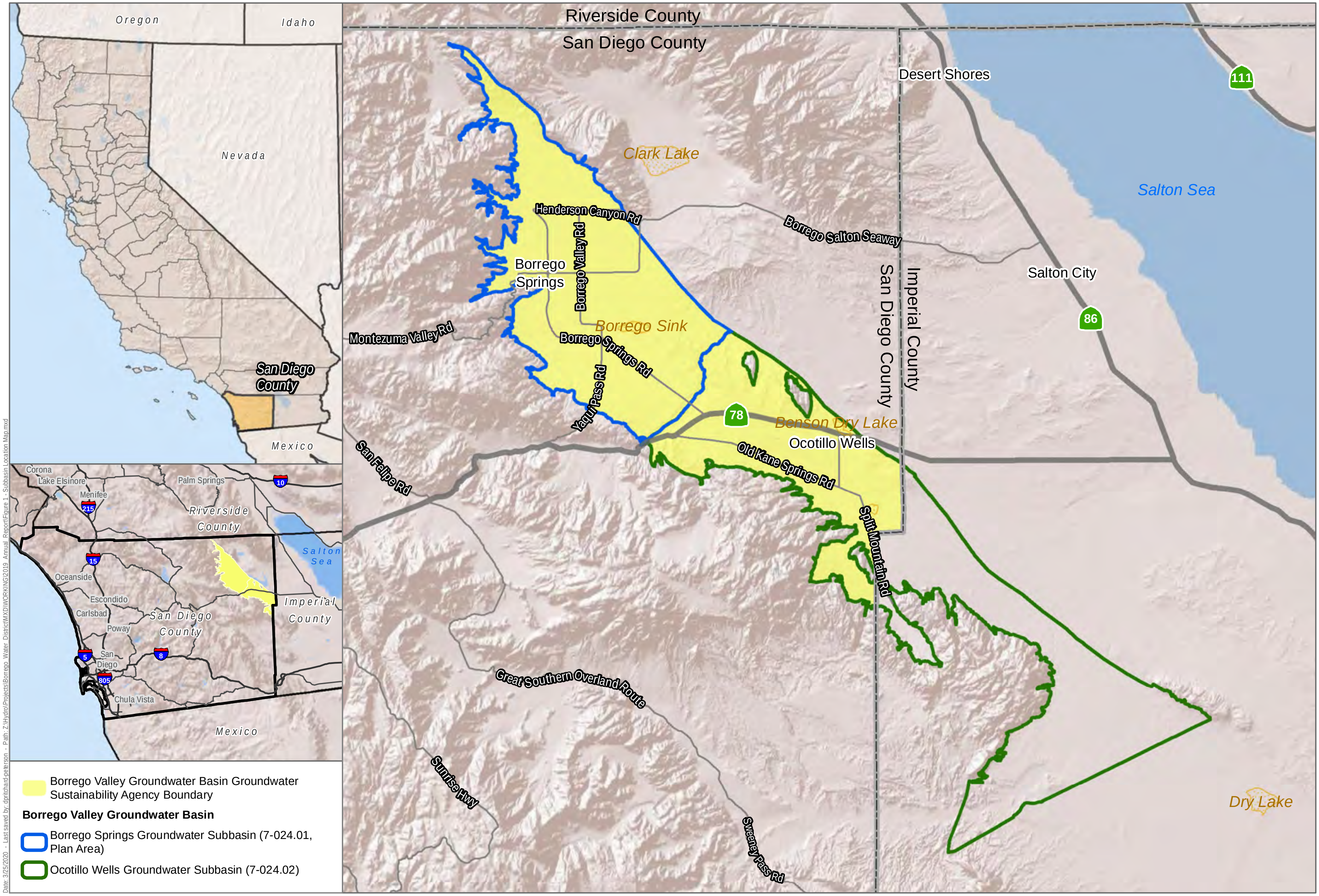

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DATUM: NAD 1983. DATA SOURCE: DWR

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FIGURE 1

Subbasin Location Map

Annual Report for the Borrego Springs Subbasin

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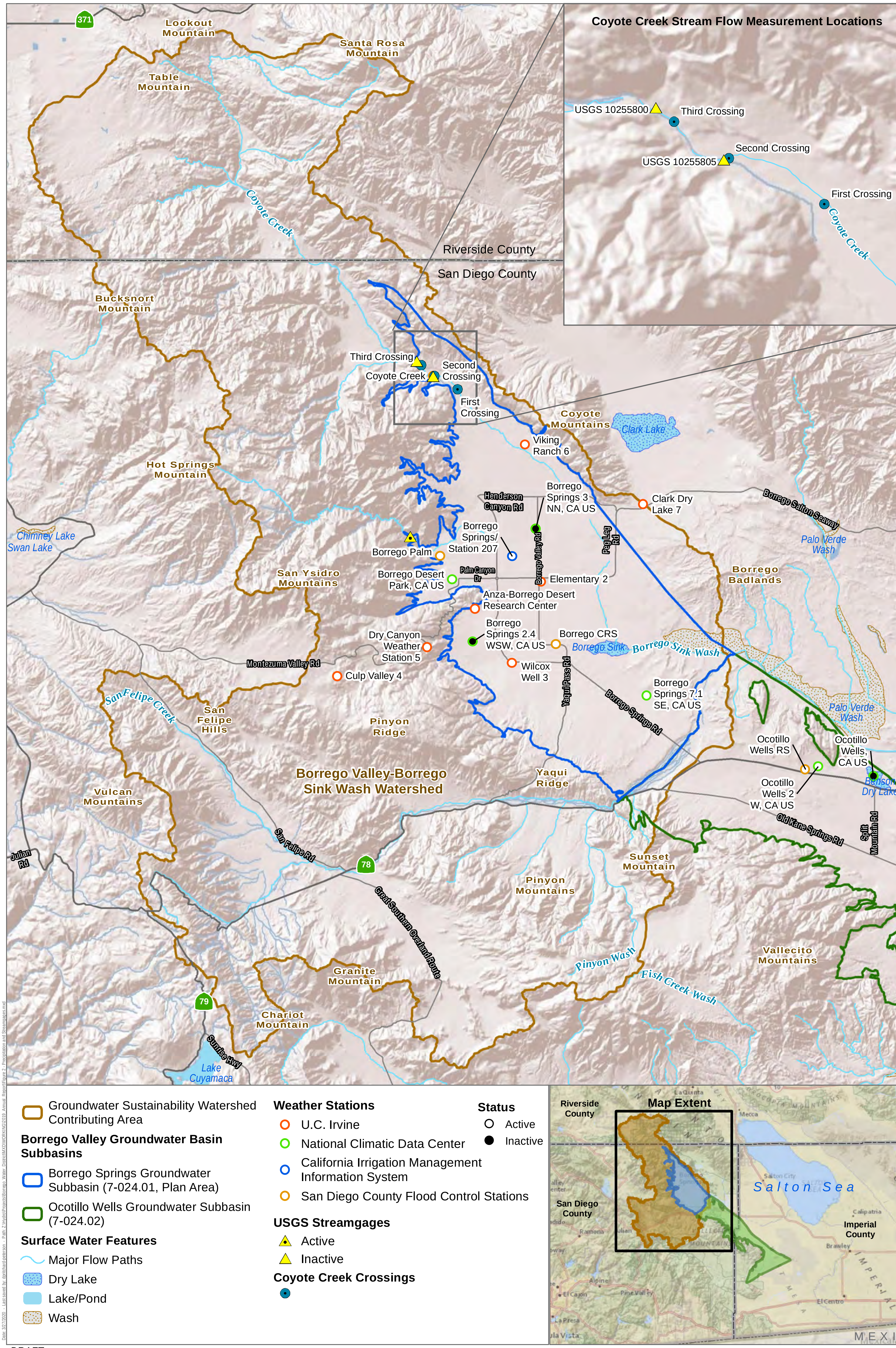

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DATUM: NAD 1983. DATA SOURCE: SanGIS; USGS; DWR

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Figure 2
Precipitation and Streamgages

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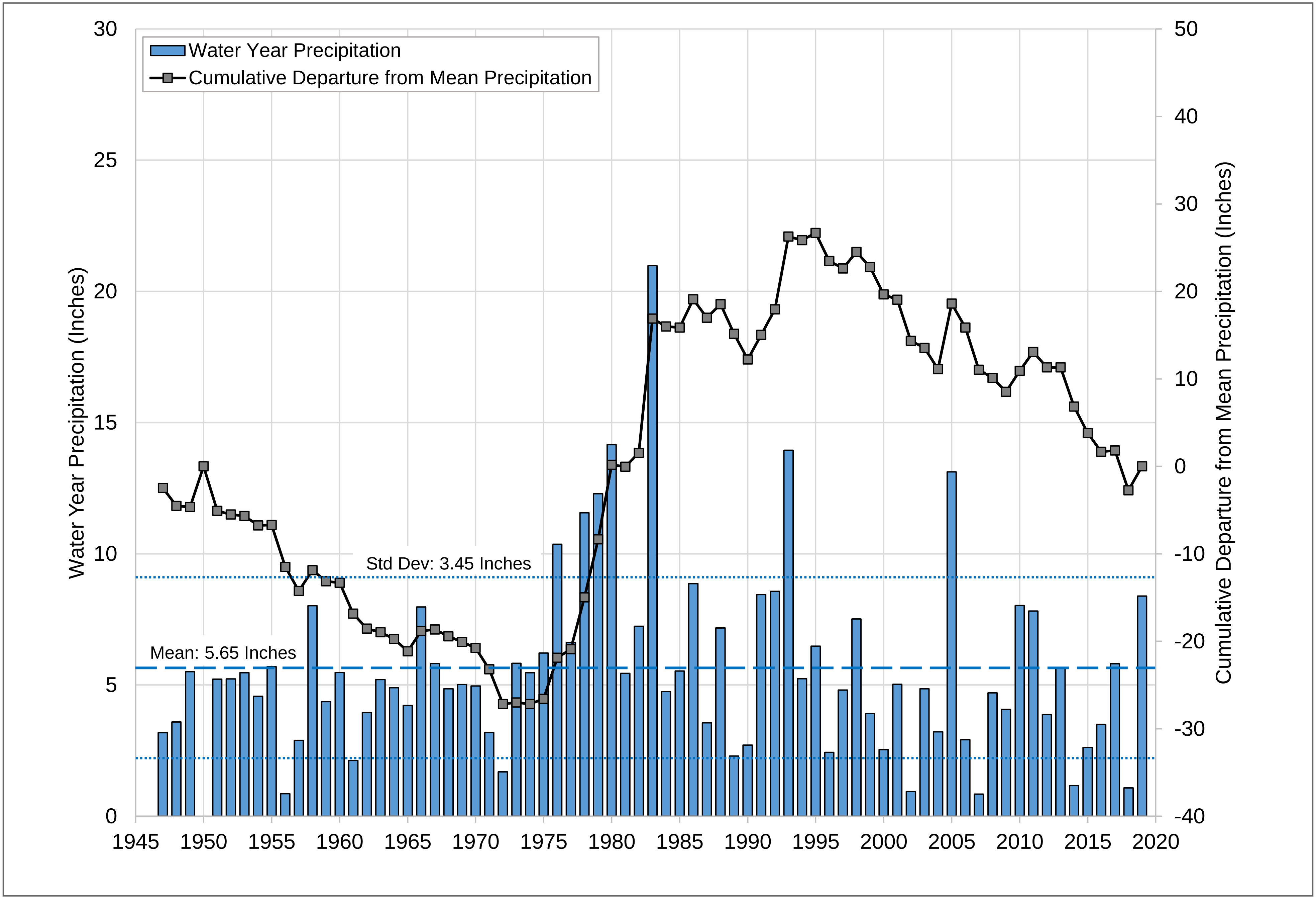

SOURCE: NOAA (Borrego Desert Park Station)

NOTE: Water year 1950 excluded due to insufficient data record

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FIGURE 3

Historical Water Year Precipitation and Cumulative Departure from Mean

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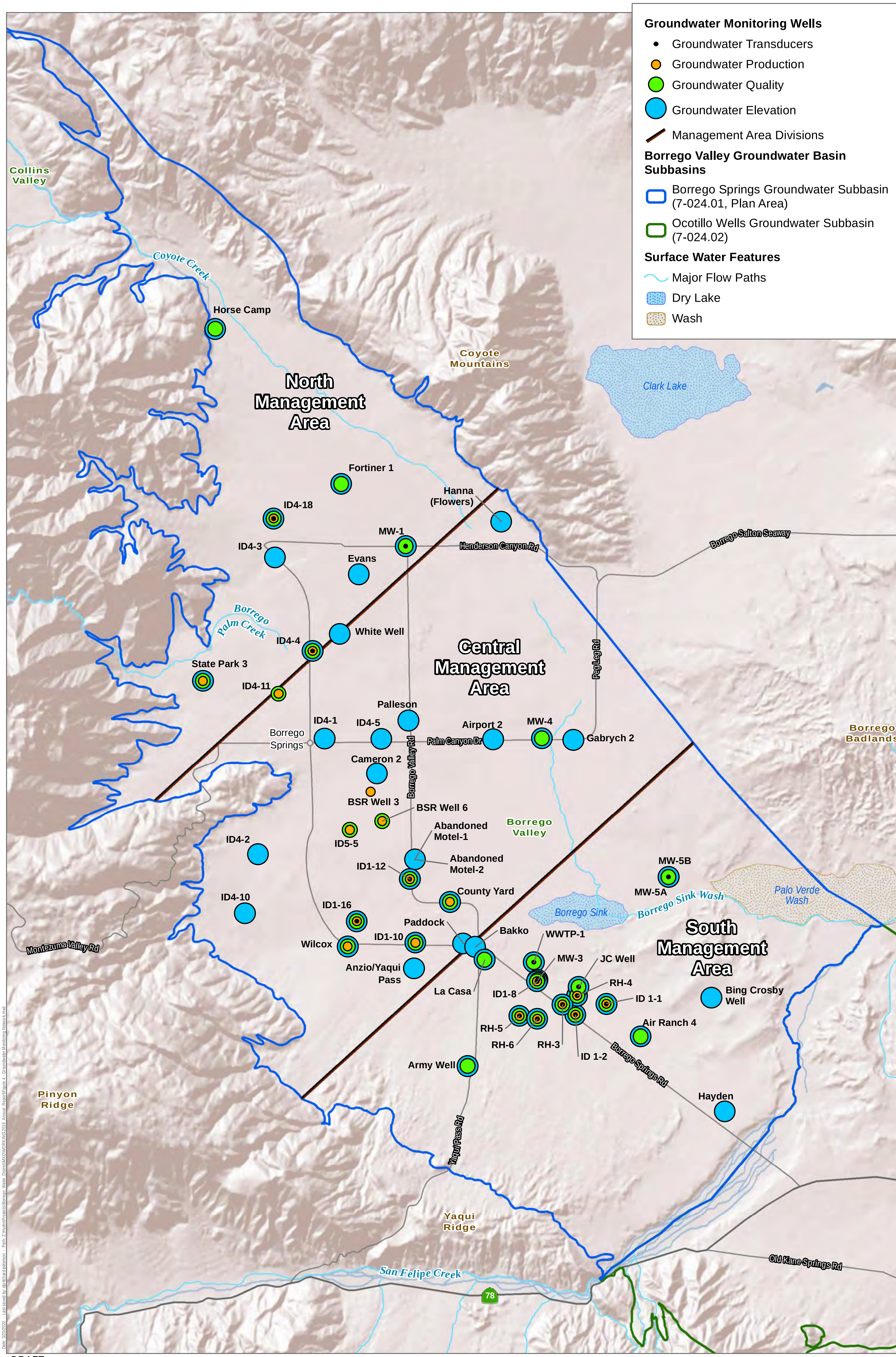

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Figure 4
Groundwater Monitoring Network

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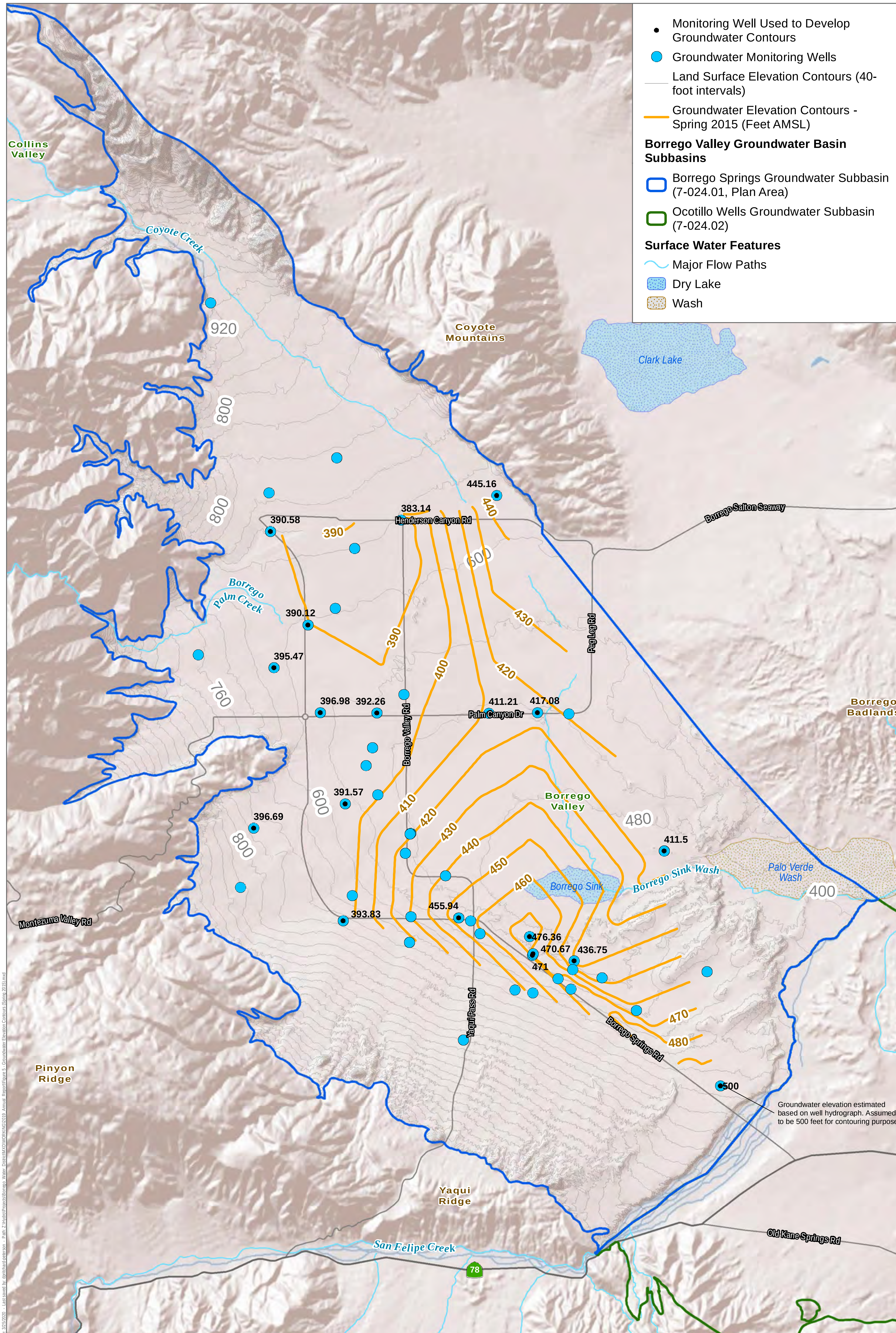

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Figure 5
Groundwater Elevation Contours (Spring 2015)

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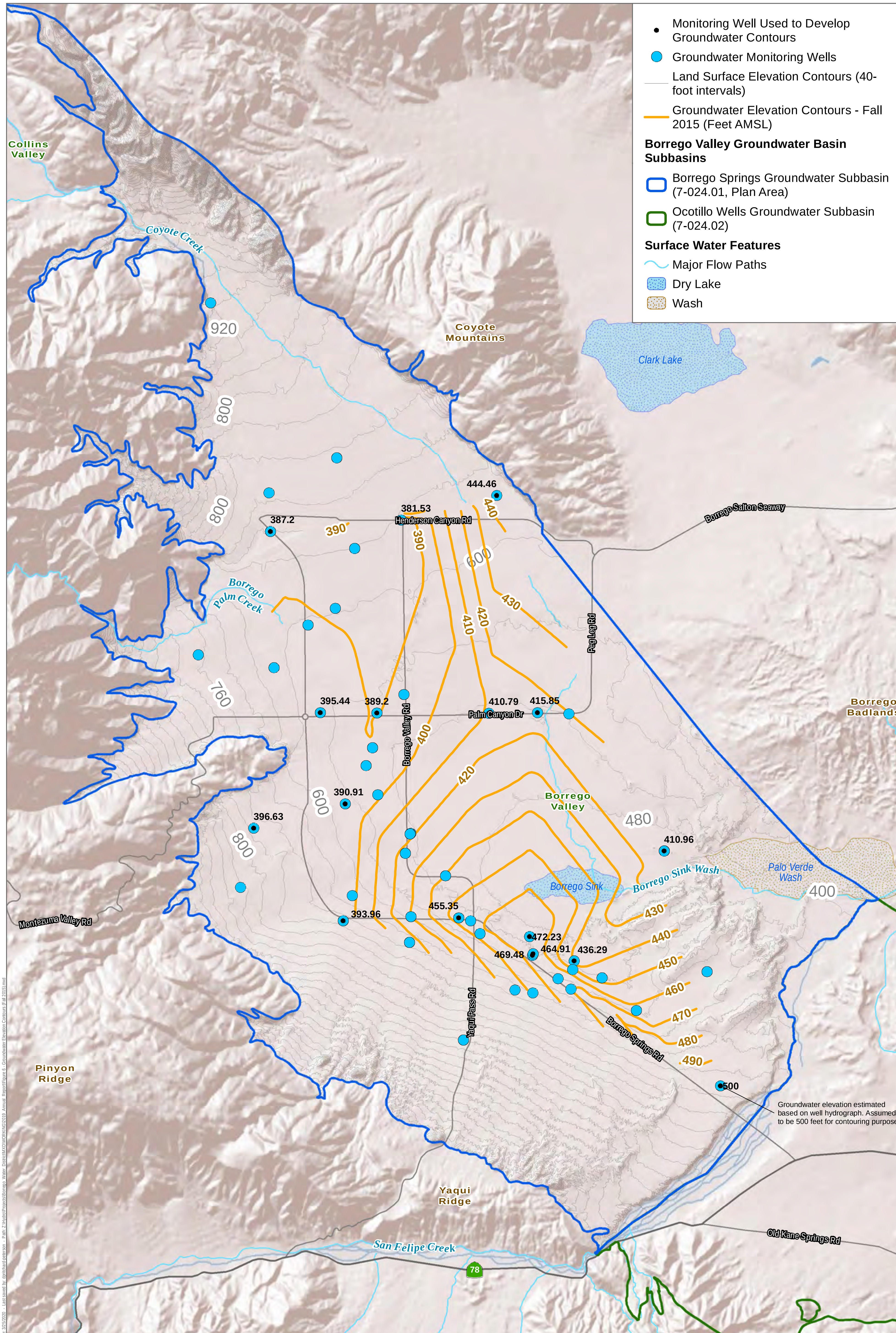

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Figure 6
Groundwater Elevation Contours (Fall 2015)

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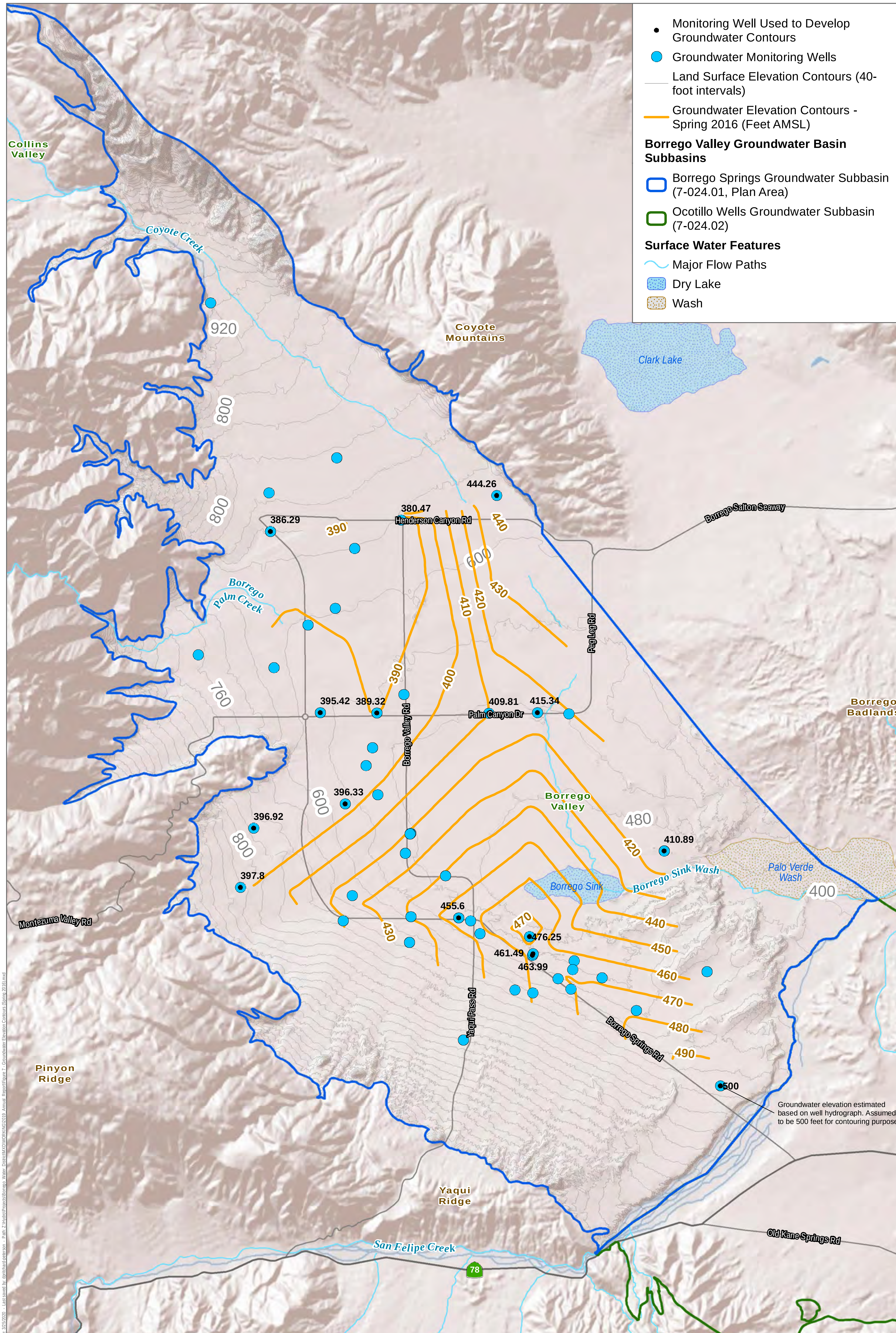

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DATUM: NAD 1983 DATA SOURCE: SanGIS

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Figure 7
Groundwater Elevation Contours (Spring 2016)

