2. Plan Area

This GSP covers the Anderson Subbasin, a subbasin of the Redding Area Groundwater Basin (RAGB), as shown on Figure 2-1. This subbasin is under the jurisdiction of the EAGSA. The Anderson Subbasin lies in southwestern Shasta County and includes the northern end of the Sacramento River Valley. The subbasin covers an area of 98,700 acres, or 154 square miles (DWR, 2004).

The Sacramento River drains the subbasin, flowing southward down the Sacramento River Valley. The cities of Redding and Anderson, the towns of Centerville and Cottonwood, and the community of Happy Valley overlie the Anderson Subbasin. U.S. Interstate 5 runs north-south through the southeastern portion of the subbasin. State Highway 44 crosses the northern portion of the subbasin running east-west, and State Highway 273 runs along the eastern portion of the subbasin running north-south before merging with Interstate 5 in Anderson. Larger streams and major roads are also shown on Figure 2-1.

2.1 Adjudicated Areas, Other GSAs, and Alternatives

An adjudicated basin is one in which, through legal action, the basin has certain requirements placed on it by the court, and those requirements are normally administered by a watermaster who is appointed by the court. The Anderson Subbasin is not adjudicated.

The EAGSA overlies the entirety of the subbasin and is the only GSA overlying it. No alternative plans were submitted within the subbasin.

2.2 Jurisdictional Areas

In accordance with the SGMA Regulations § 354.8 (a)(3), the following subsections describe the federal, state, tribal, and local agencies with water management responsibilities in the Anderson Subbasin.

2.2.1 Federal Jurisdiction

Areas under federal jurisdiction are shown on Figure 2-2. The U.S. Bureau of Land Management (BLM) manages most of the area along Clear Creek within the Anderson Subbasin, an area north of Olney Creek, an area along the western boundary of the subbasin, and an area along the Sacramento River in the southeastern portion of the subbasin.

2.2.2 State Jurisdiction

Areas under state jurisdiction are shown on Figure 2-2. The California Department of Fish and Wildlife manages the Mouth of Cottonwood Creek Wildlife Areas, the Anderson River Park and Bonnyview Road Fishing Accesses, and an area along Clear Creek.

2.2.3 Tribal Lands

The subbasin includes the Redding Rancheria tribal lands.[1] The land that comprises the Redding Rancheria was originally purchased by the Bureau of Indian Affairs (BIA) in 1922, but in 1959, the Redding Rancheria was terminated by an act of Congress. In 1983, however, it was ruled that the failure of the BIA to comply with its obligations under the California Rancheria Act invalidated the termination, and the Redding Rancheria was restored as a federally recognized tribe. Redding Rancheria lies within the jurisdiction of COR Water Utility, and in 2000, the two entities entered into an agreement to incorporate some of the COR municipal services in the Redding Rancheria. COR installed a master meter at the Redding Rancheria property line. Excluding water required to maintain sufficient flow for fire

[1] https://www.redding-rancheria.com/tribal-history/

protection, the agreement specifies a maximum monthly volume of 7,800 hundred cubic feet monthly and a maximum annual volume of 39,350 hundred cubic feet (Redding Rancheria, 2001).

2.2.4 County Jurisdiction

The entire subbasin lies within Shasta County and is subject to the land and water management authorities granted to counties. Additionally, Shasta County Department of Public Works manages one sewer district within the Anderson Subbasin, County Service Area (CSA) #17 – Cottonwood Sewage Disposal System, shown on Figure 2-3.

2.2.5 City and Local Jurisdiction

The COR and COA Water and Wastewater Utilities provide water and sewage collection services within their respective jurisdictional areas, which are shown on Figure 2-3. ACID, CCCSD, Cottonwood Water District, Centerville Community Services District (CSD), and Igo-Ono CSD provide water services within their jurisdictional boundaries.

2.3 Land Use

Shasta County, COR, and COA maintain Geographic Information System (GIS) zoning databases, which store land use zoning designations throughout the unincorporated portions of the County and the cities, respectively. These databases were used to develop land use maps for the Anderson Subbasin, shown on Figure 2-4 and summarized by major category in Table 2-1 (Shasta County, 2020, COR, 2020a, and COA, 2020). The zoning codes included in the County and COR GIS datasets were cross-referenced with those listed in the COR and Shasta County General Ordinances (Municode, 2020a, 2020b) and were generalized into the categories shown on Figure 2-4 and listed in Table 2-1. The COA zoning dataset contained generalized categories. The data presented represent the use for which a given area is zoned and might not be consistent with actual land use. However, the data presented effectively depict general land use patterns.

Table 2-1. Anderson Subbasin Land Zoning Summary

Category	Area in Anderson Subbasin (acres)	Percentage of Anderson Subbasin Area (%)
Agriculture	40,725	41.8
Commercial	2,518	2.6
Floodway	694	0.7
Habitat Protection/Open Space	2,591	2.7
Industrial	4,807	4.9
Mineral Resource	294	0.3
Planned Development	3,820	3.9
Public/Institutional	2,499	2.6
Rural Residential	14,393	14.8
Urban Residential	10,879	11.2
Unclassified	14,164	14.5
Total	**97,384**	

The most significant land use type in the subbasin is agriculture—almost 42 percent of the subbasin—which is dominated by pasture and orchards. Residential land use is also significant at approximately 26 percent. Based on the 2016 agricultural land use mapping, irrigated agriculture (approximately 8,100 acres) comprised the following amounts: approximately 65 percent pasture, 22 percent orchard, 6 percent managed wetlands, 5 percent miscellaneous truck crops, and the remaining 2 percent idle (CNRA, 2020a).

2.3.1 Water Source Types

According to the SGMA regulations (§ 351. Definitions), "water source type represents the source from which water is derived to meet the applied beneficial uses, including groundwater, recycled water, reused water, and surface-water sources identified as CVP, the State Water Project, the Colorado River Project, local supplies, and local imported supplies." The Anderson Subbasin has two water source types: surface water and groundwater. Surface water diverted from the Sacramento River or from Whiskeytown Lake under Central Valley Project (CVP) contracts with Bureau of Reclamation (Reclamation) is the primary water source for all water sectors for most purveyors in the Anderson Subbasin. The primary water source for all water use sectors for COA Water Utility and Cottonwood Water District is groundwater (Figure 2-5). Throughout the subbasin, groundwater is primarily used for rural residential areas, small community systems, and small commercial operations, such as golf courses and schools. However, during times of drought, water districts in the subbasin become more reliant on groundwater; and as a result, it is used more broadly. The jurisdictional areas shown on Figure 2-5 were sourced directly from the responsible entities (ACID, 2015; COA, 2019; COR, 2020a; and Shasta County, 2019a).

Locations served by COR Water Utility receive a combination of CVP surface water and groundwater. CVP surface water is diverted from either the Spring Creek Conduit dropping from Whiskeytown Reservoir to Keswick Reservoir or from the Sacramento River at Pump Station 1. The surface-water supply is governed under two separate contracts with Reclamation and ACID (COR, 2015). Groundwater is used to augment the COR surface-water supply and is sourced from the Cascade and Enterprise well fields, consisting of 5 and 12 