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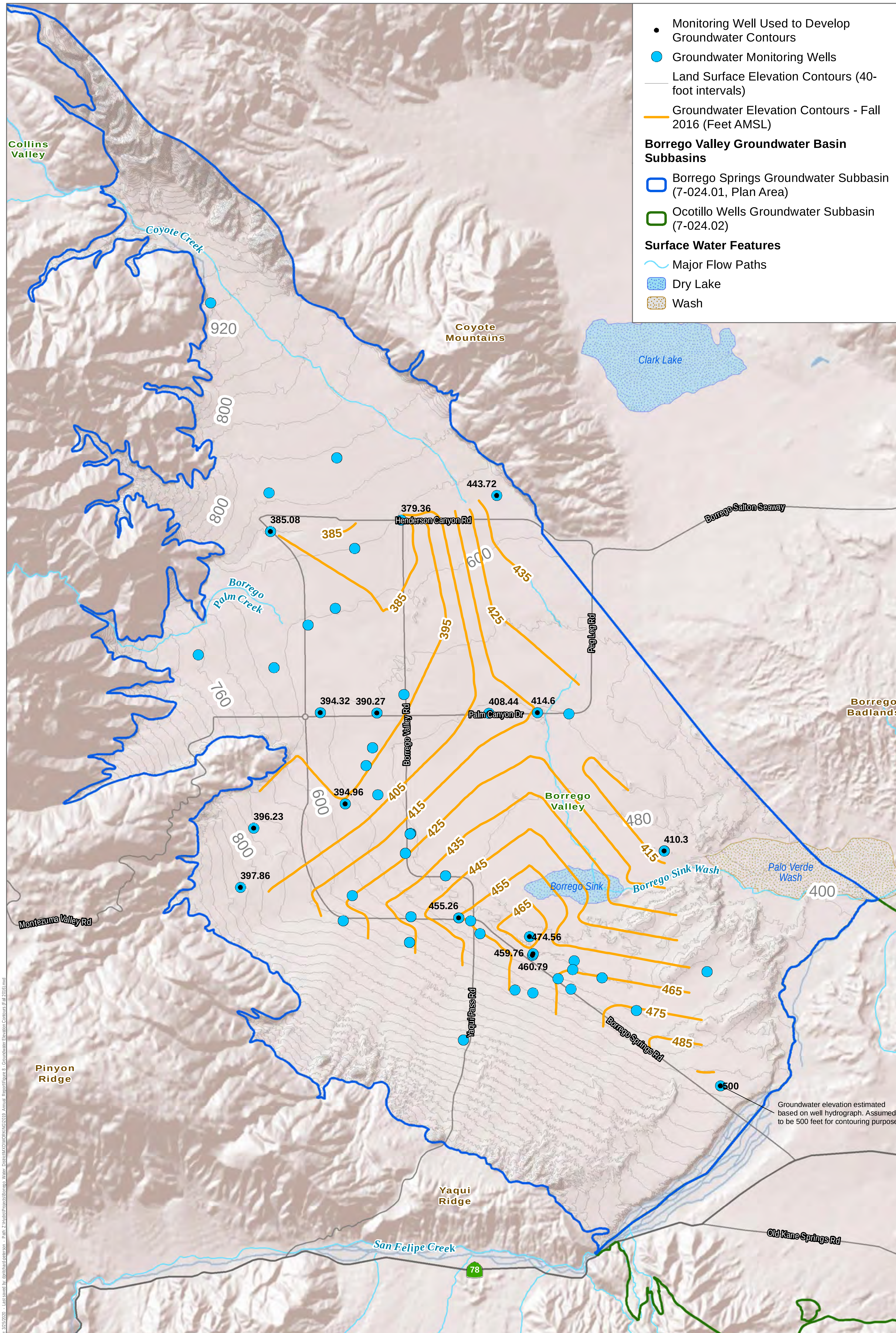

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DATUM: NAD 1983 DATA SOURCE: SanGIS

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Figure 8
Groundwater Elevation Contours (Fall 2016)

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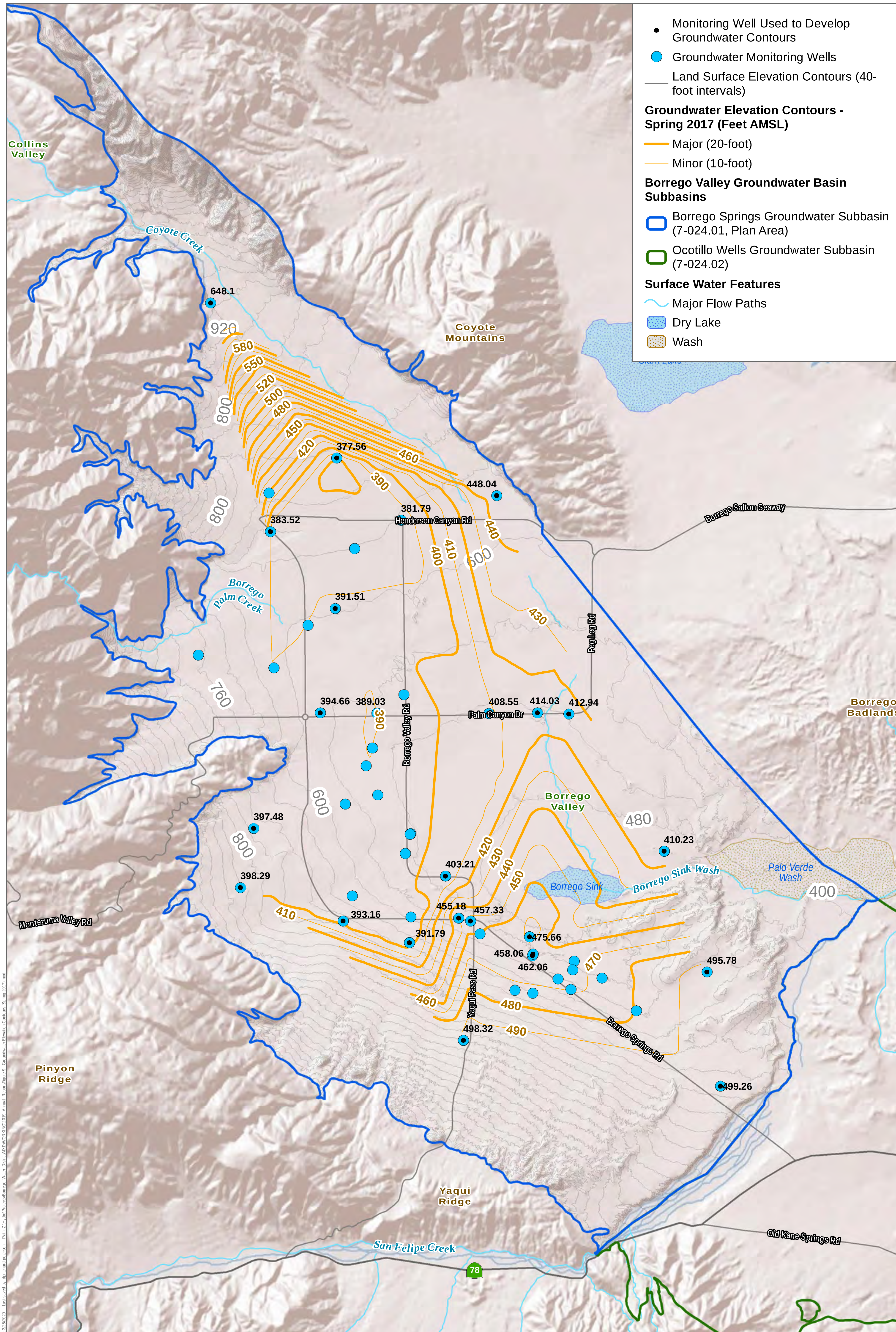

DRAFT

DATUM: NAD 1983 DATA SOURCE: SanGIS

DUDEK

0 0.5 1 Miles

Figure 9
Groundwater Elevation Contours (Spring 2017)

Annual Report for the Borrego Springs Subbasin

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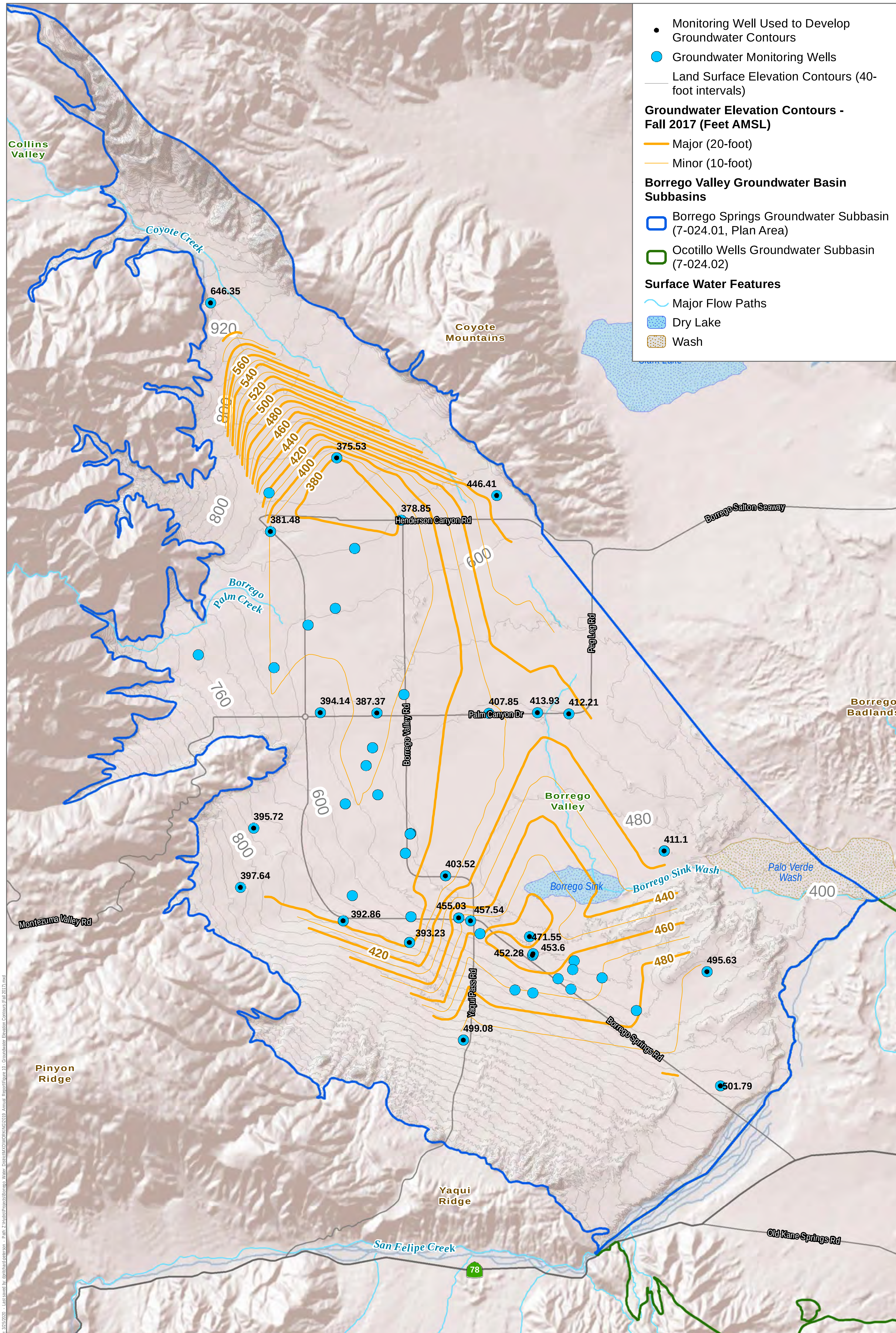

DRAFT

DATUM: NAD 1983 DATA SOURCE: SanGIS

DUDEK

0 0.5 1 Miles

Figure 10
Groundwater Elevation Contours (Fall 2017)

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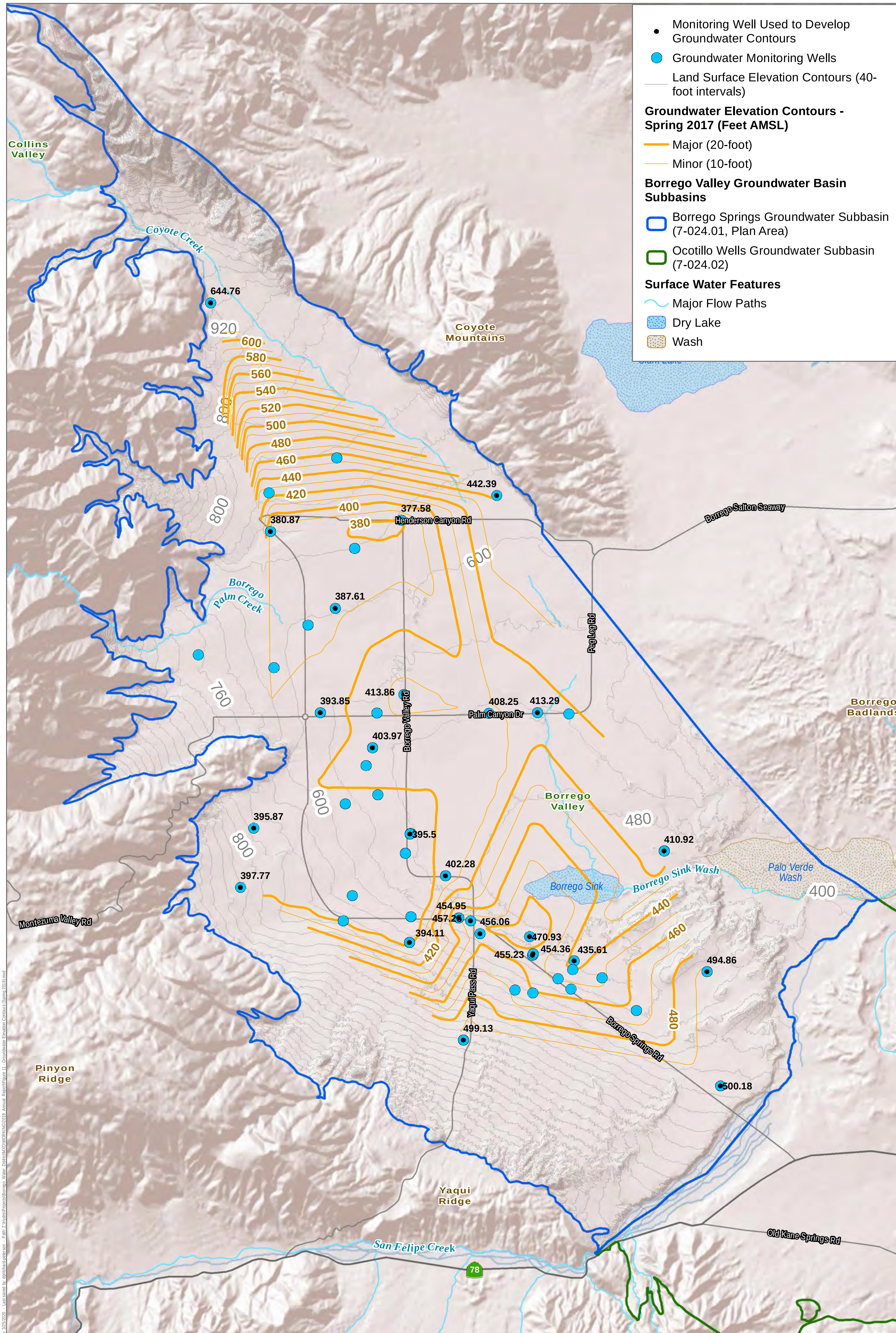

DRAFT

DATUM: NAD 1983 DATA SOURCE: SanGIS

DUDEK

0 0.5 1 Miles

Figure 11
Groundwater Elevation Contours (Spring 2018)
Annual Report for the Borrego Springs Subbasin

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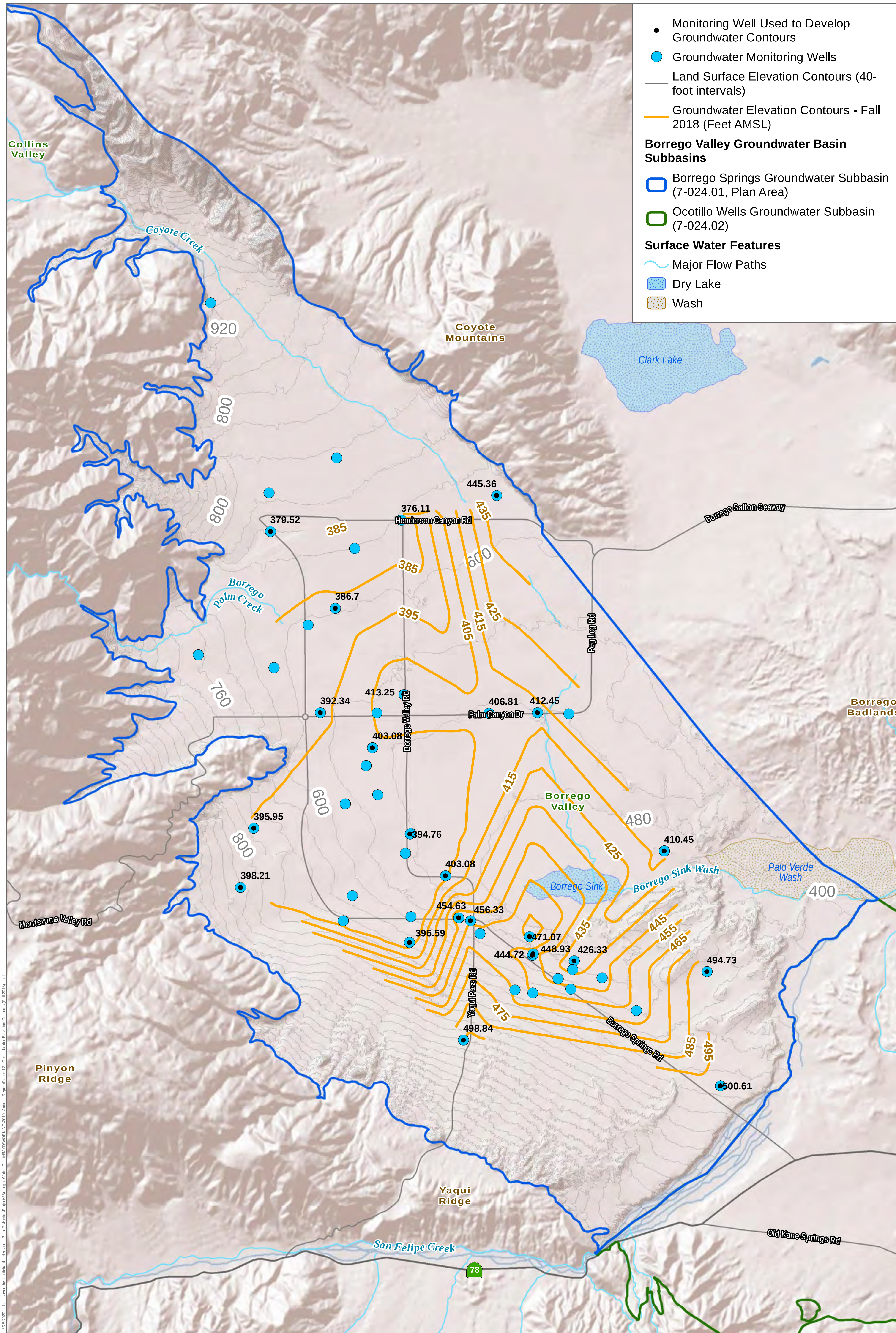

DRAFT

DATUM: NAD 1983 DATA SOURCE: SanGIS

DUDEK

0 0.5 1 Miles

Figure 12
Groundwater Elevation Contours (Fall 2018)

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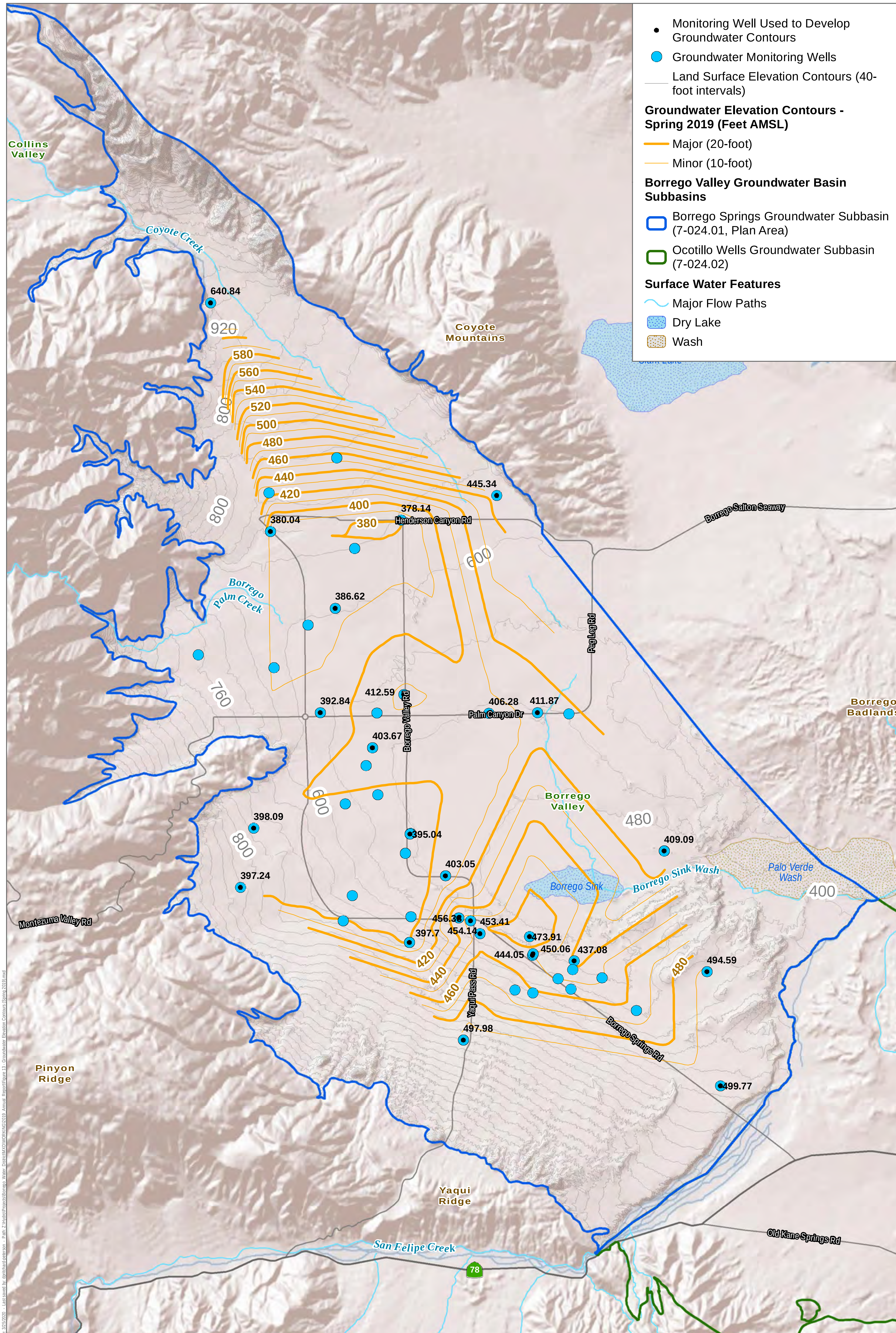

DRAFT

DATUM: NAD 1983 DATA SOURCE: SanGIS

DUDEK

0 0.5 1 Miles

Figure 13
Groundwater Elevation Contours (Spring 2019)
Annual Report for the Borrego Springs Subbasin

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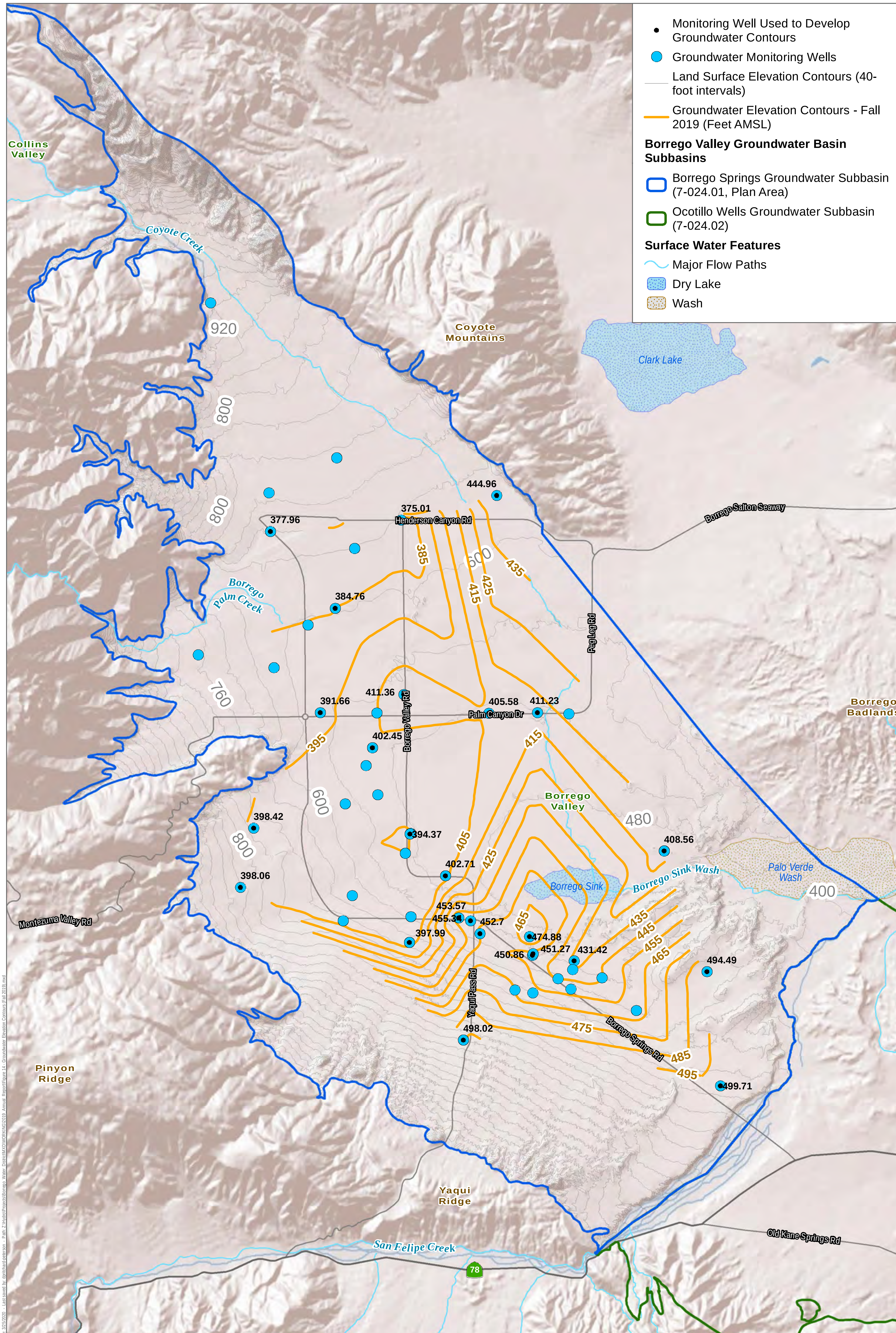

DRAFT

DATUM: NAD 1983 DATA SOURCE: SanGIS

DUDEK 0 0.5 1 Miles

Figure 14
Groundwater Elevation Contours (Fall 2019)

Annual Report for the Borrego Springs Subbasin

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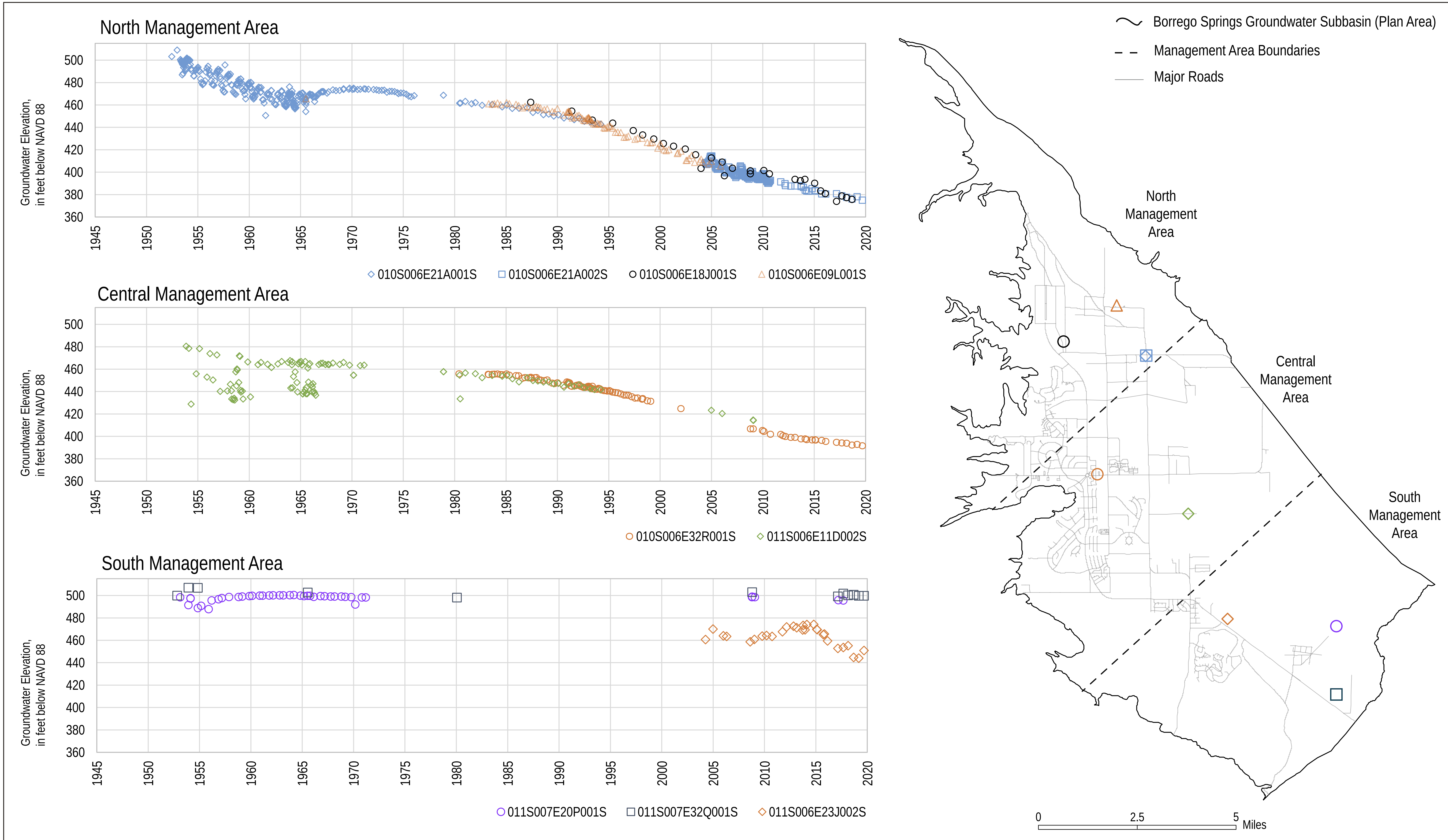

SOURCE: USGS

FIGURE 15

Groundwater Levels in Key Wells

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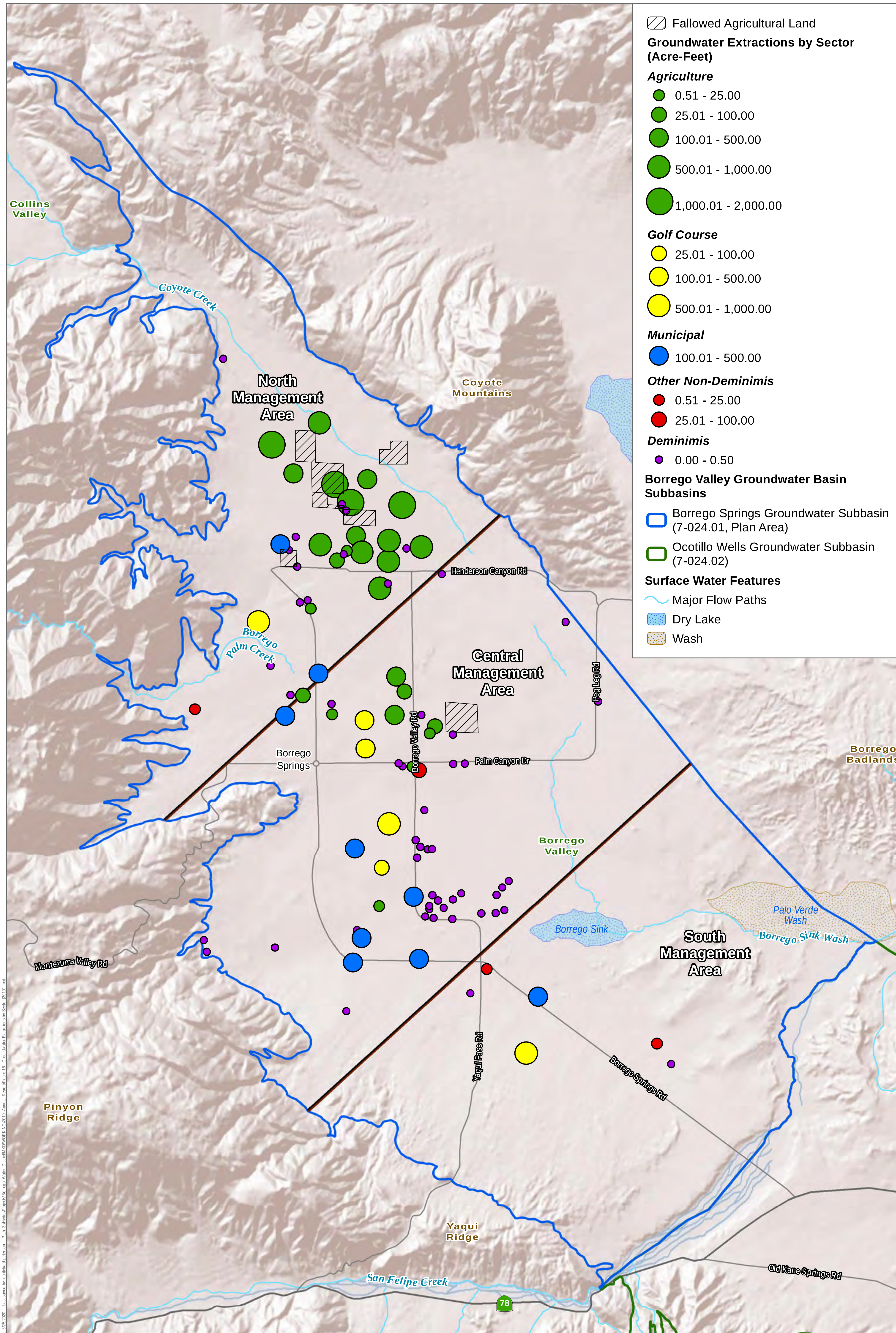

DRAFT

DATUM: NAD 1983 DATA SOURCE: SanGIS

DUDEK

0 0.5 1 Miles

Figure 16

Groundwater Extractions by Sector (2019)

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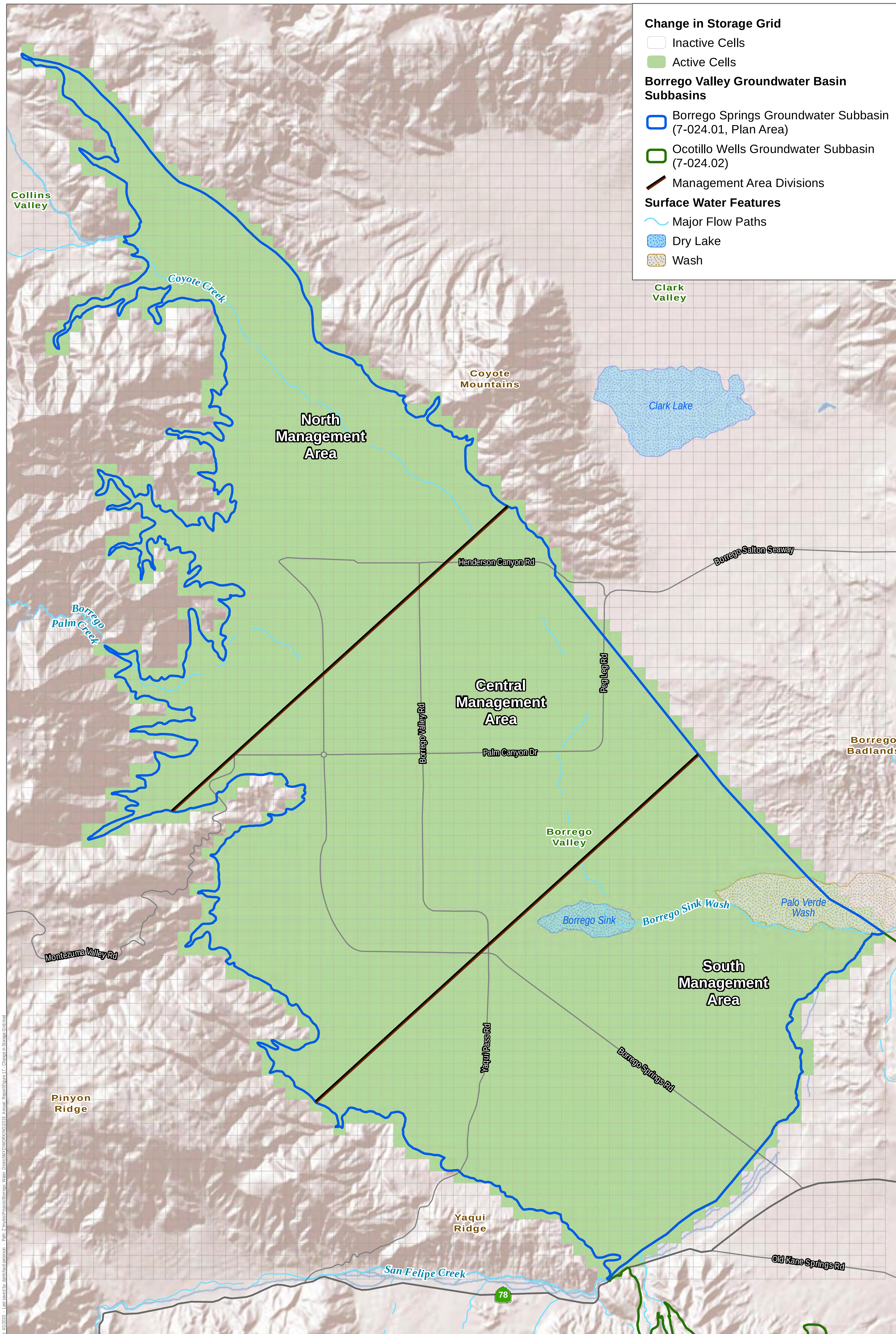

DRAFT

DATUM: NAD 1983 DATA SOURCE: SanGIS

DUDEK

0 0.5 1 Miles

Figure 17
Change in Storage Grid
Annual Report for the Borrego Springs Subbasin

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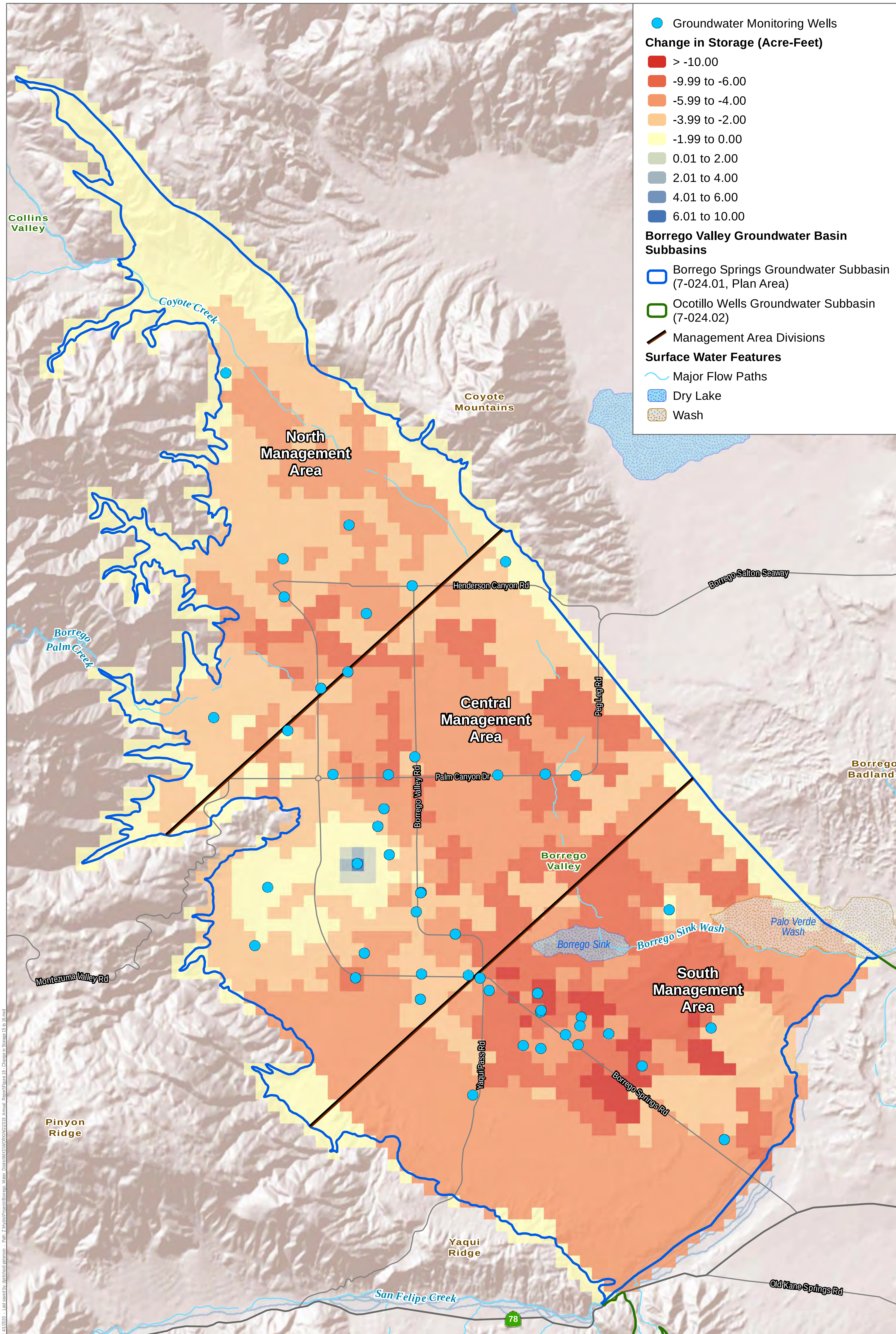

DRAFT

DATUM: NAD 1983 DATA SOURCE: SanGIS

0 0.5 1 Miles

Figure 18
Change in Storage Spring 2015 to Spring 2016

Annual Report for the Borrego Springs Subbasin

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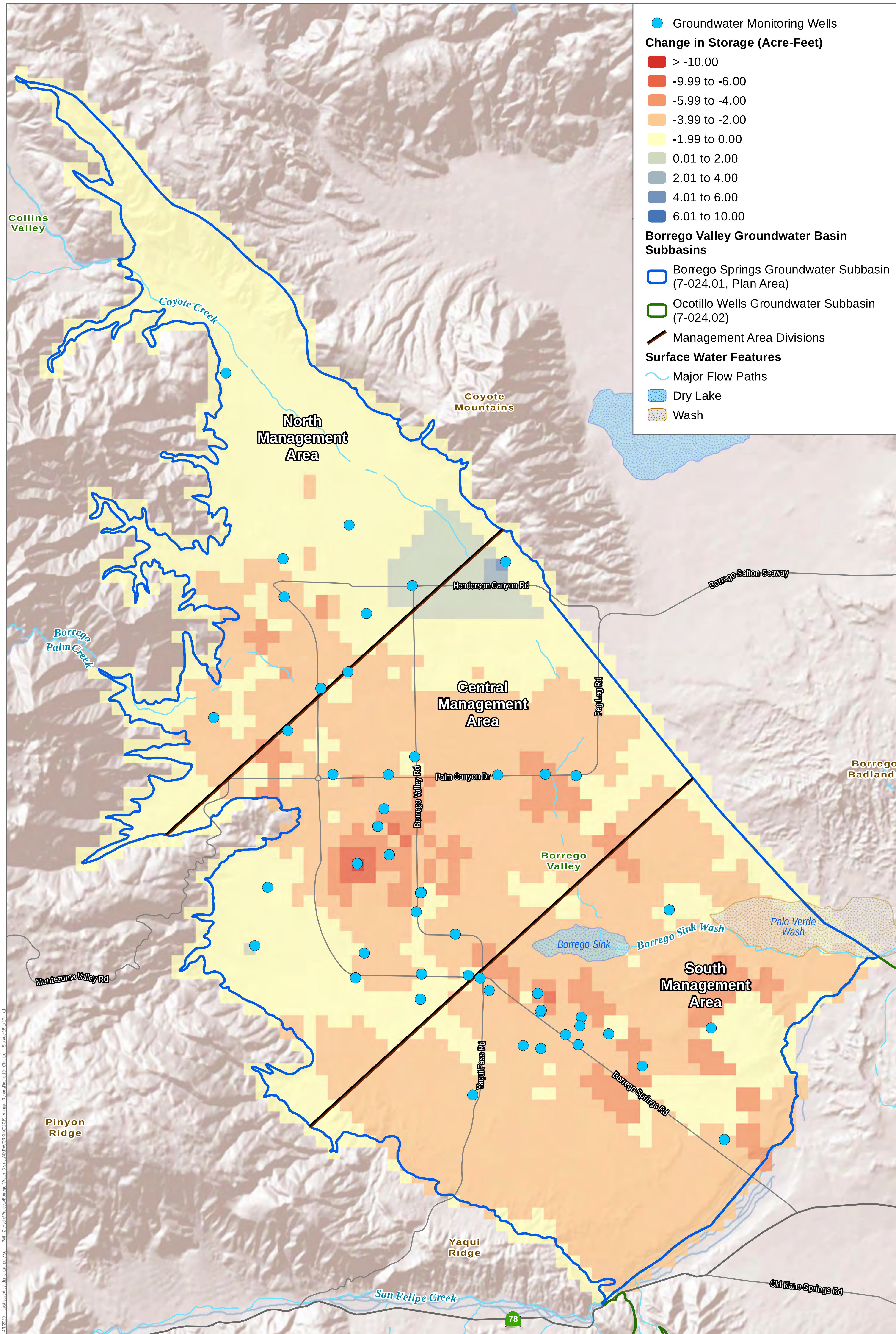


DRAFT

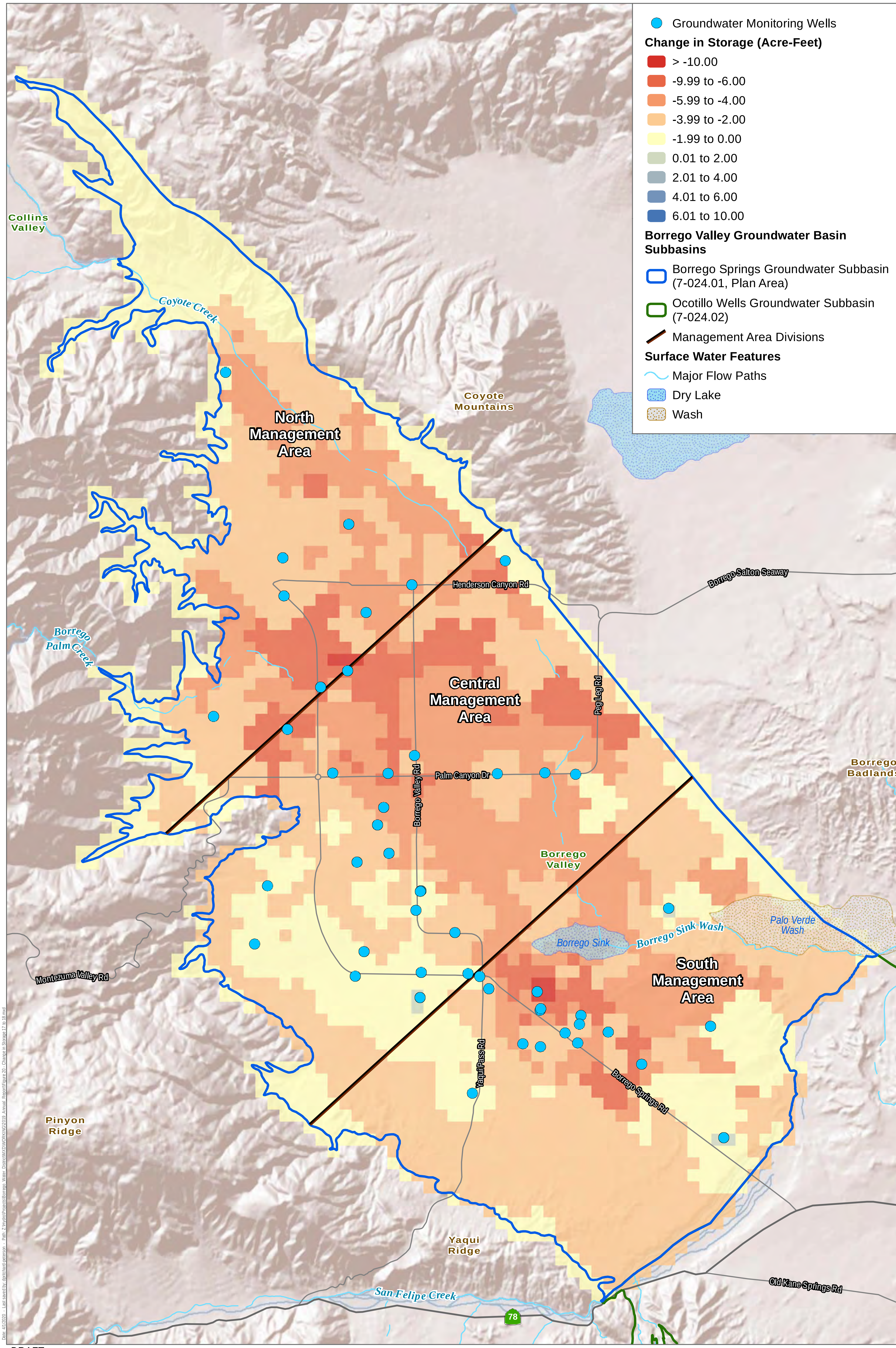
DATUM: NAD 1983 DATA SOURCE: SanGIS

DUDEK

0 0.5 1 Miles

Figure 19
Change in Storage Spring 2016 to Spring 2017

INTENTIONALLY LEFT BLANK



DRAFT

DATUM: NAD 1983 DATA SOURCE: SanGIS

DUDEK

0 0.5 1 Miles

Figure 20

Change in Storage Spring 2017 to Spring 2018

Annual Report for the Borrego Springs Subbasin

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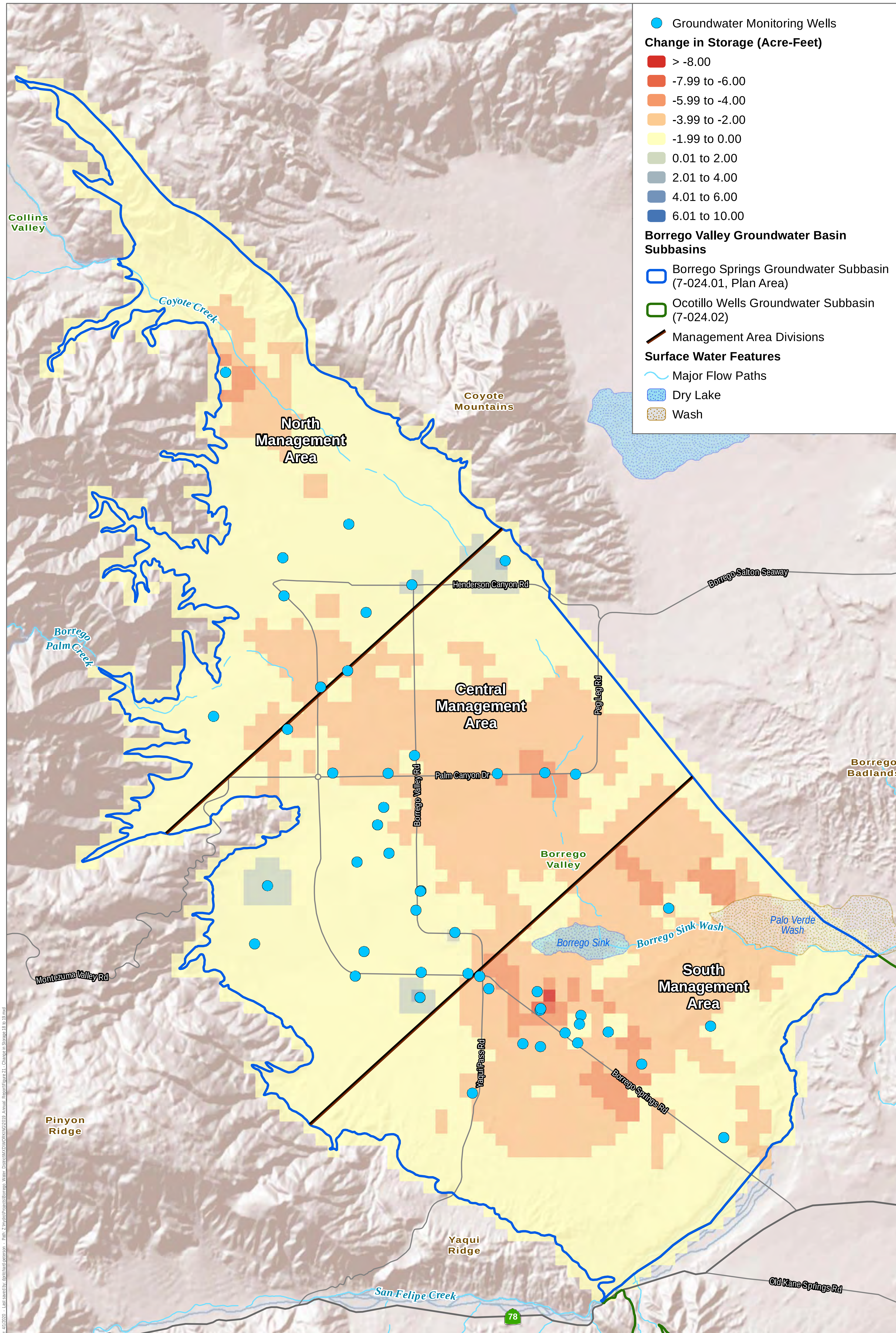

DRAFT

DATUM: NAD 1983 DATA SOURCE: SanGIS

DUDEK

Figure 21
Change in Storage Spring 2018 to Spring 2019

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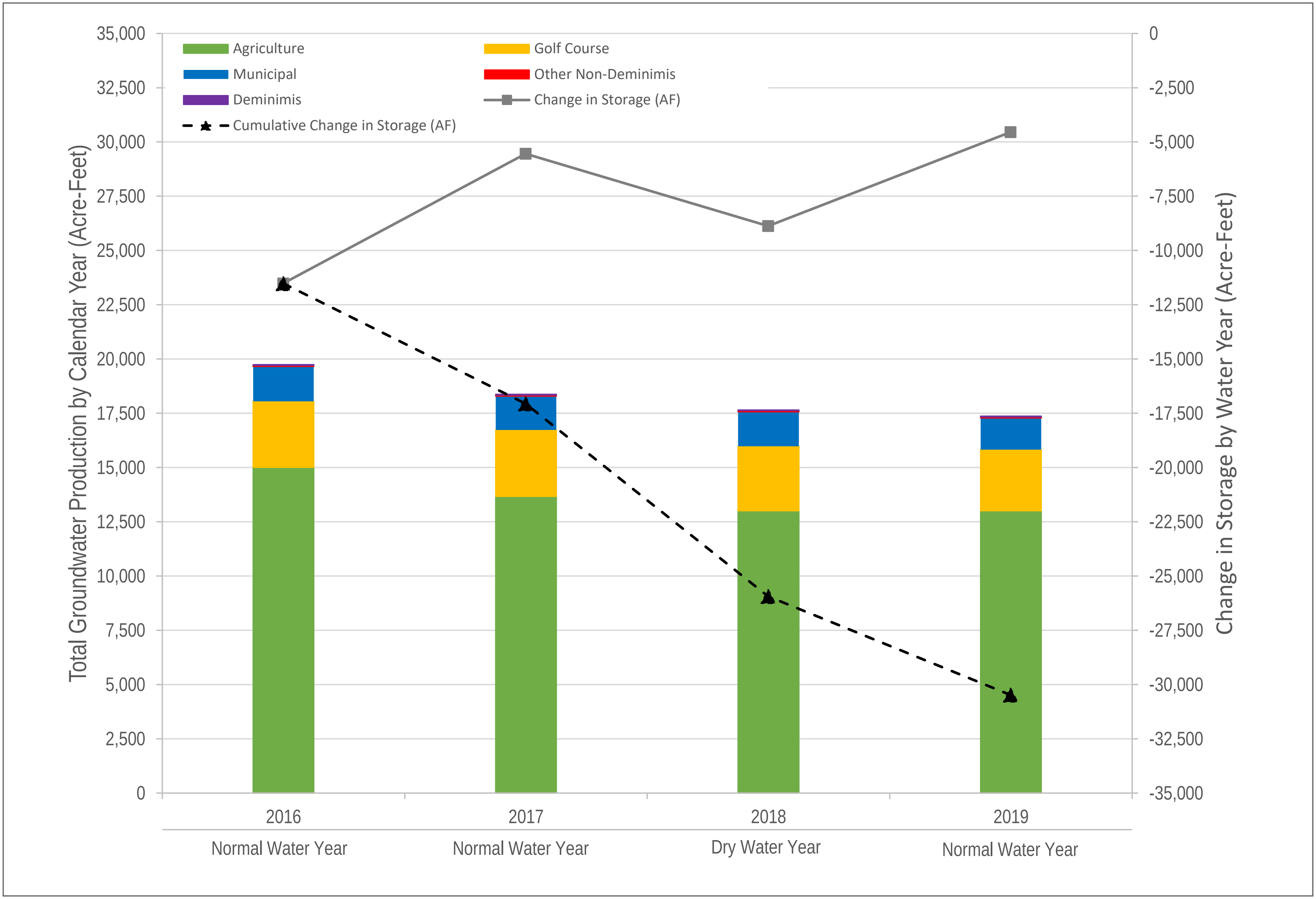

NOTE: Water year type based on Borrego Desert Park Station data

FIGURE 22

Annual and Cumulative Change in Storage

DUDEK

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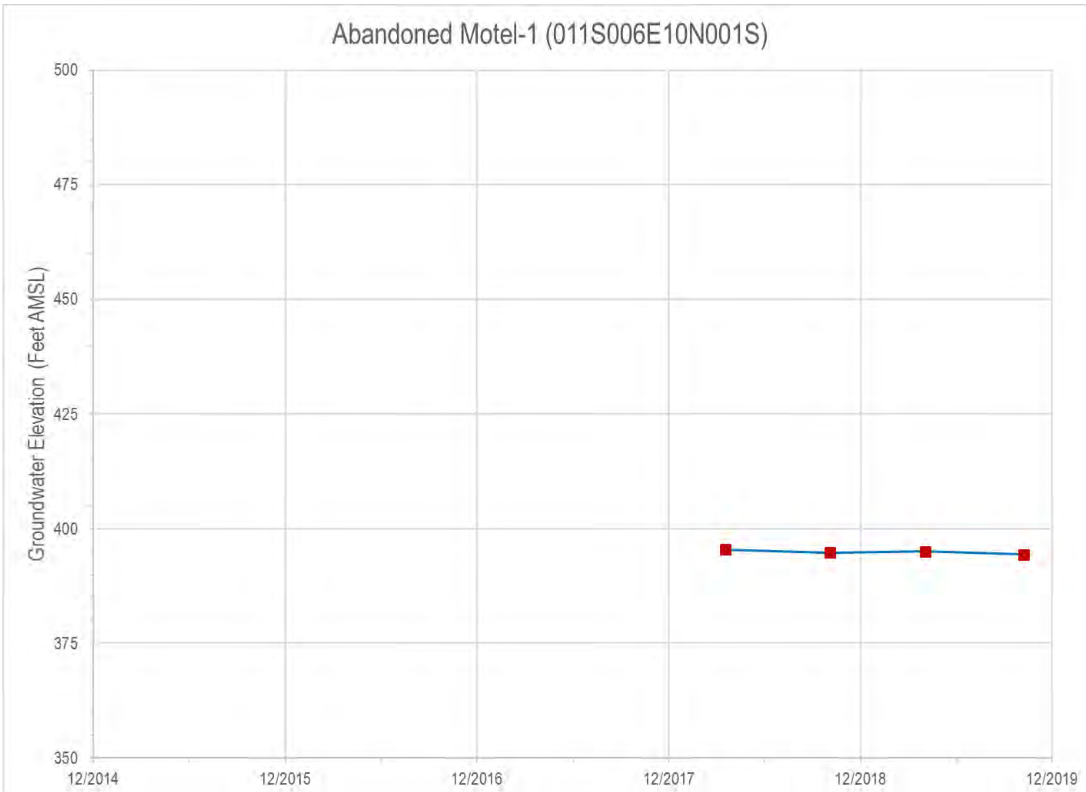
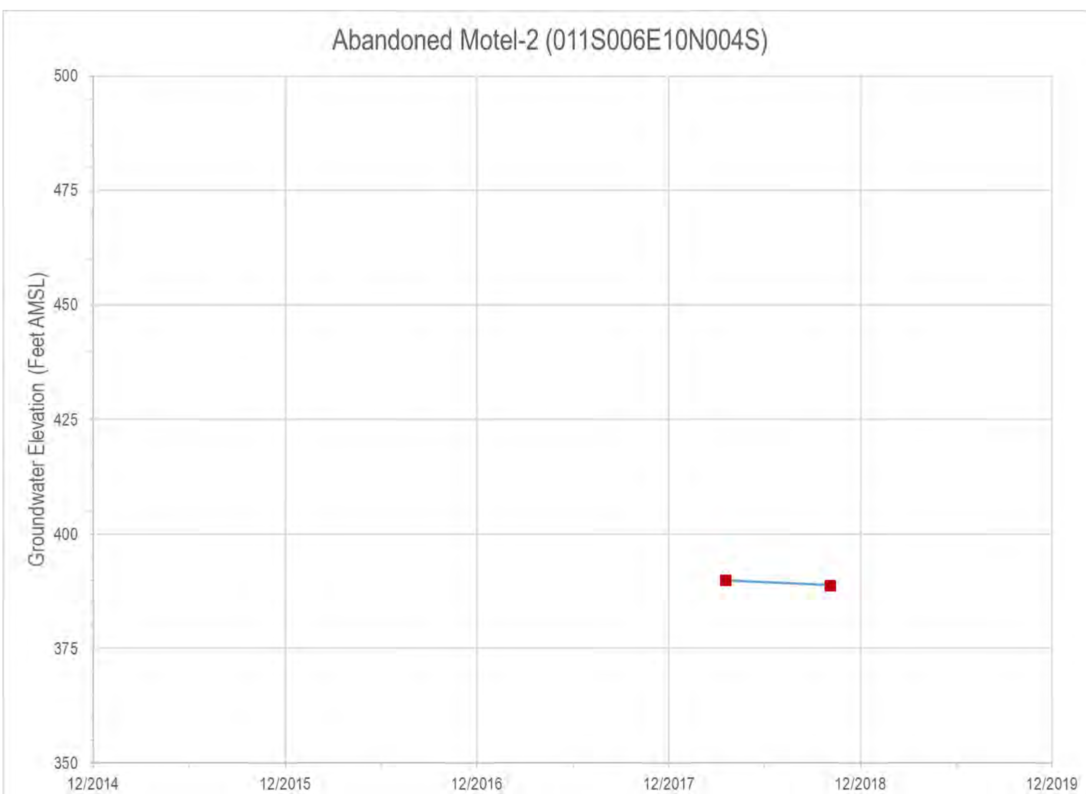
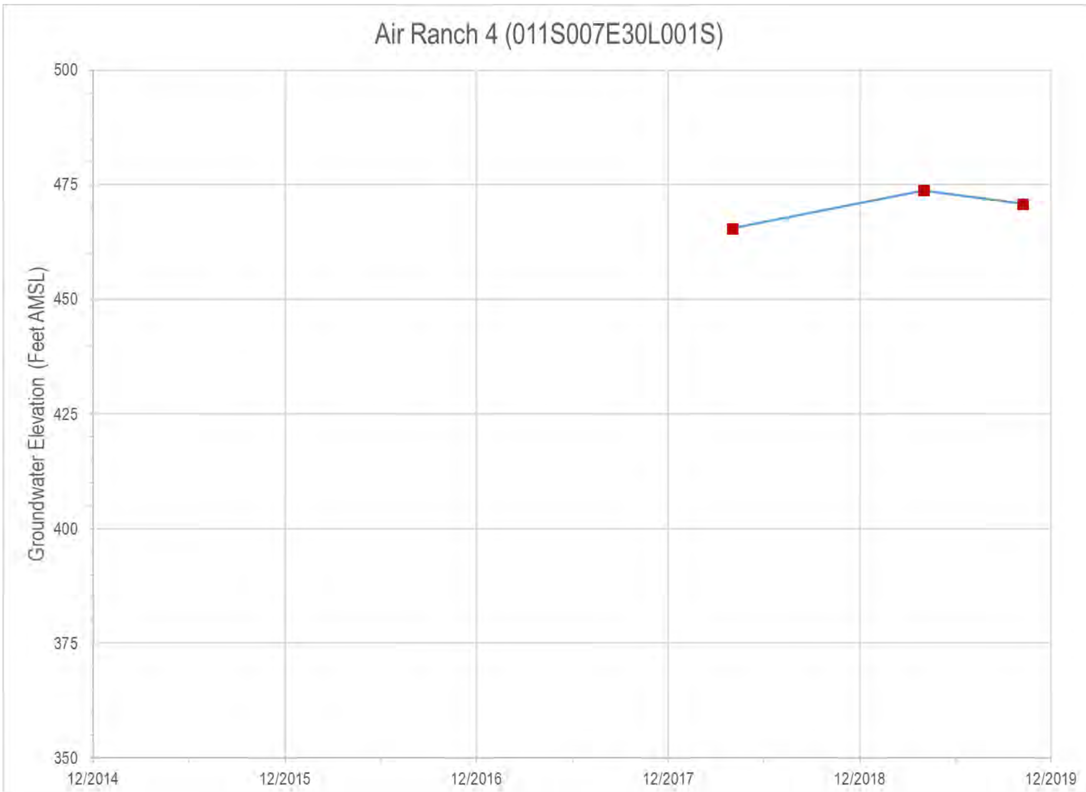
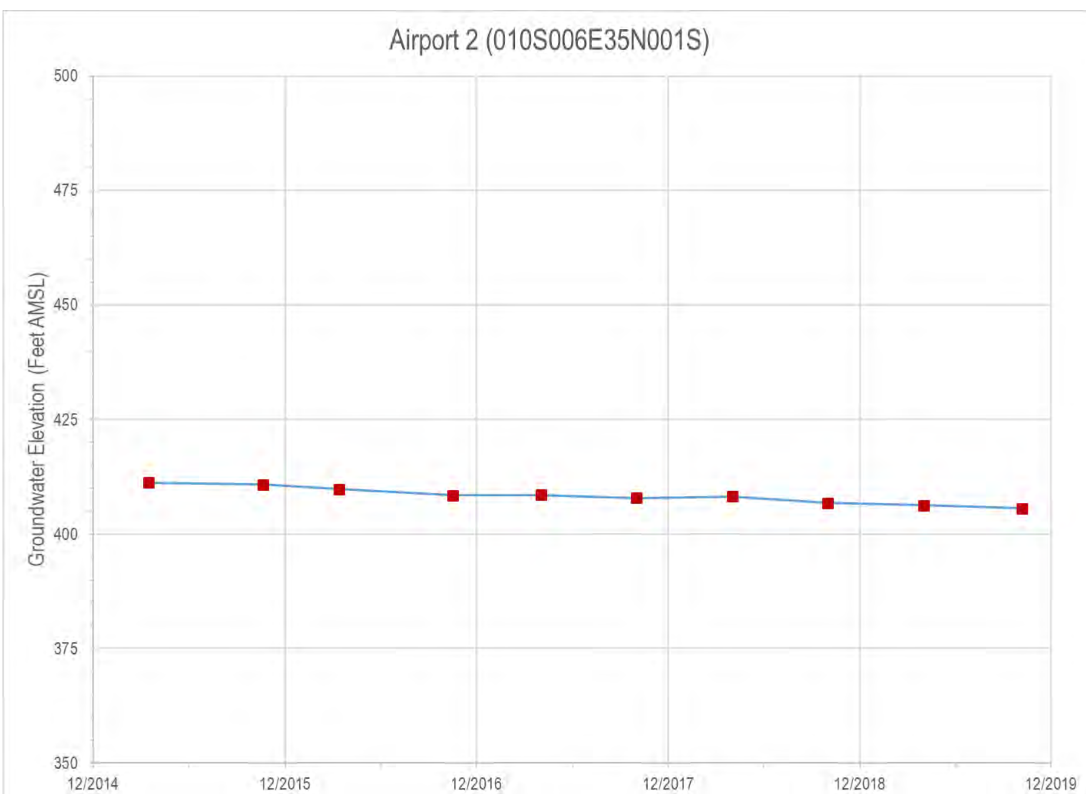
Appendix A

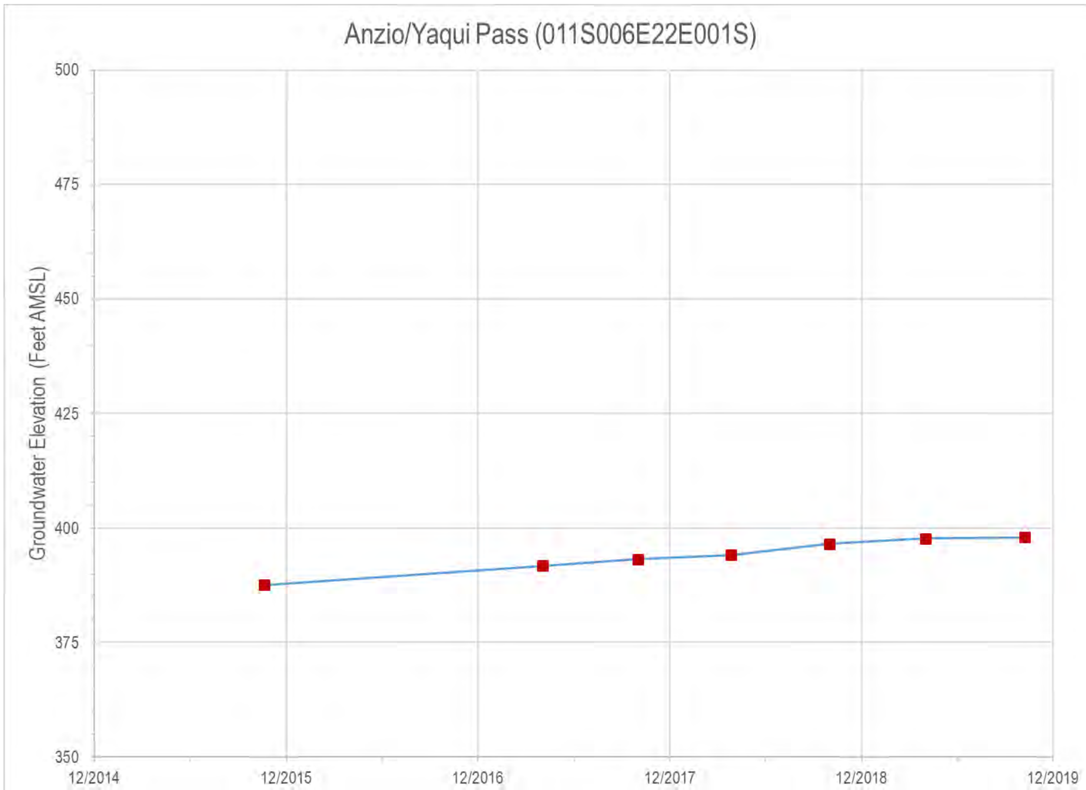
Monitoring Well Hydrographs

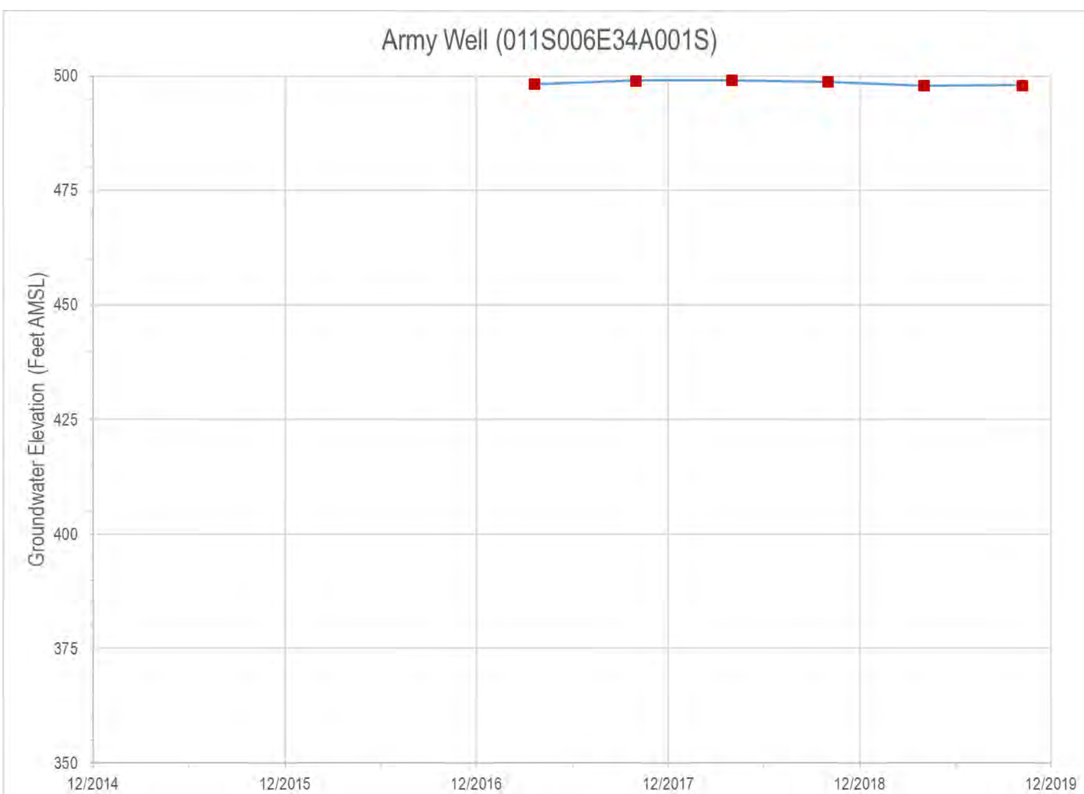

Abandoned Motel-1 (011S006E10N001S)
Groundwater Elevation (Feet AMSL)
500
475
450
425
400
375
350
12/2014
12/2015
12/2016
12/2017
12/2018
12/2019

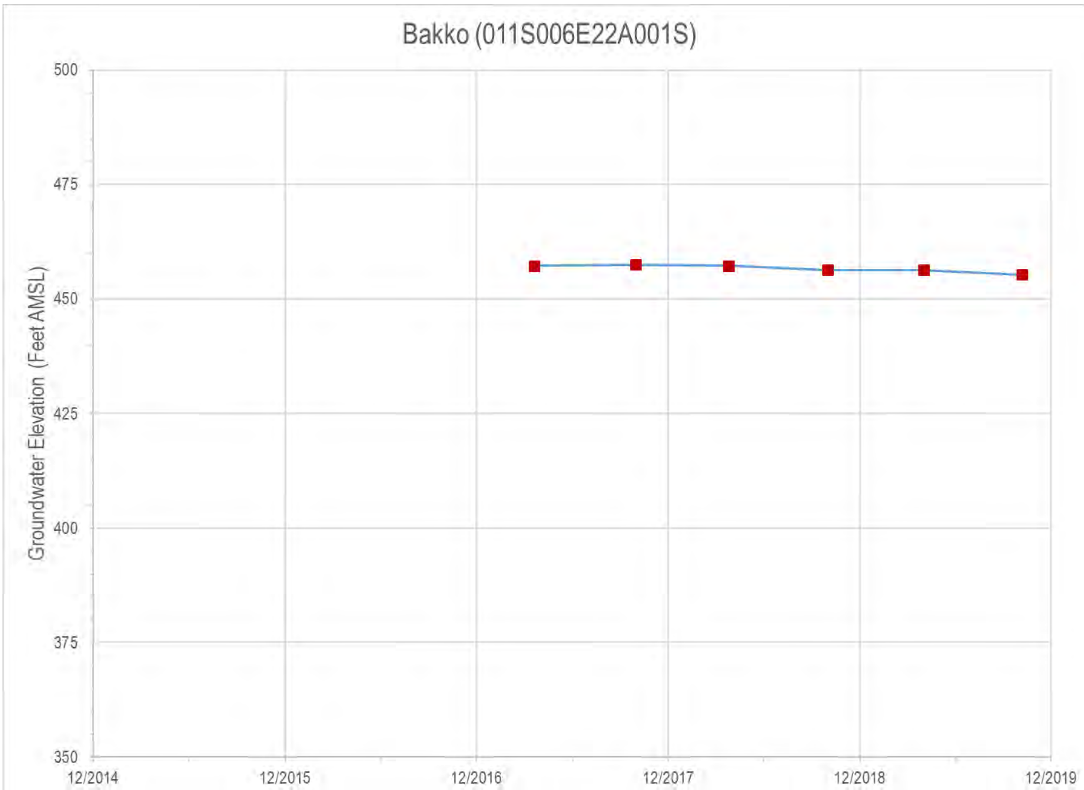

Abandoned Motel-2 (011S006E10N004S)
Groundwater Elevation (Feet AMSL)
500
475
450
425
400
375
350
12/2014
12/2015
12/2016
12/2017
12/2018
12/2019

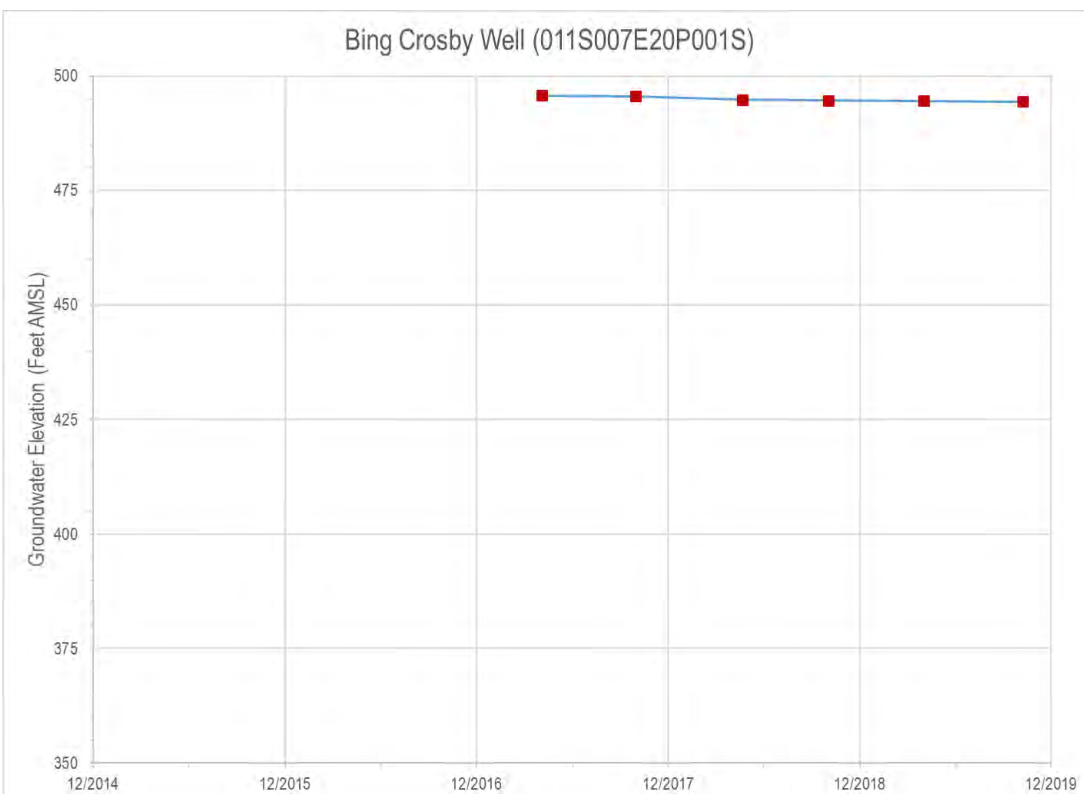

Air Ranch 4 (011S007E30L001S)
Groundwater Elevation (Feet AMSL)
500
475
450
425
400
375
350
12/2014
12/2015
12/2016
12/2017
12/2018
12/2019

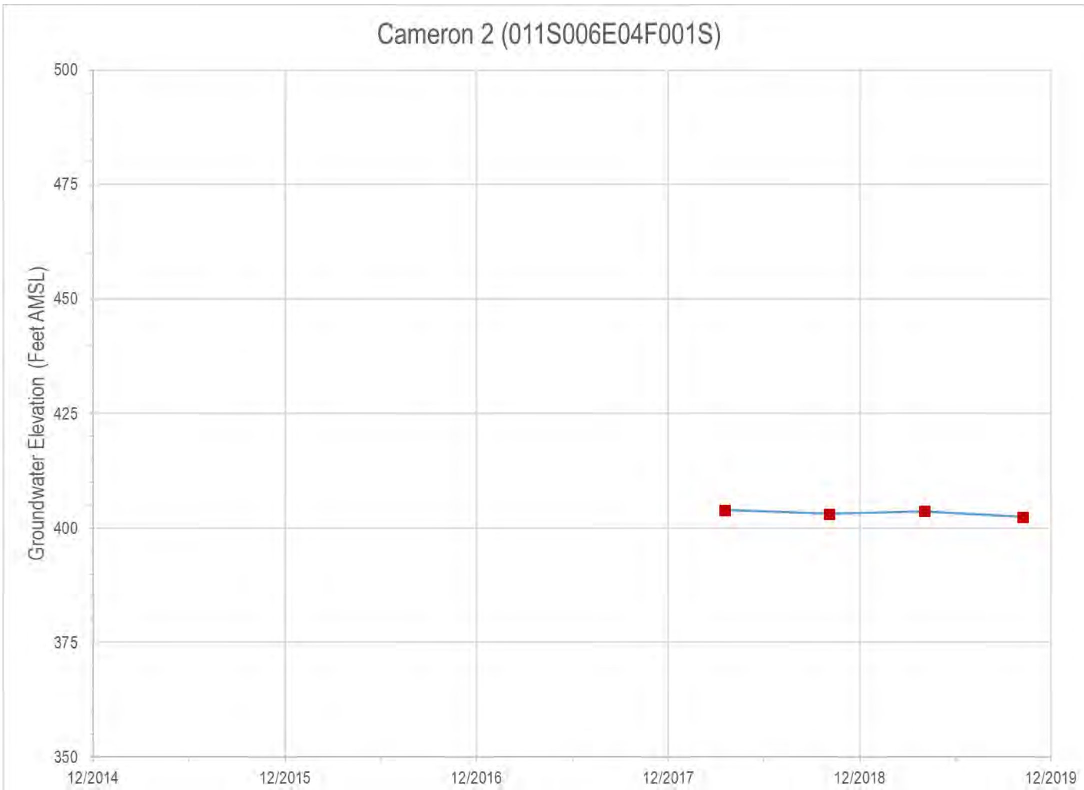

Airport 2 (010S006E35N001S)
Groundwater Elevation (Feet AMSL)
500
475
450
425
400
375
350
12/2014
12/2015
12/2016
12/2017
12/2018
12/2019

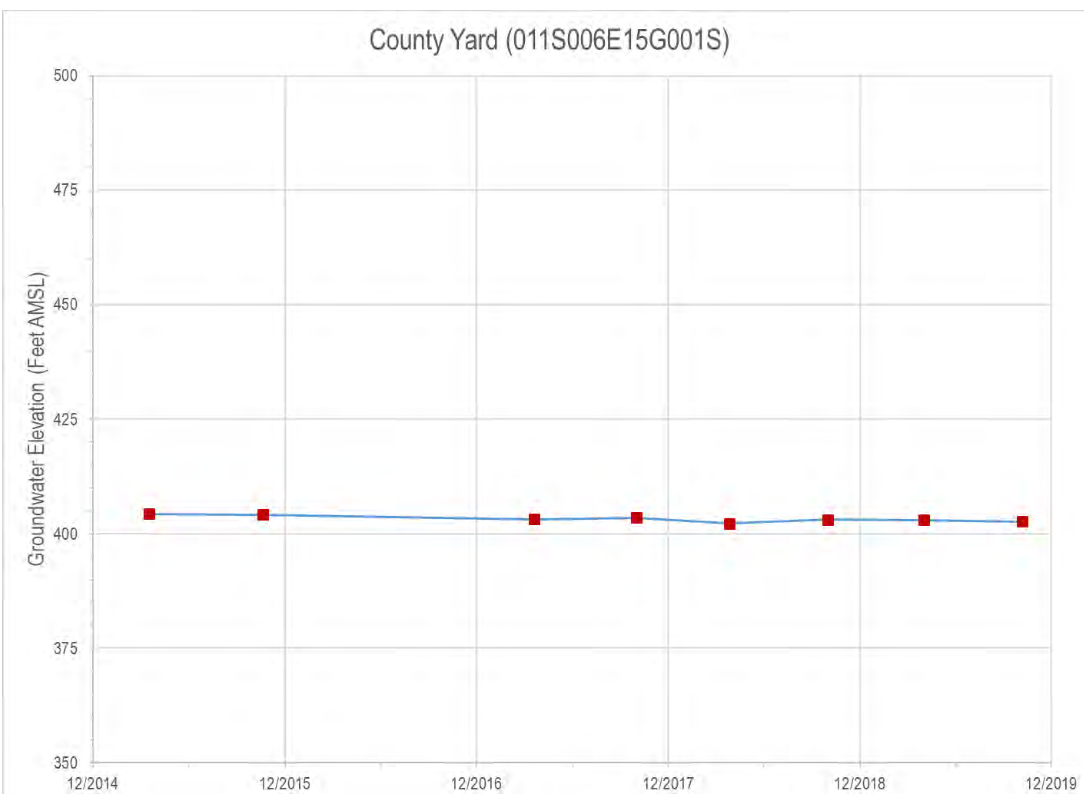

Anzio/Yaqui Pass (011S006E22E001S)
Groundwater Elevation (Feet AMSL)
500
475
450
425
400
375
350
12/2014
12/2015
12/2016
12/2017
12/2018
12/2019

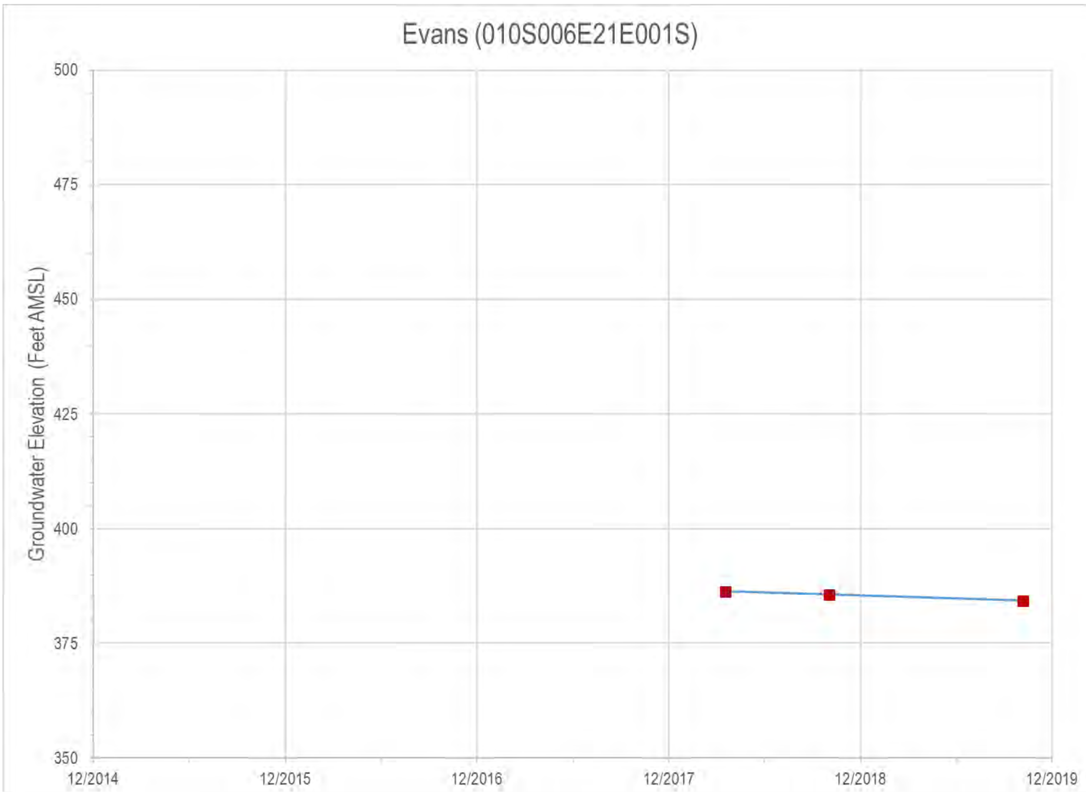

Army Well (011S006E34A001S)
Groundwater Elevation (Feet AMSL)
500
475
450
425
400
375
350
12/2014
12/2015
12/2016
12/2017
12/2018
12/2019


Bakko (011S006E22A001S)
Groundwater Elevation (Feet AMSL)
500
475
450
425
400
375
350
12/2014
12/2015
12/2016
12/2017
12/2018
12/2019

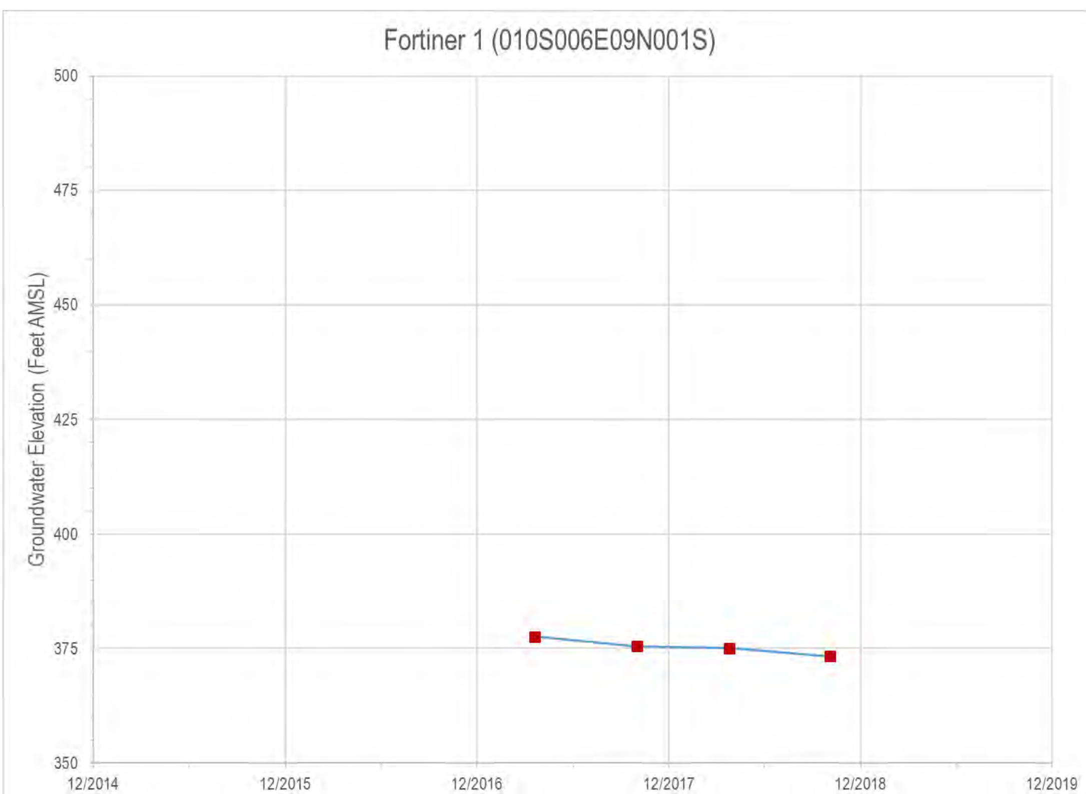

Bing Crosby Well (011S007E20P001S)
Groundwater Elevation (Feet AMSL)
500
475
450
425
400
375
350
12/2014
12/2015
12/2016
12/2017
12/2018
12/2019


Cameron 2 (011S006E04F001S)
Groundwater Elevation (Feet AMSL)
500
475
450
425
400
375
350
12/2014
12/2015
12/2016
12/2017
12/2018
12/2019

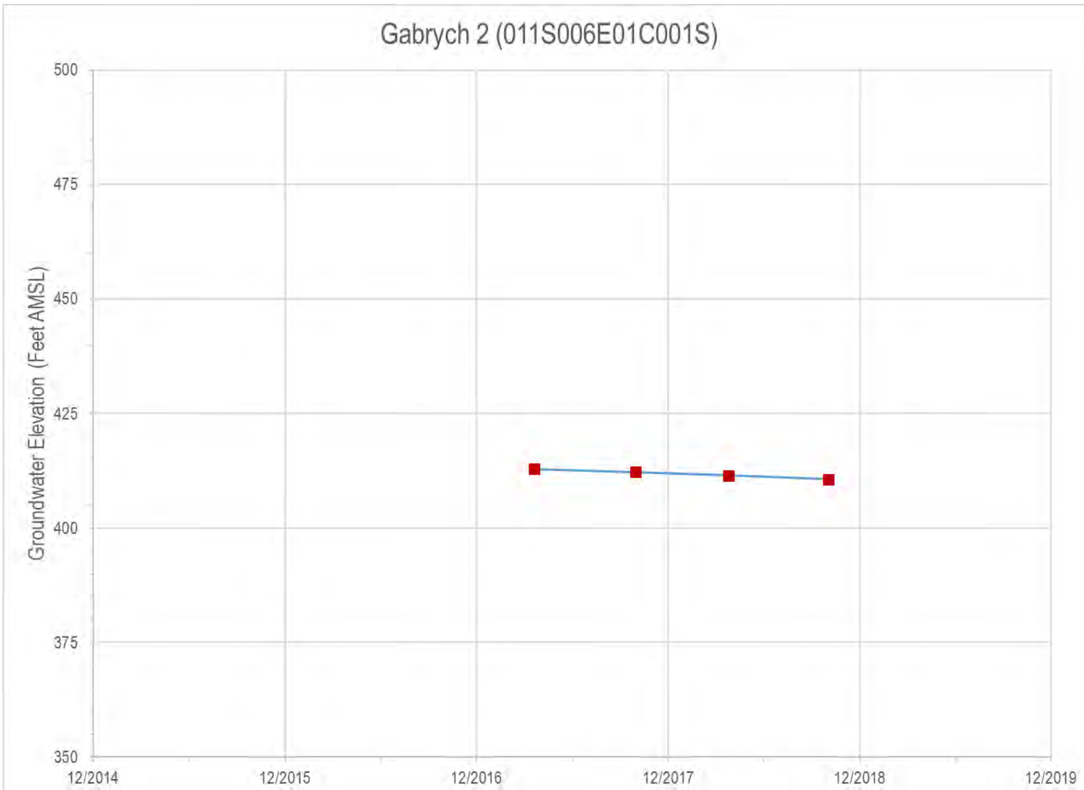

County Yard (011S006E15G001S)
Groundwater Elevation (Feet AMSL)
500
475
450
425
400
375
350
12/2014
12/2015
12/2016
12/2017
12/2018
12/2019

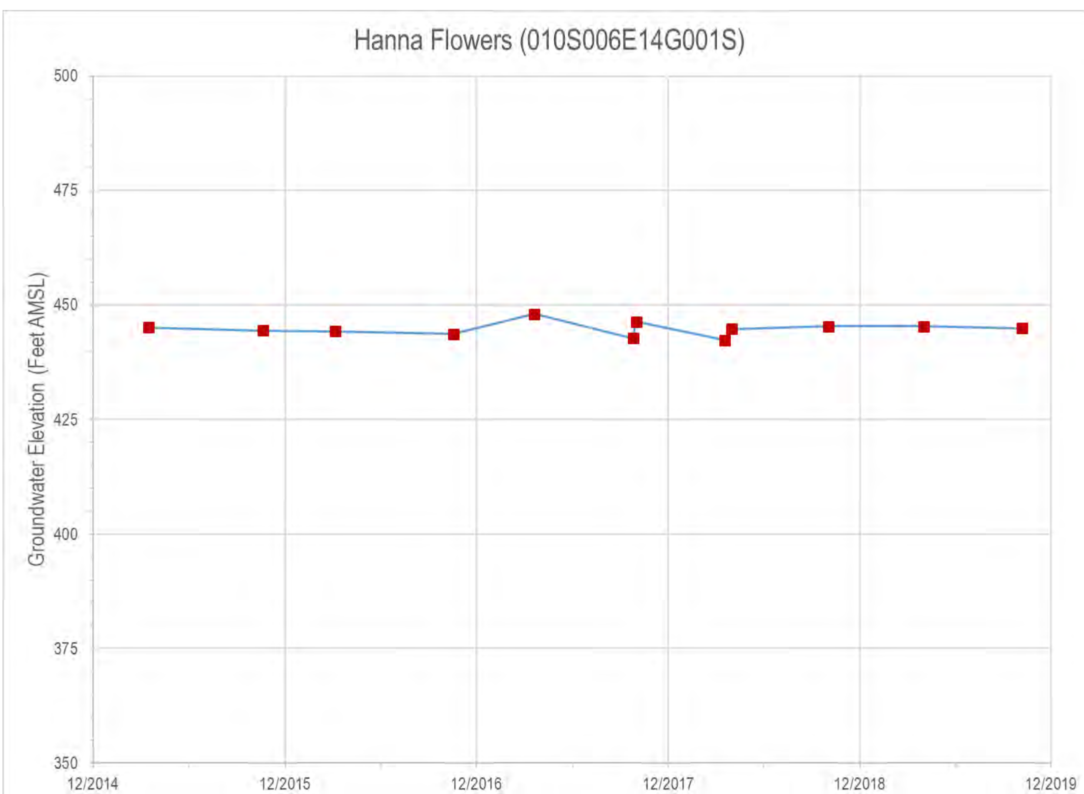


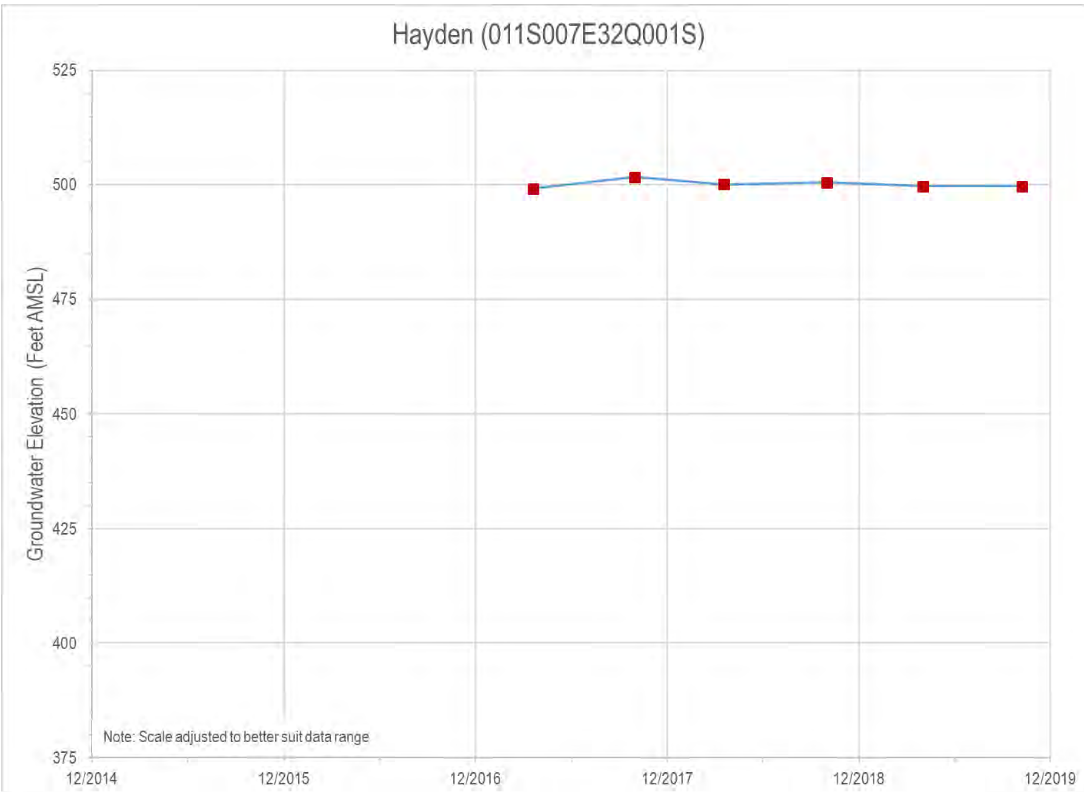
Evans (010S006E21E001S)
Groundwater Elevation (Feet AMSL)
500
475
450
425
400
375
350
12/2014
12/2015
12/2016
12/2017
12/2018
12/2019

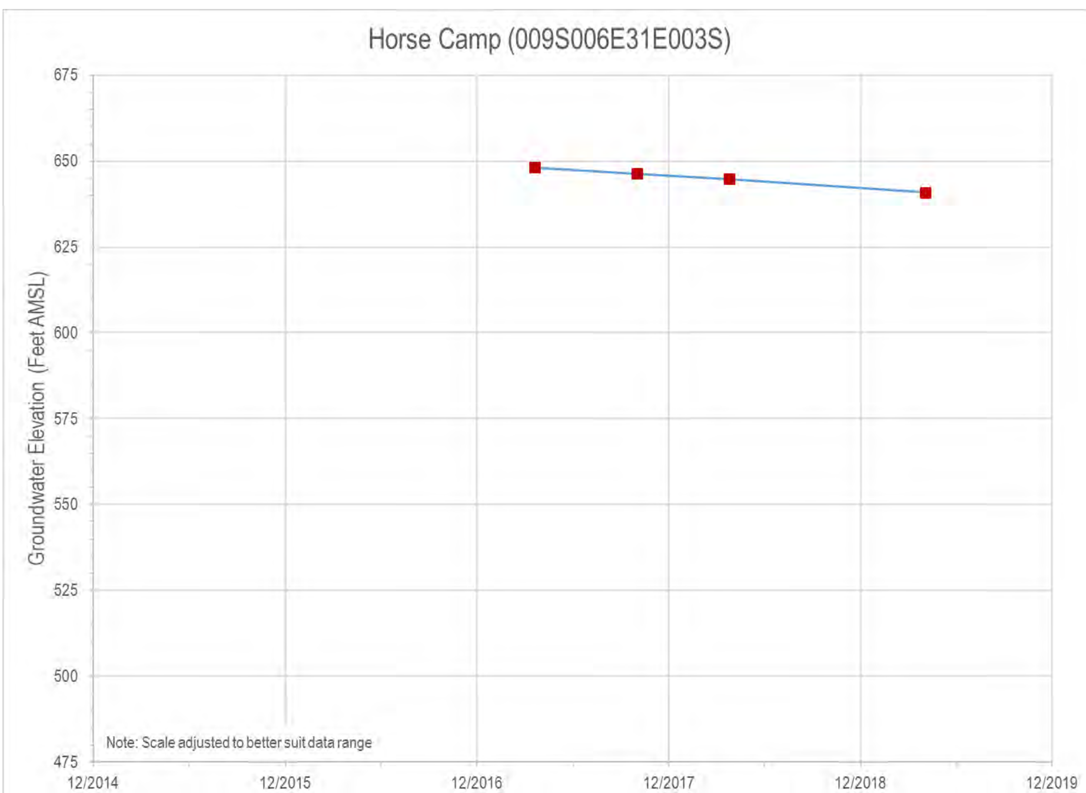


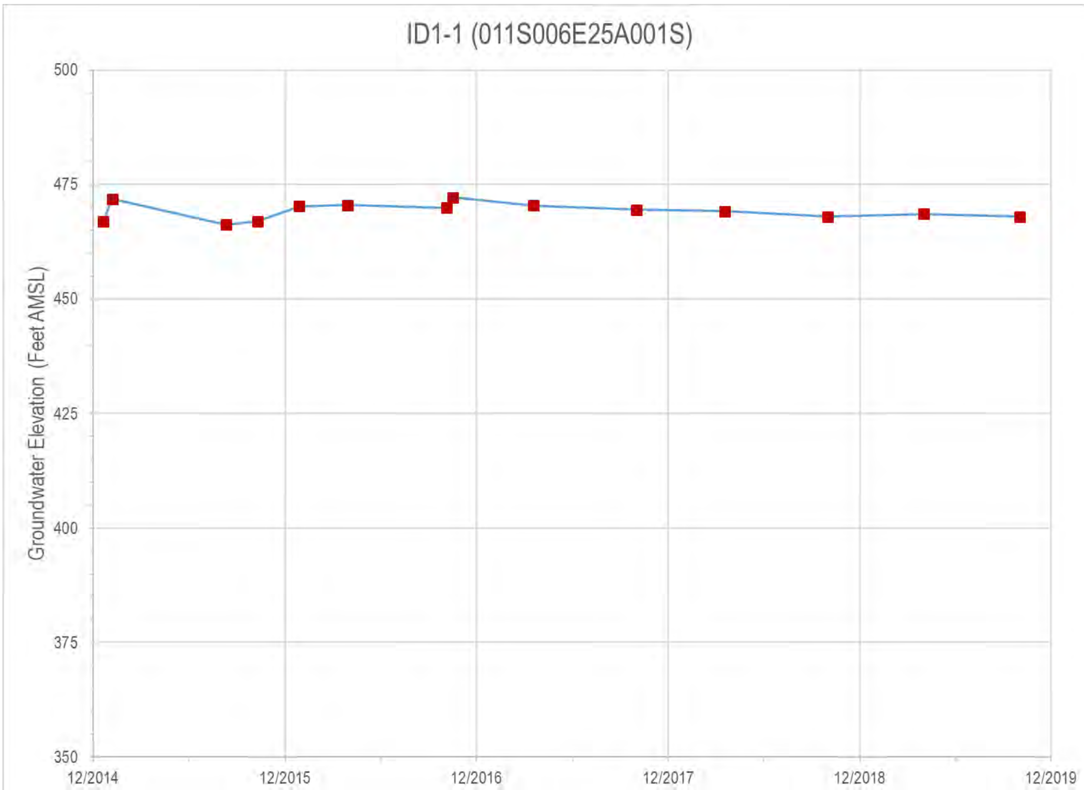
Fortiner 1 (010S006E09N001S)
Groundwater Elevation (Feet AMSL)
500
475
450
425
400
375
350
12/2014
12/2015
12/2016
12/2017
12/2018
12/2019


Gabrych 2 (011S006E01C001S)
Groundwater Elevation (Feet AMSL)
500
475
450
425
400
375
350
12/2014
12/2015
12/2016
12/2017
12/2018
12/2019

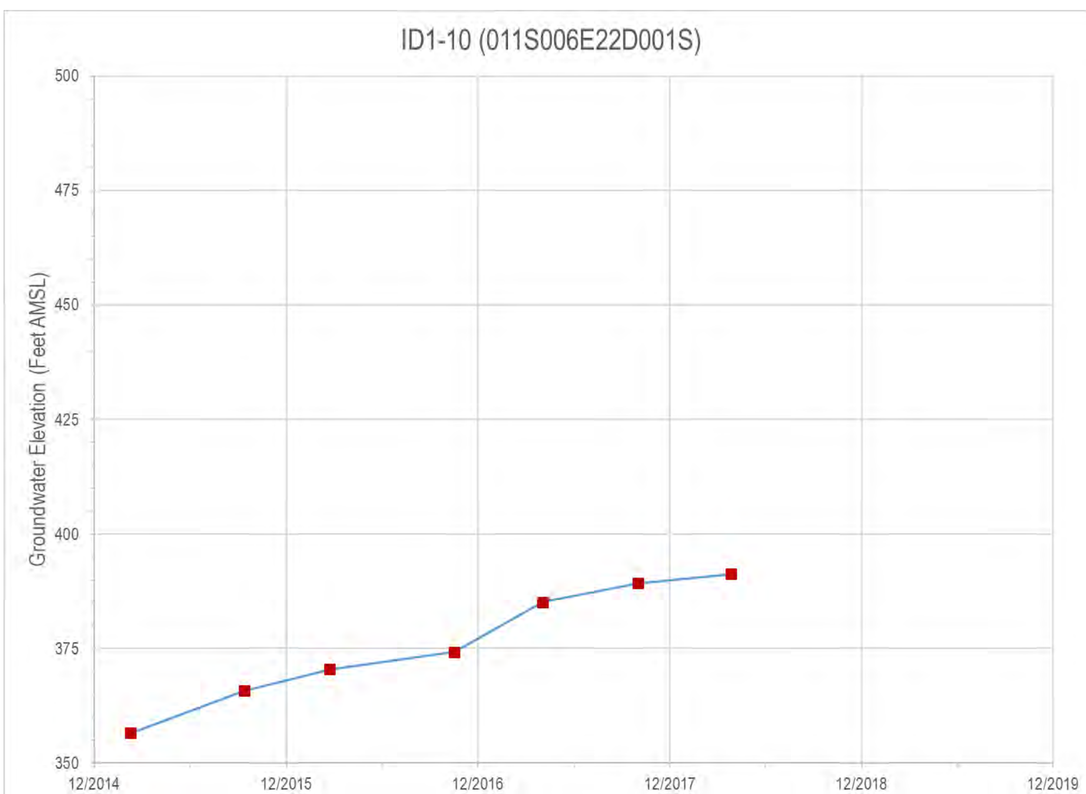

Hanna Flowers (010S006E14G001S)
Groundwater Elevation (Feet AMSL)
500
475
450
425
400
375
350
12/2014
12/2015
12/2016
12/2017
12/2018
12/2019


Hayden (011S007E32Q001S)
525
500
475
450
425
400
375
Groundwater Elevation (Feet AMSL)
Note: Scale adjusted to better suit data range
12/2014
12/2015
12/2016
12/2017
12/2018
12/2019

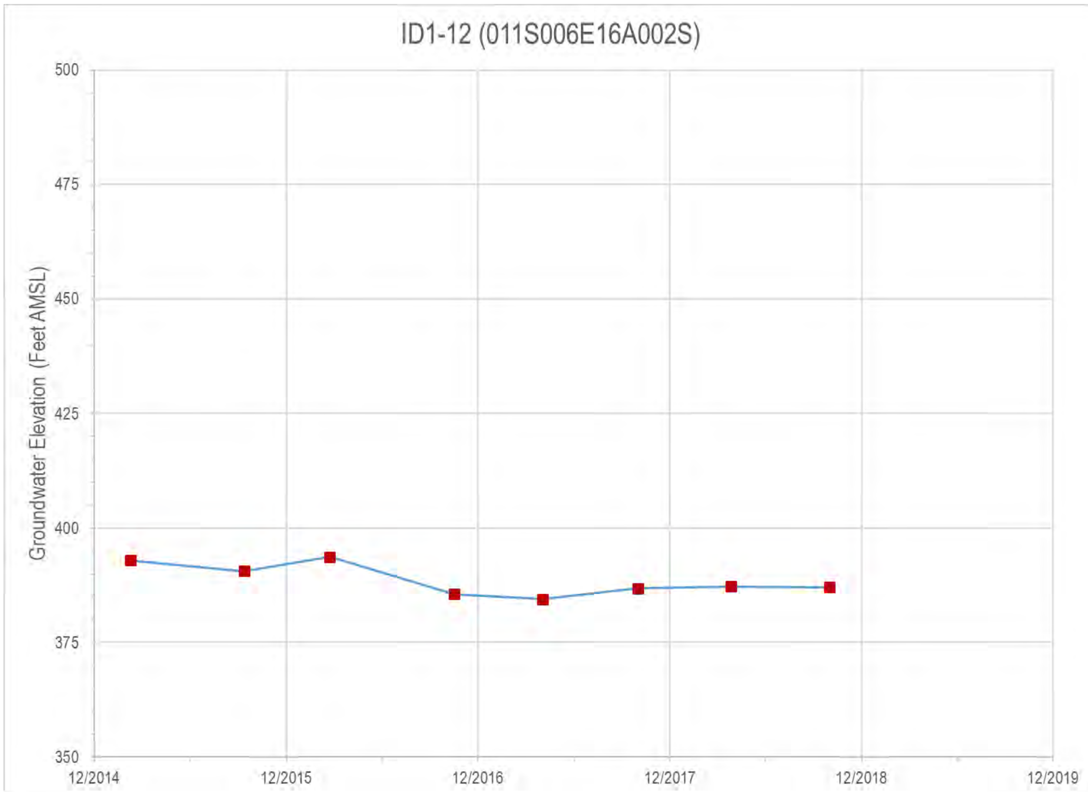

Horse Camp (009S006E31E003S)
675
650
625
600
575
550
525
500
475
Groundwater Elevation (Feet AMSL)
Note: Scale adjusted to better suit data range
12/2014
12/2015
12/2016
12/2017
12/2018
12/2019



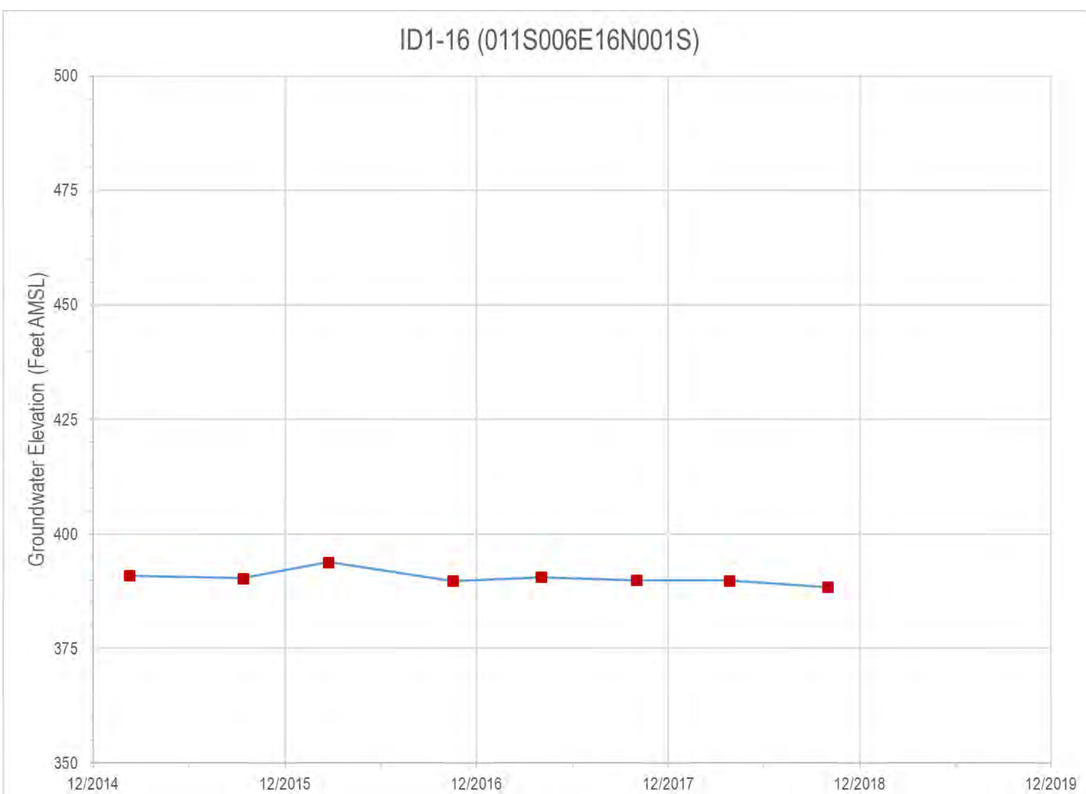
ID1-1 (011S006E25A001S)
Groundwater Elevation (Feet AMSL)
500
475
450
425
400
375
350
12/2014
12/2015
12/2016
12/2017
12/2018
12/2019



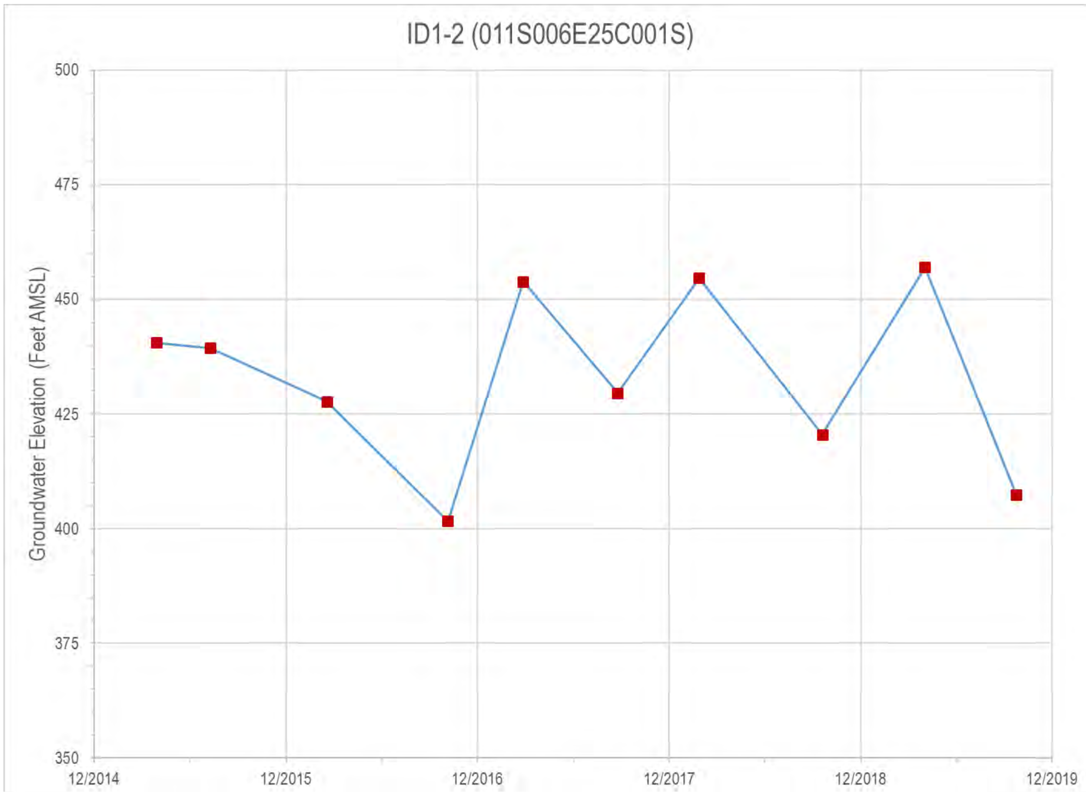
ID1-10 (011S006E22D001S)
Groundwater Elevation (Feet AMSL)
500
475
450
425
400
375
350
12/2014
12/2015
12/2016
12/2017
12/2018
12/2019

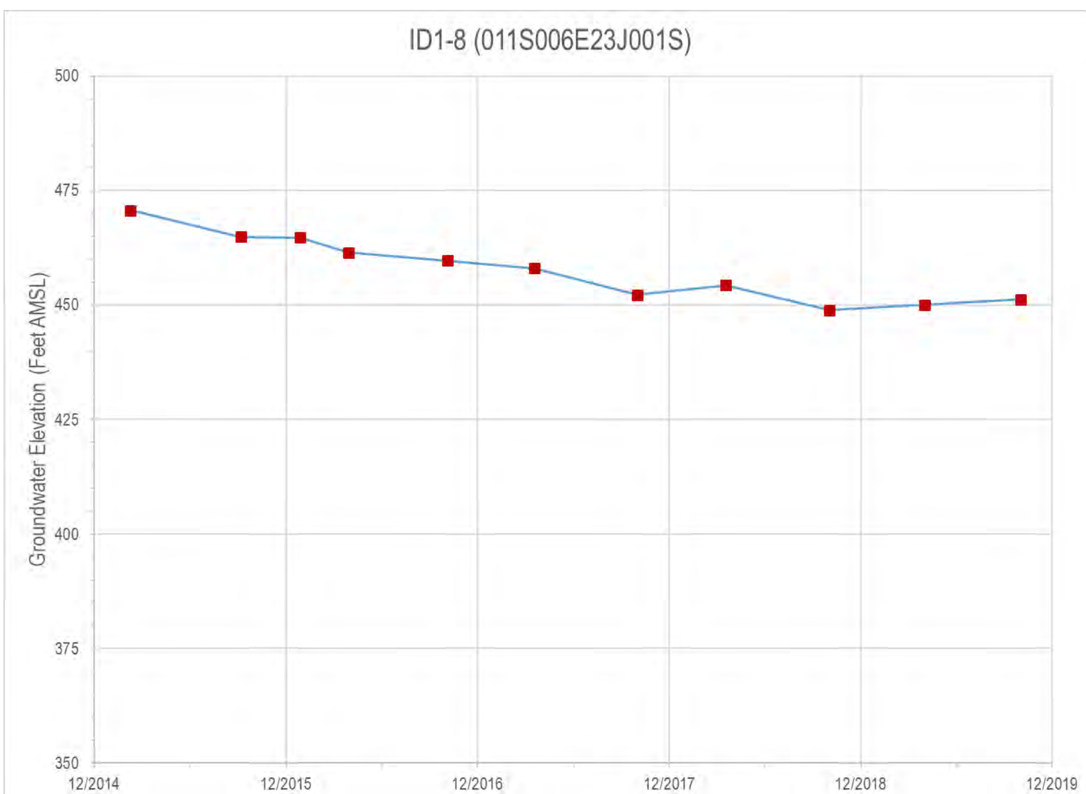


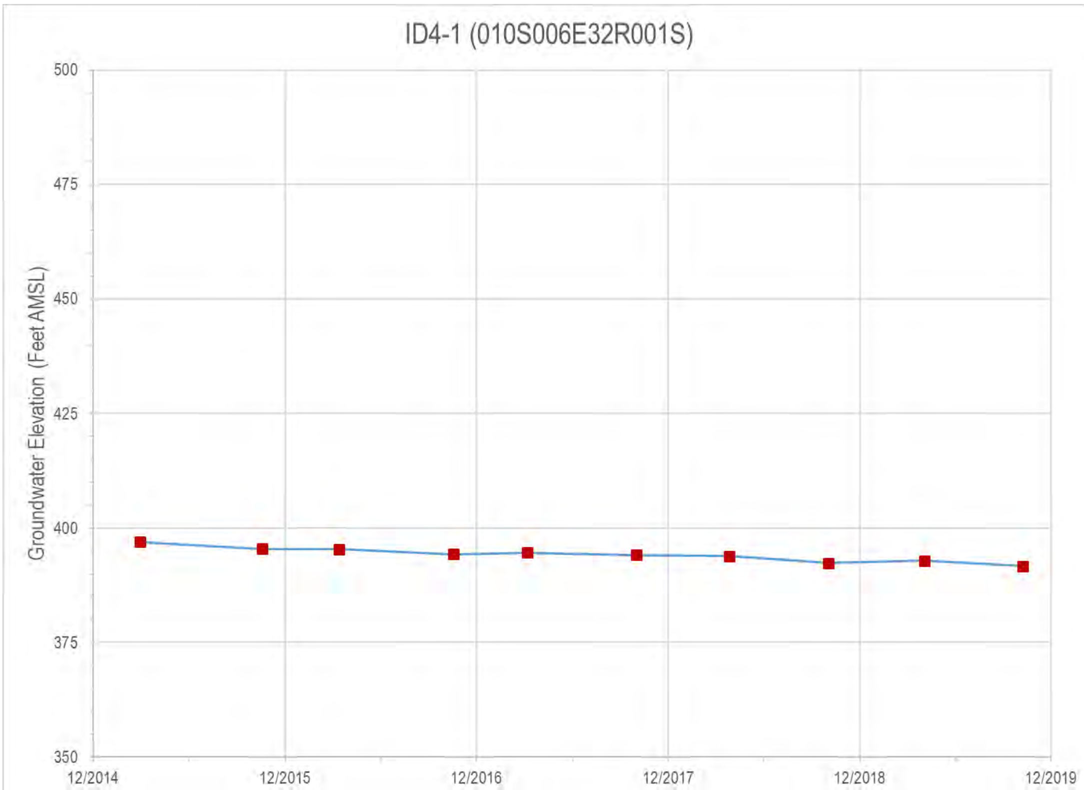
ID1-12 (011S006E16A002S)
Groundwater Elevation (Feet AMSL)
500
475
450
425
400
375
350
12/2014
12/2015
12/2016
12/2017
12/2018
12/2019

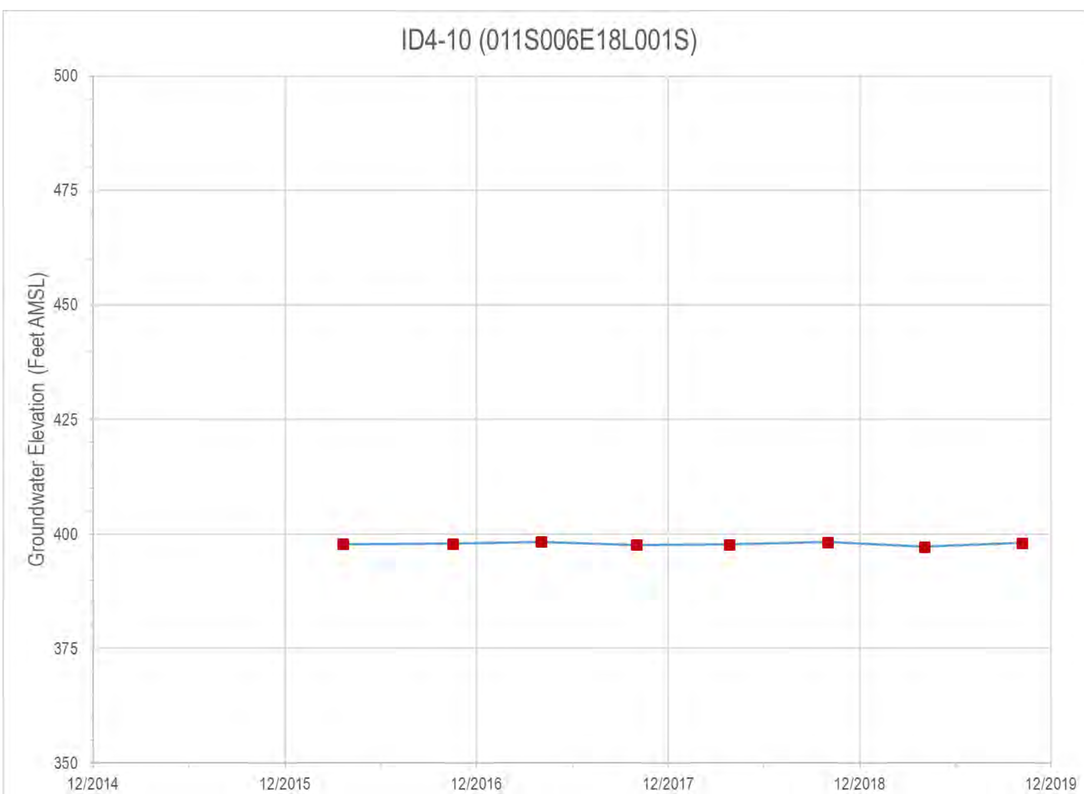


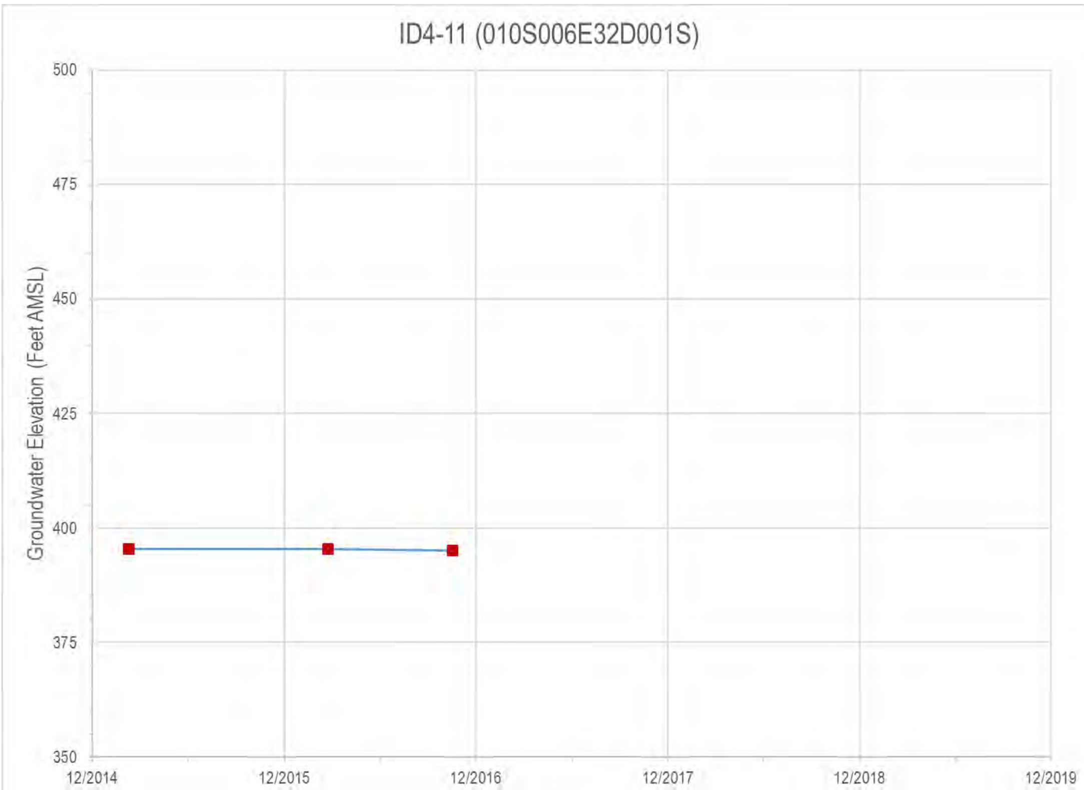
ID1-16 (011S006E16N001S)
Groundwater Elevation (Feet AMSL)
500
475
450
425
400
375
350
12/2014
12/2015
12/2016
12/2017
12/2018
12/2019

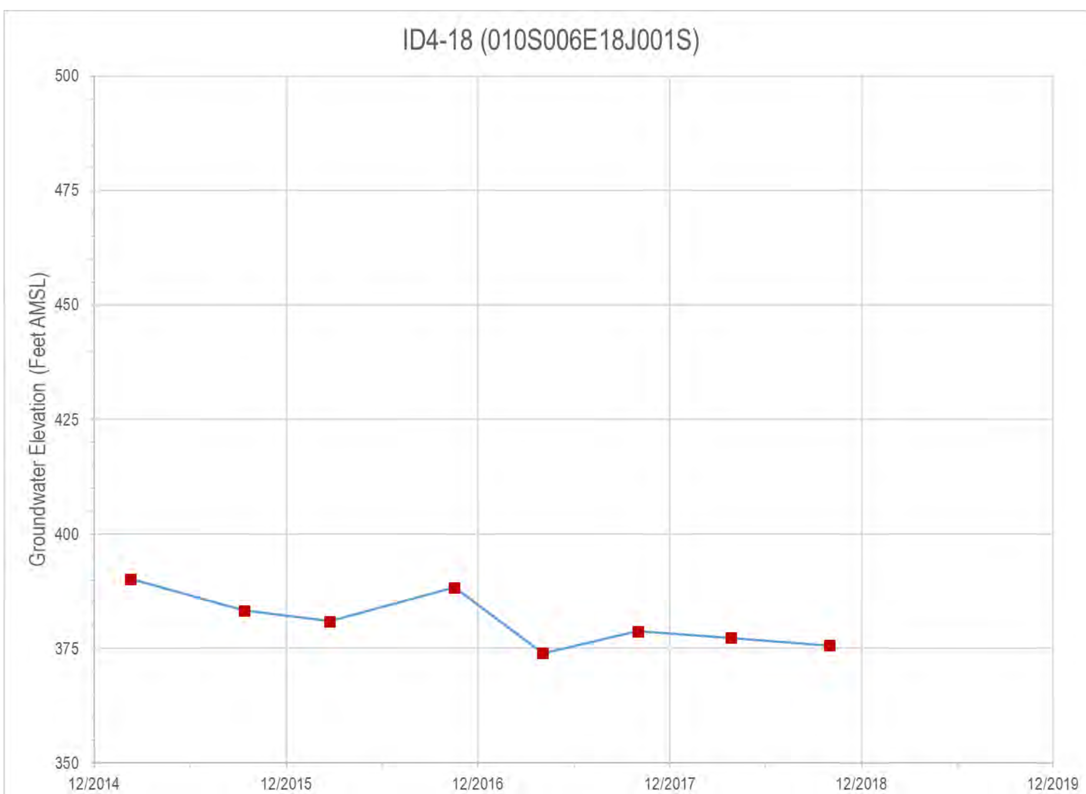

ID1-2 (011S006E25C001S)
Groundwater Elevation (Feet AMSL)
500
475
450
425
400
375
350
12/2014
12/2015
12/2016
12/2017
12/2018
12/2019

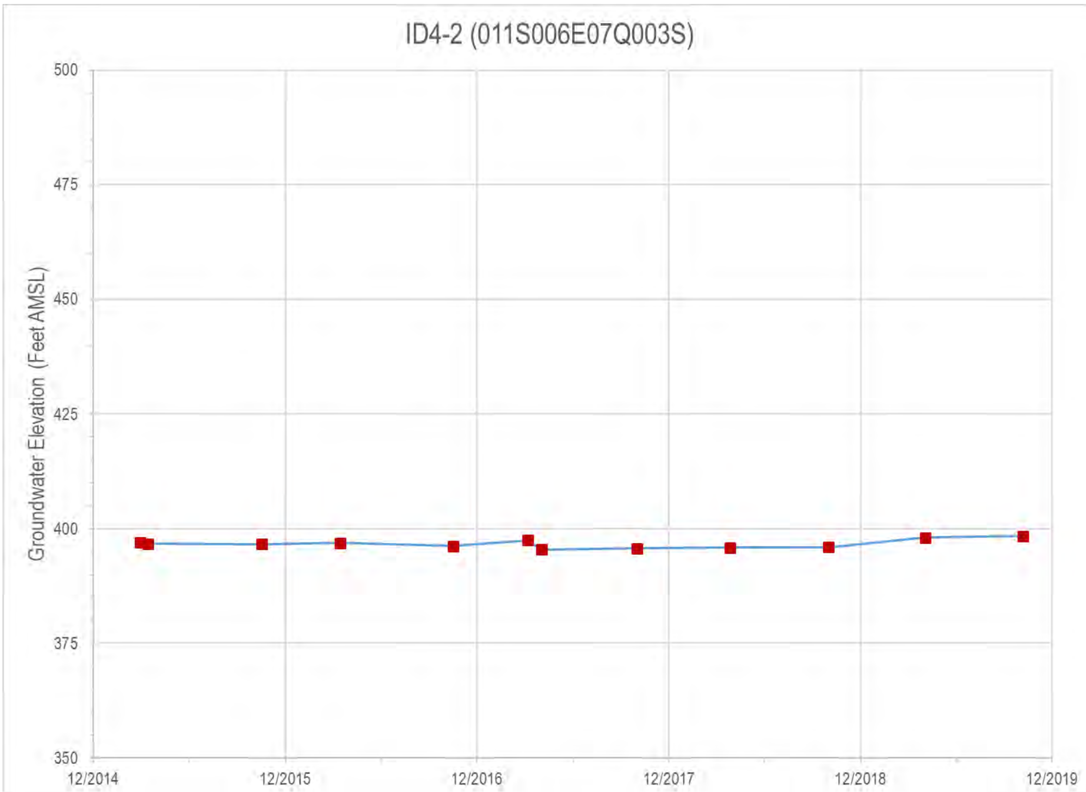

ID1-8 (011S006E23J001S)
Groundwater Elevation (Feet AMSL)
500
475
450
425
400
375
350
12/2014
12/2015
12/2016
12/2017
12/2018
12/2019

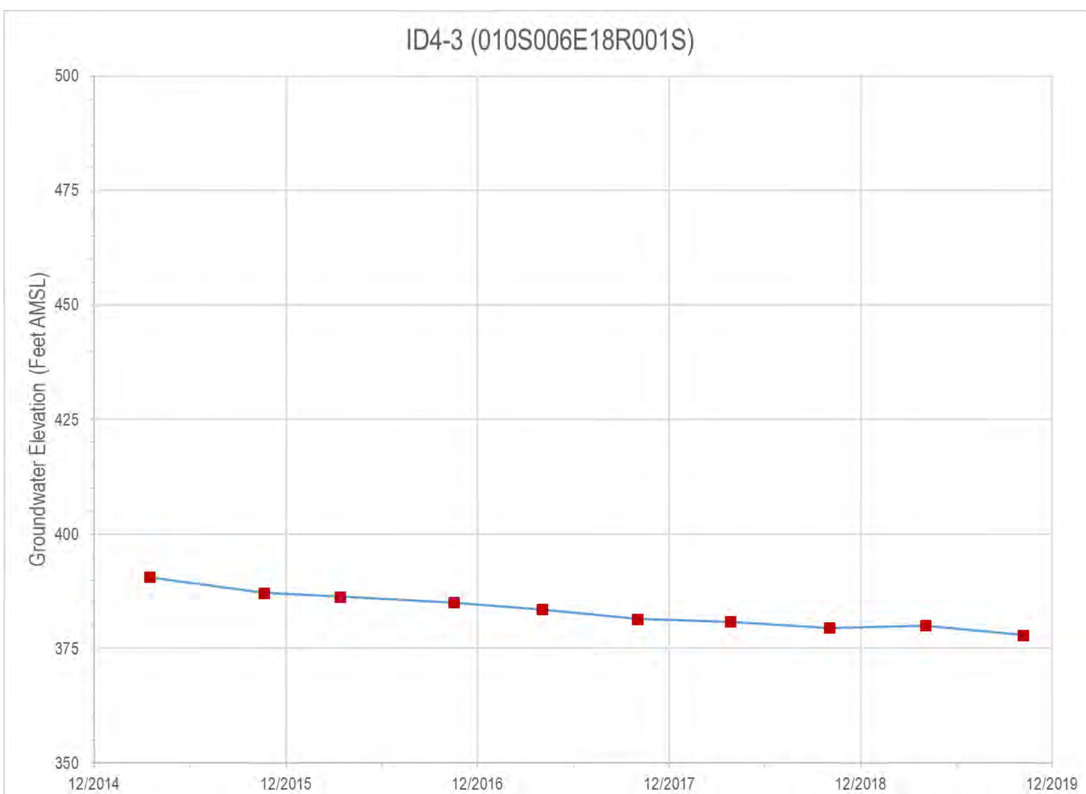

ID4-1 (010S006E32R001S)
Groundwater Elevation (Feet AMSL)
500
475
450
425
400
375
350
12/2014
12/2015
12/2016
12/2017
12/2018
12/2019

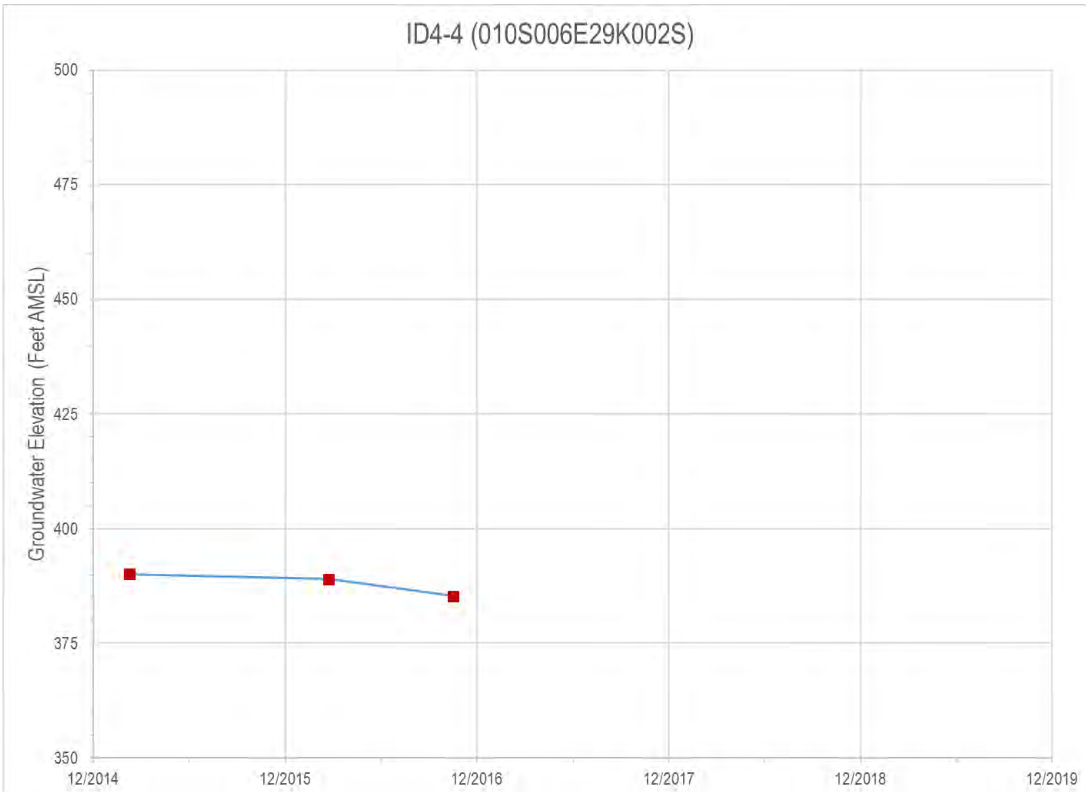

ID4-10 (011S006E18L001S)
Groundwater Elevation (Feet AMSL)
500
475
450
425
400
375
350
12/2014
12/2015
12/2016
12/2017
12/2018
12/2019

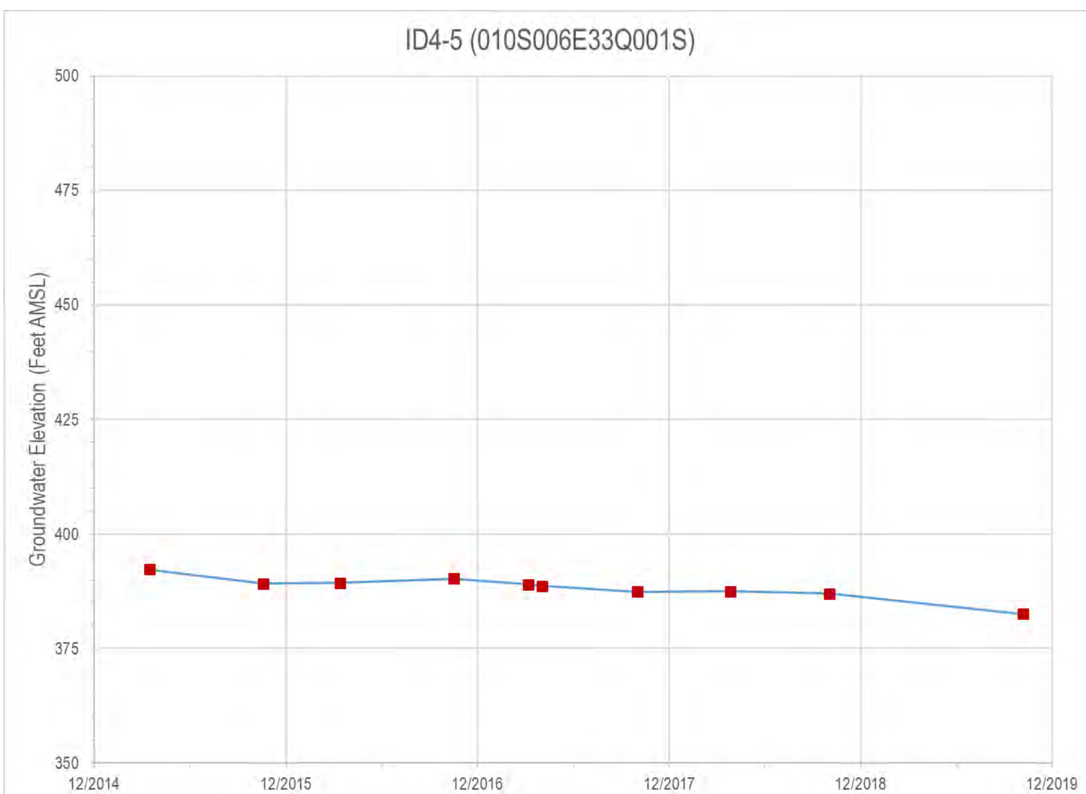

ID4-11 (010S006E32D001S)
Groundwater Elevation (Feet AMSL)
500
475
450
425
400
375
350
12/2014
12/2015
12/2016
12/2017
12/2018
12/2019

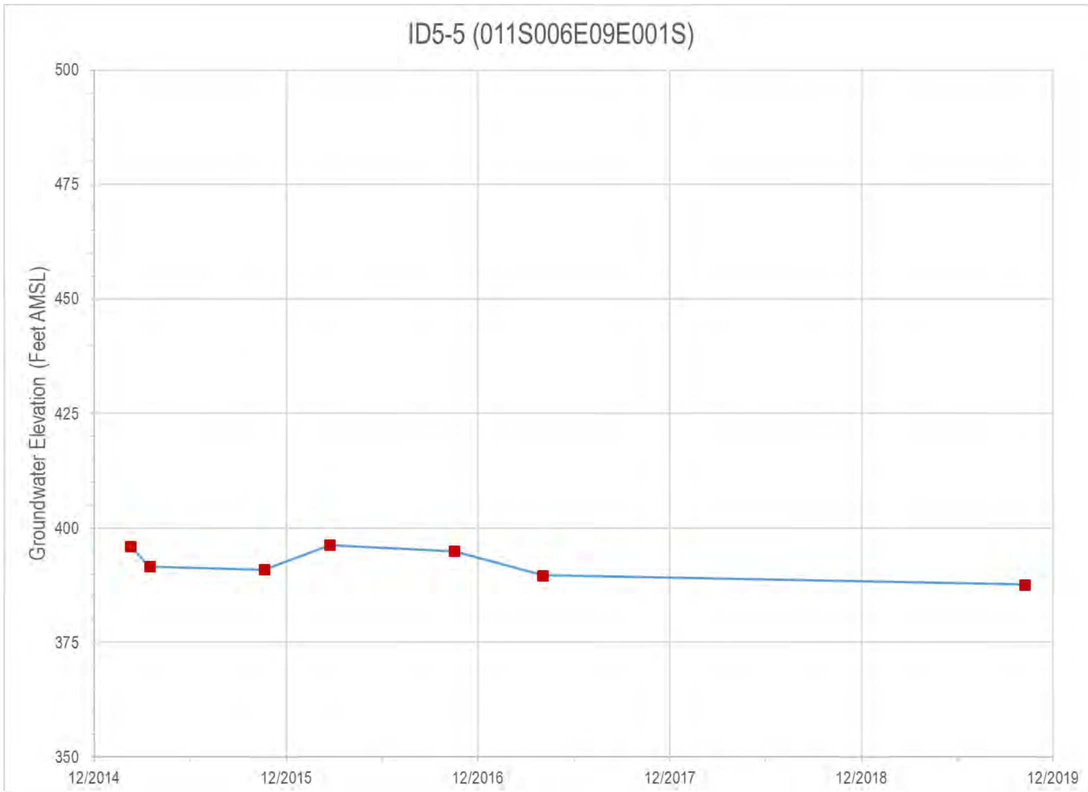

ID4-18 (010S006E18J001S)
Groundwater Elevation (Feet AMSL)
500
475
450
425
400
375
350
12/2014
12/2015
12/2016
12/2017
12/2018
12/2019

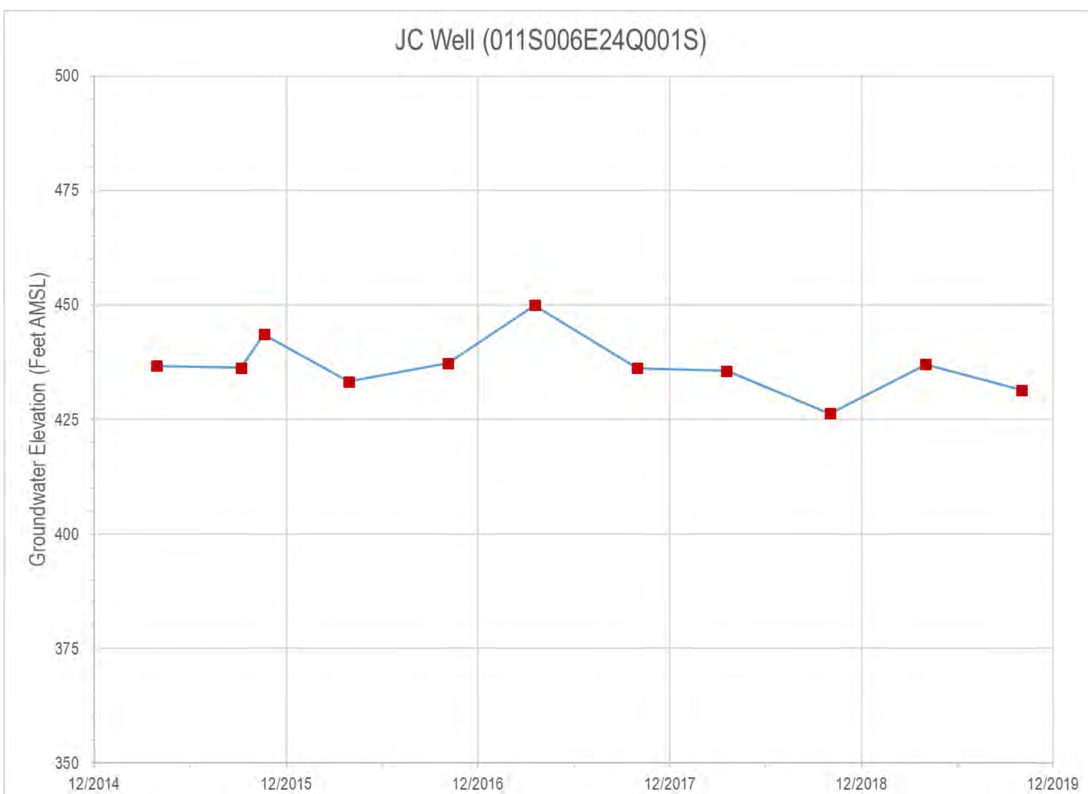

ID4-2 (011S006E07Q003S)
Groundwater Elevation (Feet AMSL)
500
475
450
425
400
375
350
12/2014
12/2015
12/2016
12/2017
12/2018
12/2019

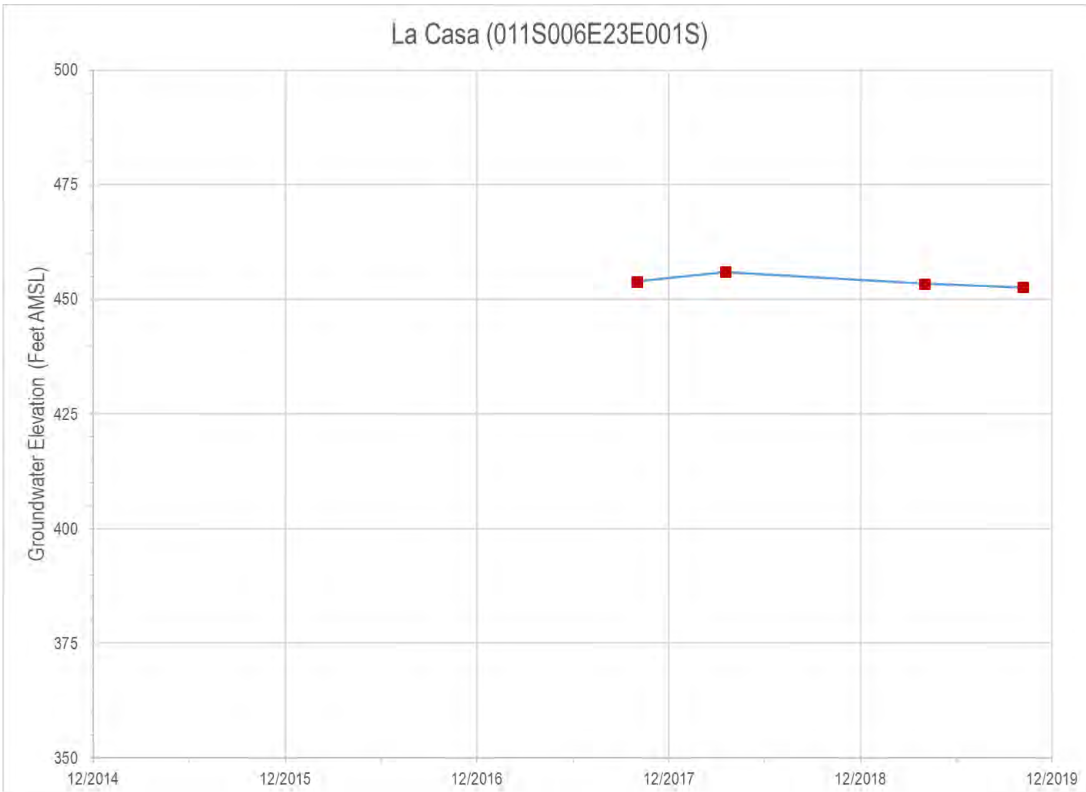

ID4-3 (010S006E18R001S)
Groundwater Elevation (Feet AMSL)
500
475
450
425
400
375
350
12/2014
12/2015
12/2016
12/2017
12/2018
12/2019

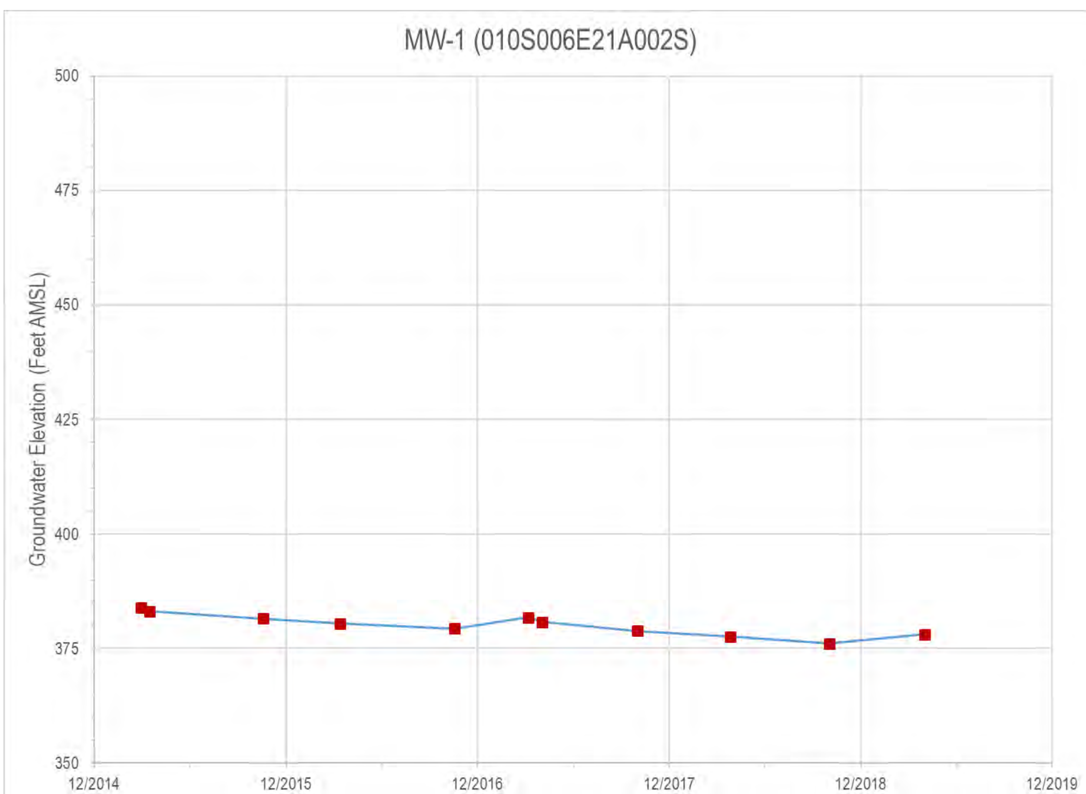

ID4-4 (010S006E29K002S)
Groundwater Elevation (Feet AMSL)
500
475
450
425
400
375
350
12/2014
12/2015
12/2016
12/2017
12/2018
12/2019

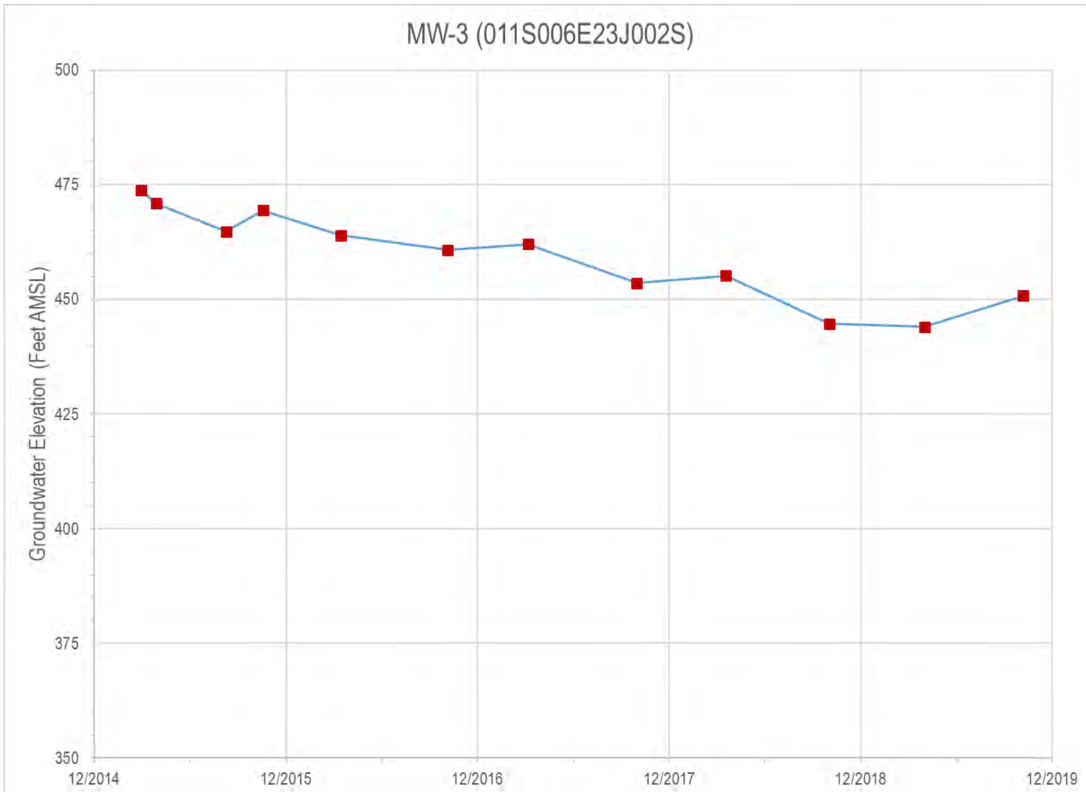

ID4-5 (010S006E33Q001S)
Groundwater Elevation (Feet AMSL)
500
475
450
425
400
375
350
12/2014
12/2015
12/2016
12/2017
12/2018
12/2019


ID5-5 (011S006E09E001S)
Groundwater Elevation (Feet AMSL)
500
475
450
425
400
375
350
12/2014
12/2015
12/2016
12/2017
12/2018
12/2019

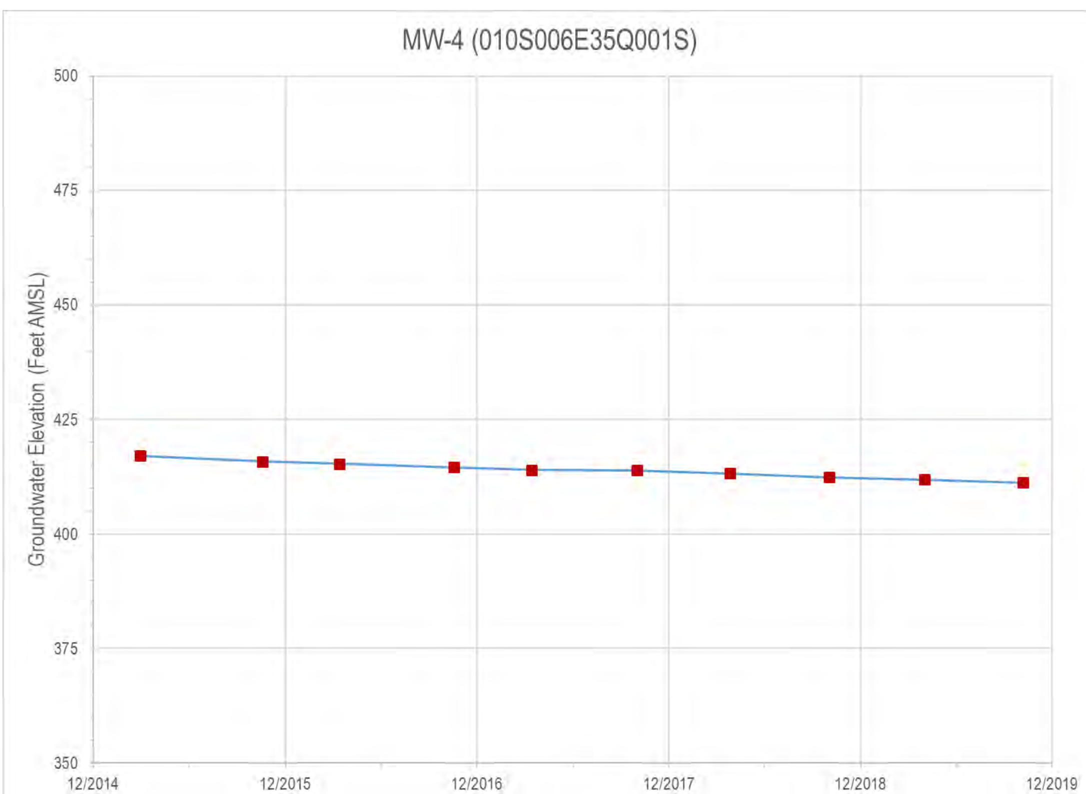

JC Well (011S006E24Q001S)
Groundwater Elevation (Feet AMSL)
500
475
450
425
400
375
350
12/2014
12/2015
12/2016
12/2017
12/2018
12/2019


La Casa (011S006E23E001S)
Groundwater Elevation (Feet AMSL)
500
475
450
425
400
375
350
12/2014
12/2015
12/2016
12/2017
12/2018
12/2019

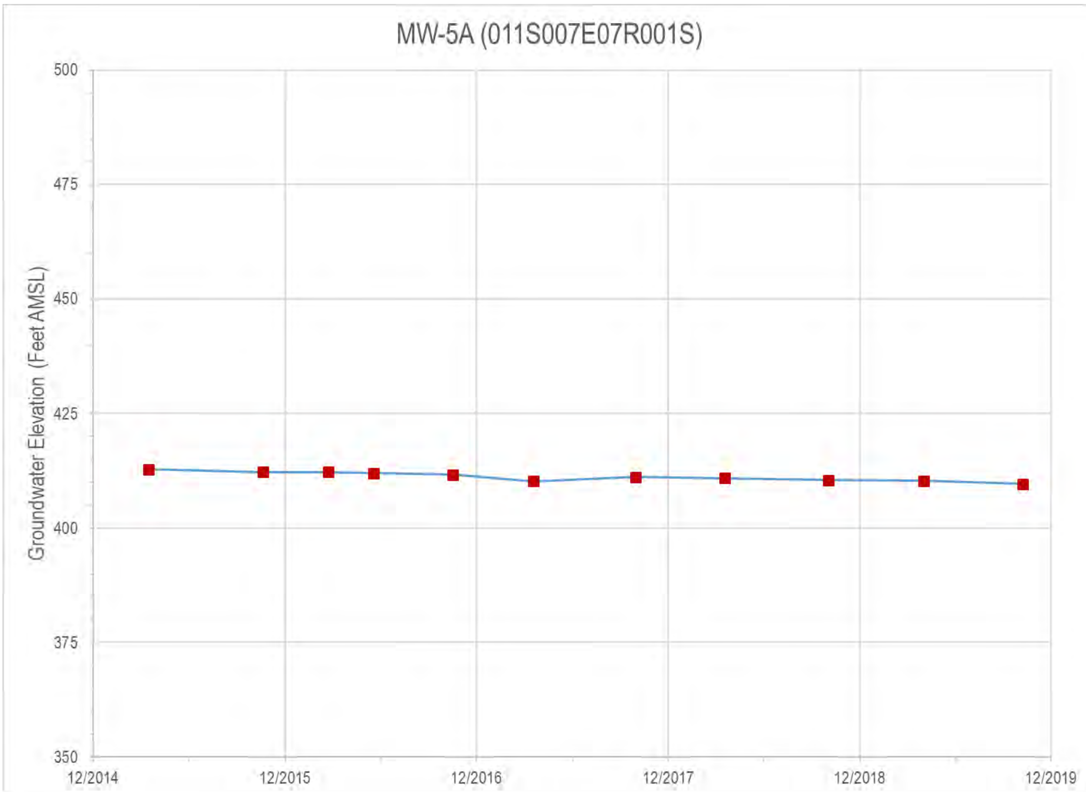

MW-1 (010S006E21A002S)
Groundwater Elevation (Feet AMSL)
500
475
450
425
400
375
350
12/2014
12/2015
12/2016
12/2017
12/2018
12/2019

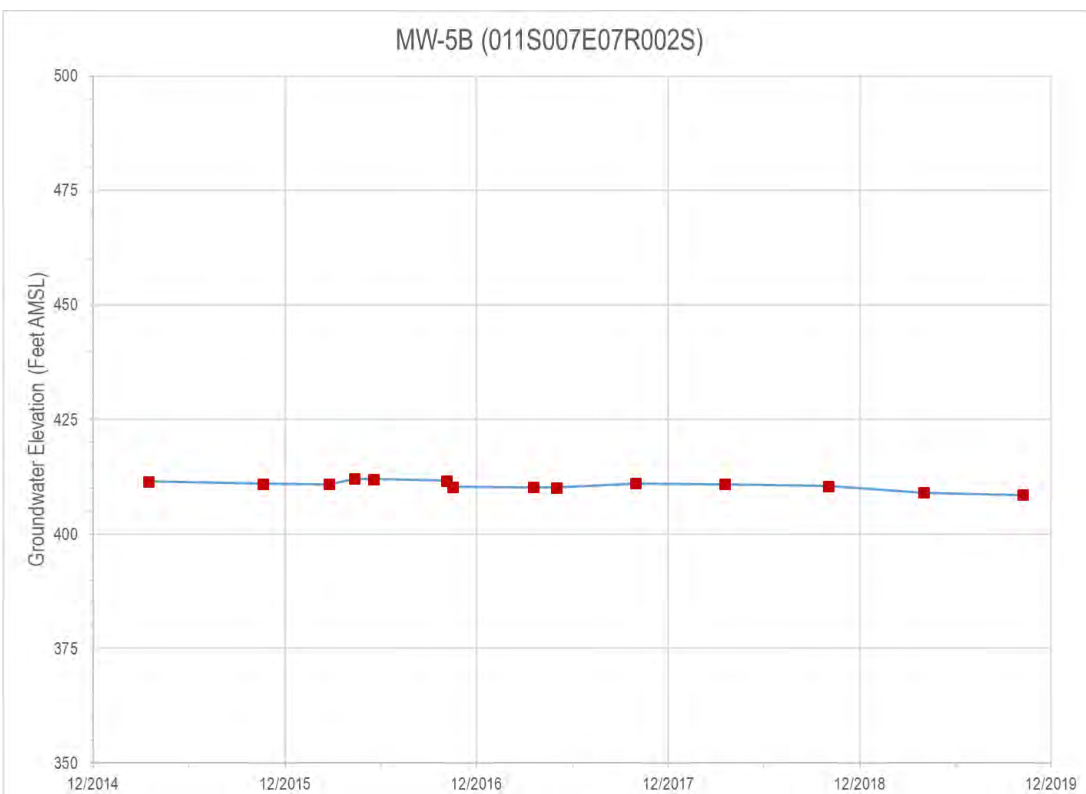


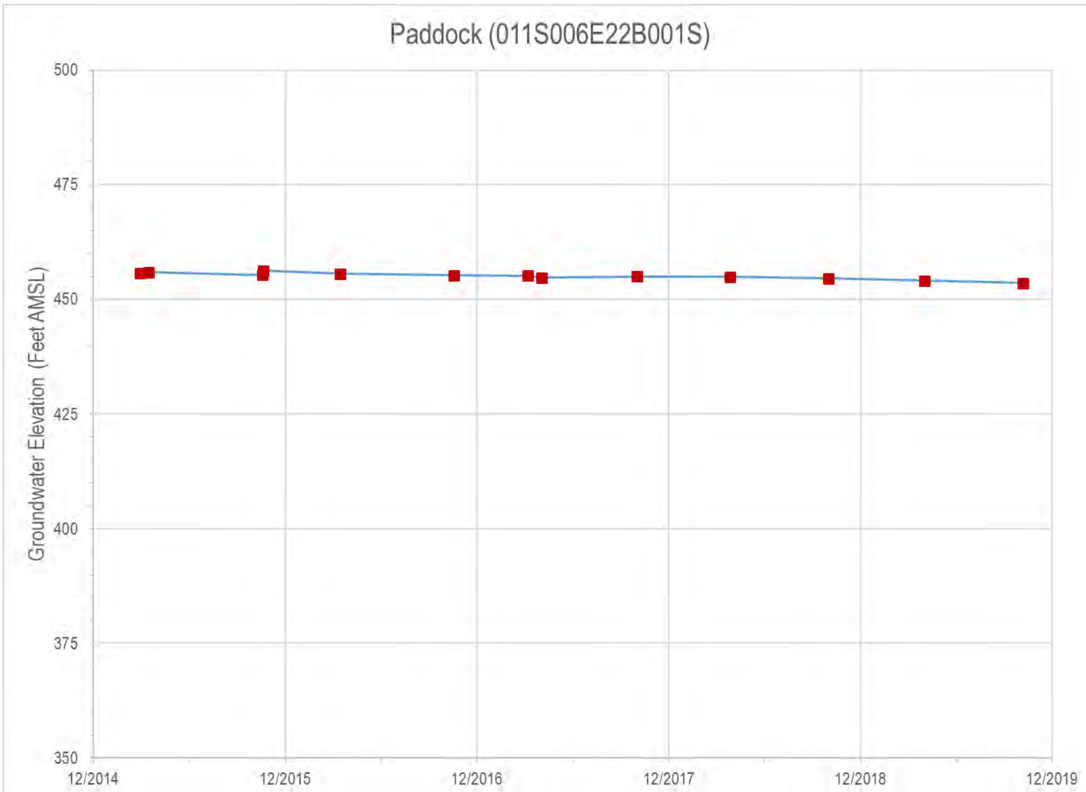
MW-3 (011S006E23J002S)
Groundwater Elevation (Feet AMSL)
500
475
450
425
400
375
350
12/2014
12/2015
12/2016
12/2017
12/2018
12/2019

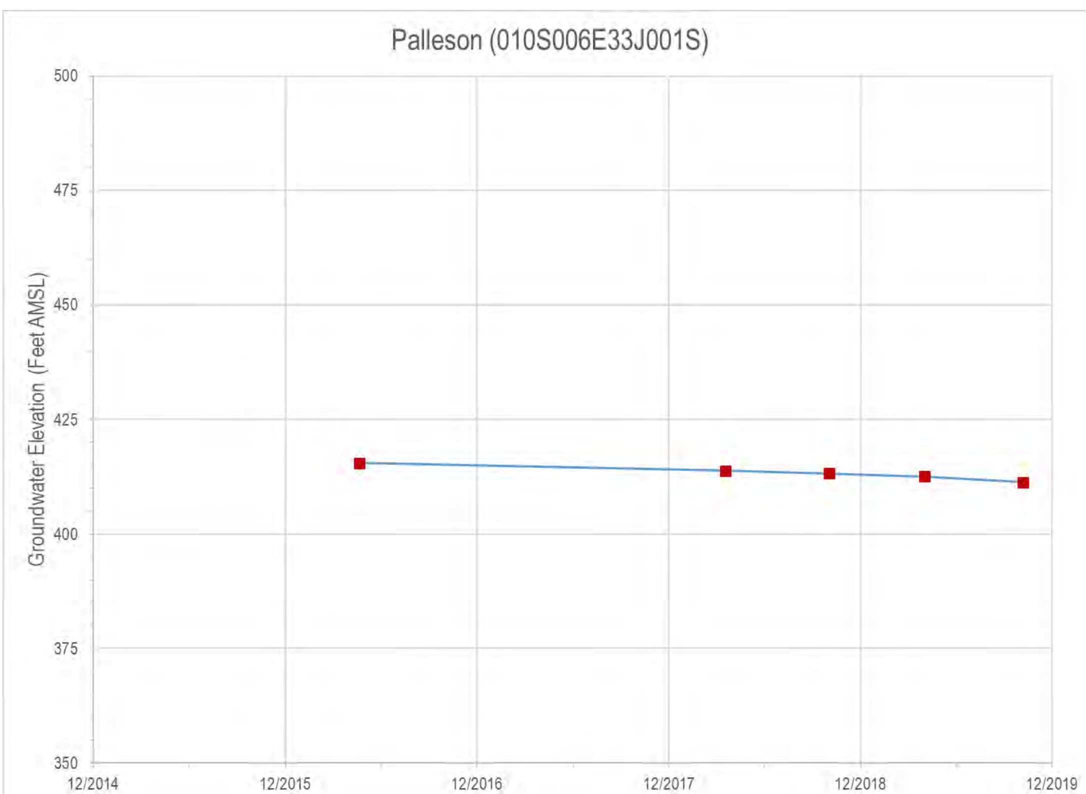


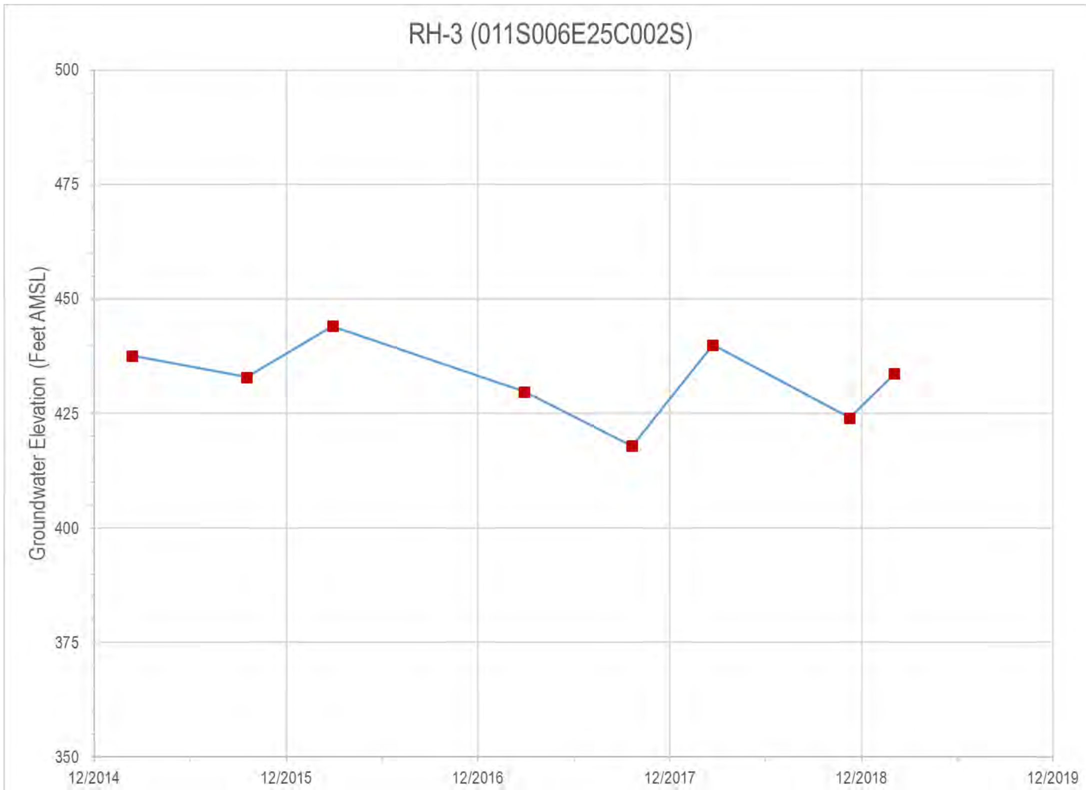
MW-4 (010S006E35Q001S)
Groundwater Elevation (Feet AMSL)
500
475
450
425
400
375
350
12/2014
12/2015
12/2016
12/2017
12/2018
12/2019


MW-5A (011S007E07R001S)
Groundwater Elevation (Feet AMSL)
500
475
450
425
400
375
350
12/2014
12/2015
12/2016
12/2017
12/2018
12/2019

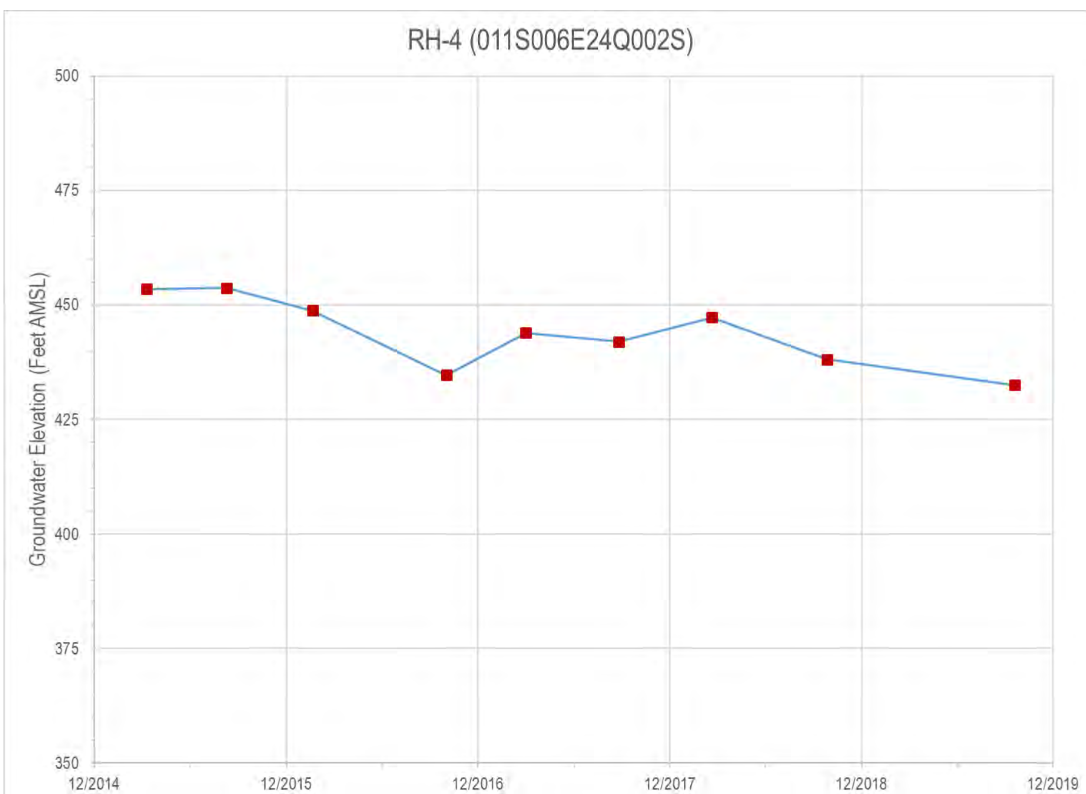

MW-5B (011S007E07R002S)
Groundwater Elevation (Feet AMSL)
500
475
450
425
400
375
350
12/2014
12/2015
12/2016
12/2017
12/2018
12/2019


Paddock (011S006E22B001S)
Groundwater Elevation (Feet AMSL)
500
475
450
425
400
375
350
12/2014
12/2015
12/2016
12/2017
12/2018
12/2019

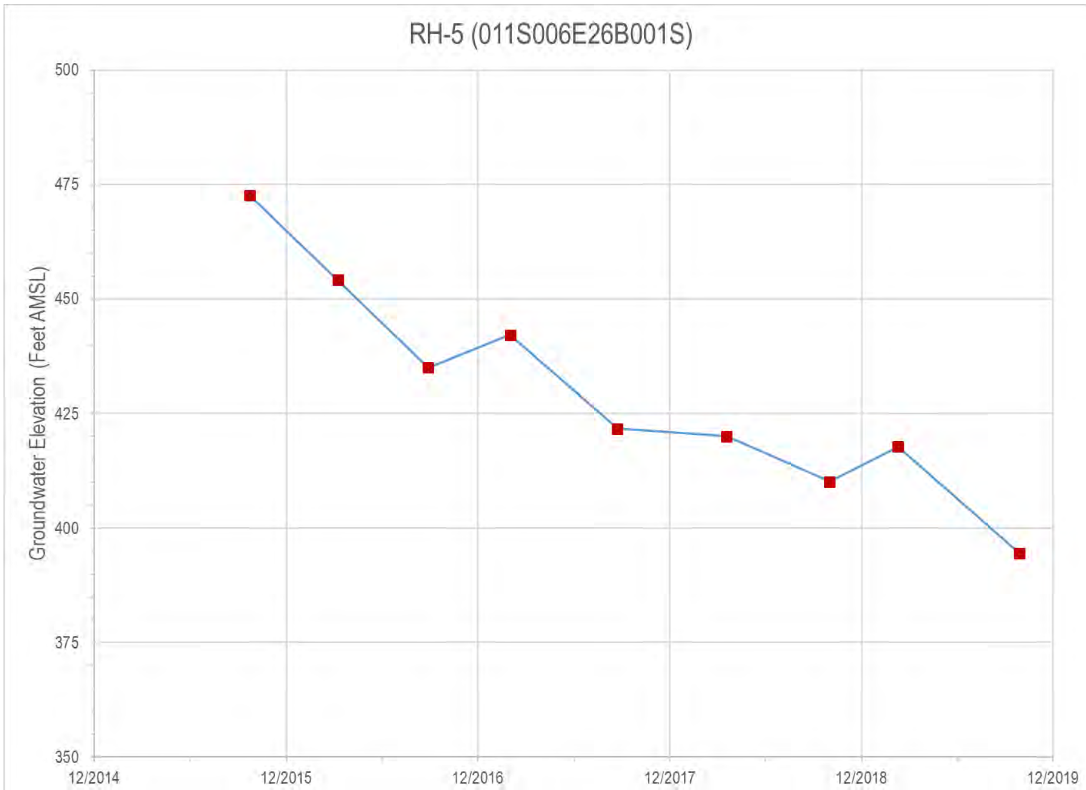

Palleson (010S006E33J001S)
Groundwater Elevation (Feet AMSL)
500
475
450
425
400
375
350
12/2014
12/2015
12/2016
12/2017
12/2018
12/2019

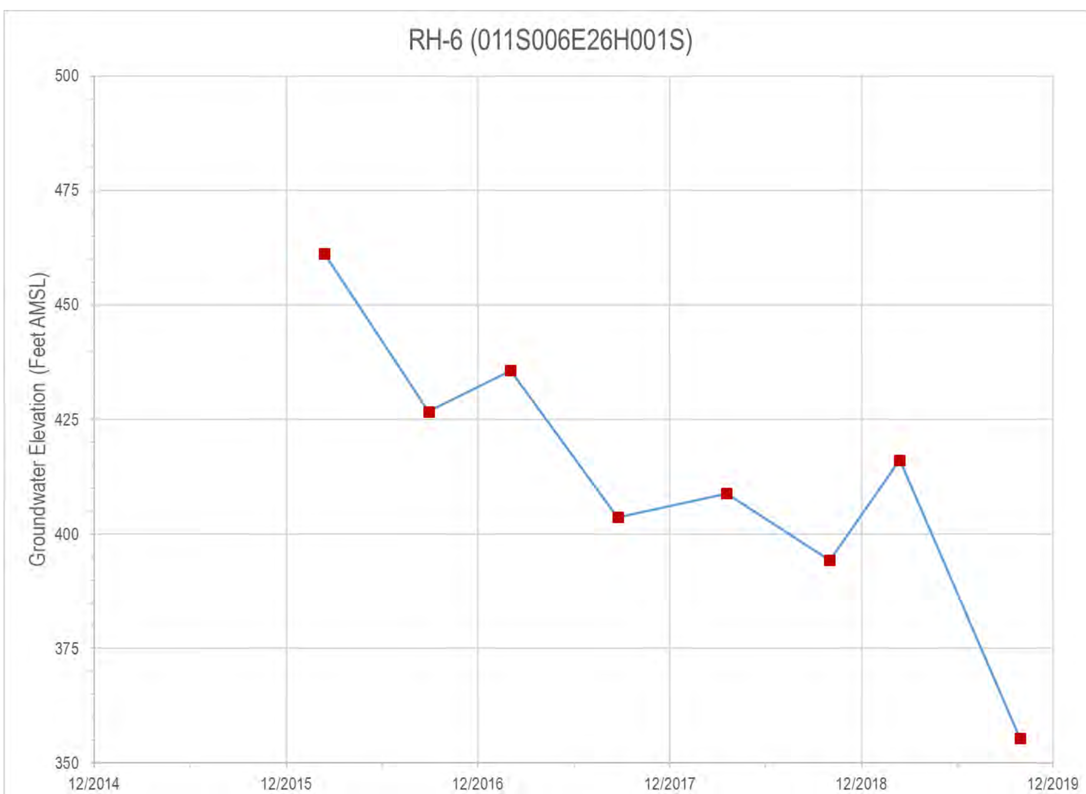


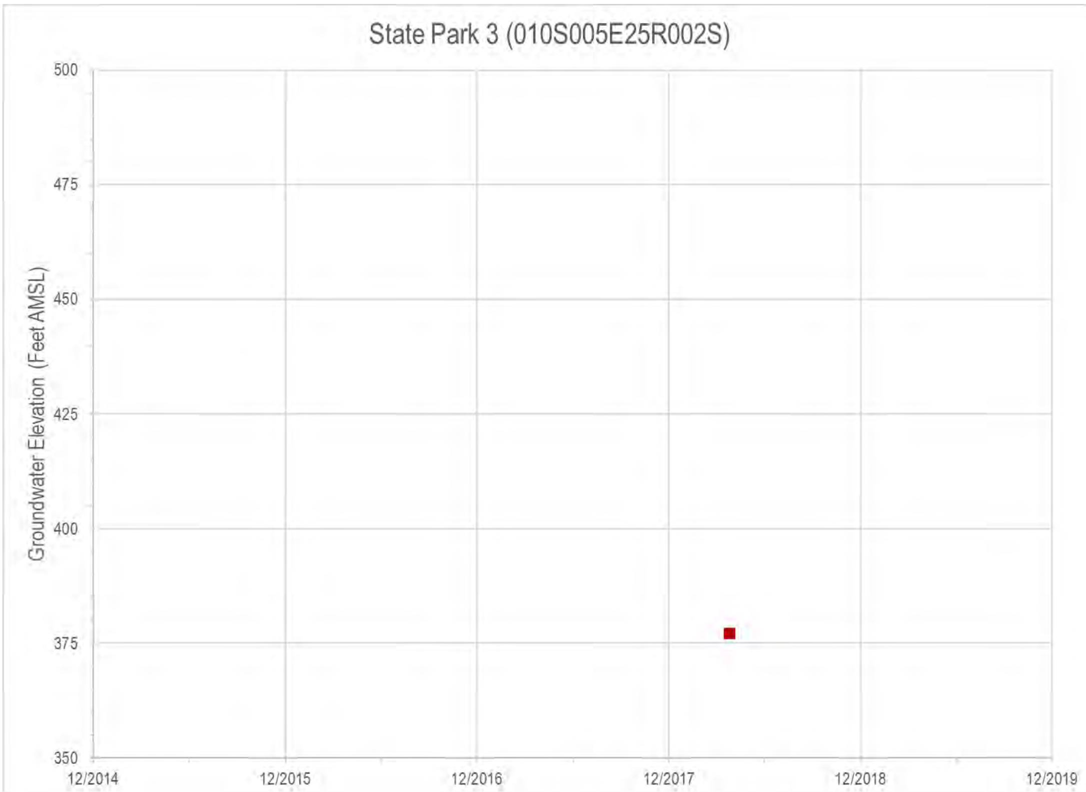
RH-3 (011S006E25C002S)
Groundwater Elevation (Feet AMSL)
500
475
450
425
400
375
350
12/2014
12/2015
12/2016
12/2017
12/2018
12/2019



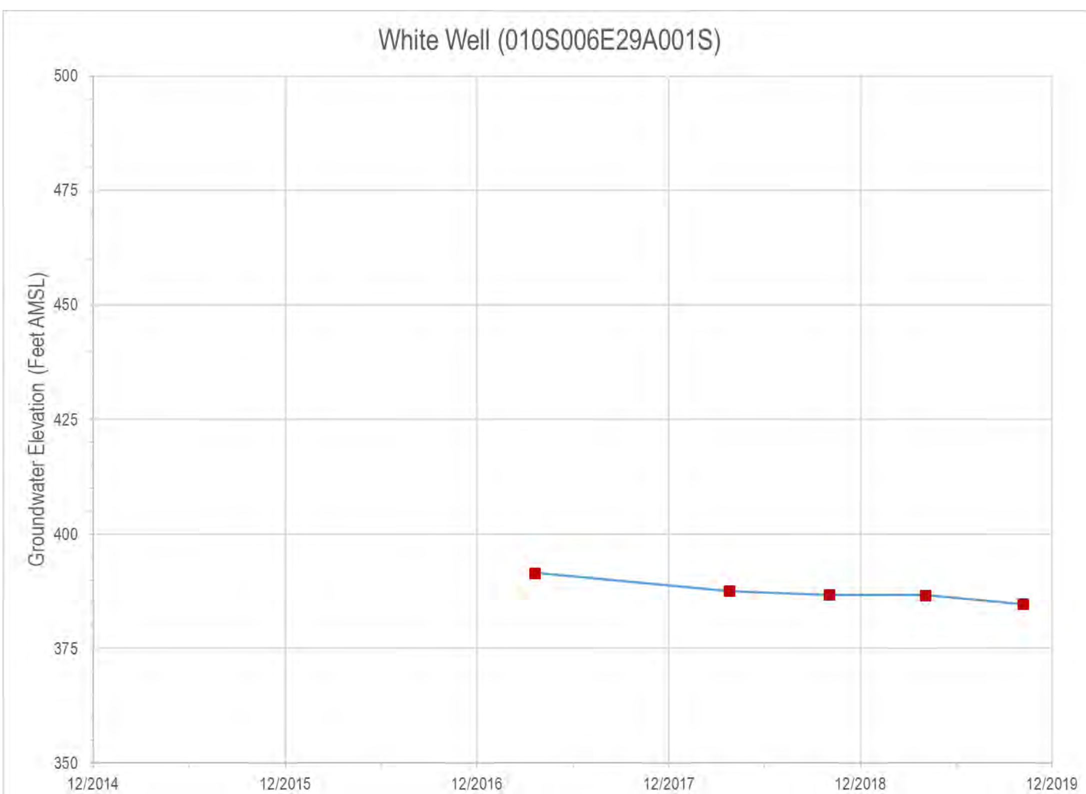
RH-4 (011S006E24Q002S)
Groundwater Elevation (Feet AMSL)
500
475
450
425
400
375
350
12/2014
12/2015
12/2016
12/2017
12/2018
12/2019


RH-5 (011S006E26B001S)
Groundwater Elevation (Feet AMSL)
500
475
450
425
400
375
350
12/2014
12/2015
12/2016
12/2017
12/2018
12/2019

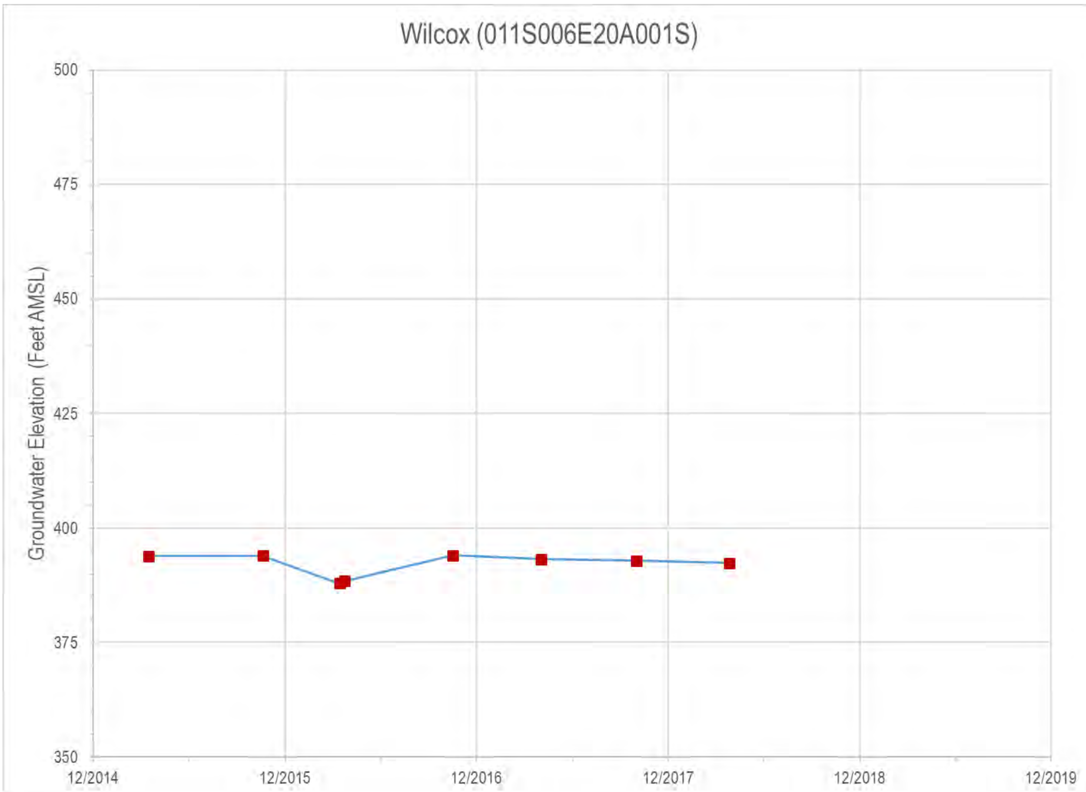

RH-6 (011S006E26H001S)
Groundwater Elevation (Feet AMSL)
500
475
450
425
400
375
350
12/2014
12/2015
12/2016
12/2017
12/2018
12/2019

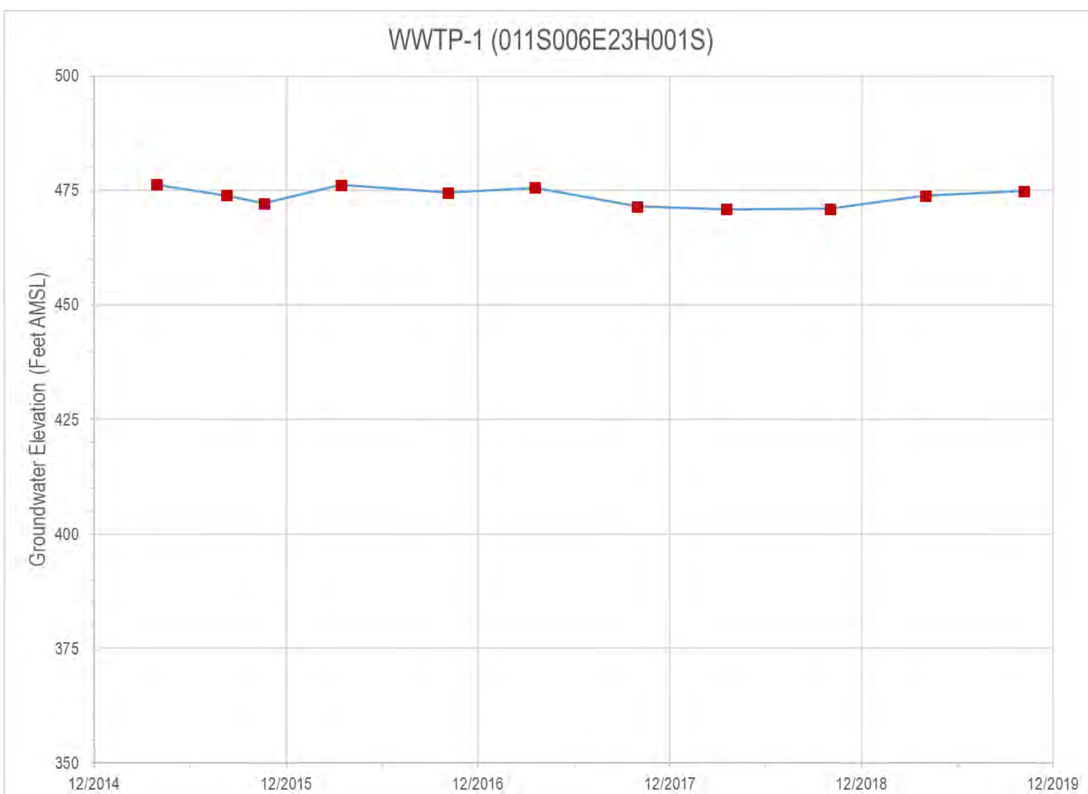


State Park 3 (010S005E25R002S)
Groundwater Elevation (Feet AMSL)
500
475
450
425
400
375
350
12/2014
12/2015
12/2016
12/2017
12/2018
12/2019



White Well (010S006E29A001S)
Groundwater Elevation (Feet AMSL)
500
475
450
425
400
375
350
12/2014
12/2015
12/2016
12/2017
12/2018
12/2019


Wilcox (011S006E20A001S)
Groundwater Elevation (Feet AMSL)
500
475
450
425
400
375
350
12/2014
12/2015
12/2016
12/2017
12/2018
12/2019


WWTP-1 (011S006E23H001S)
Groundwater Elevation (Feet AMSL)
500
475
450
425
400
375
350
12/2014
12/2015
12/2016
12/2017
12/2018
12/2019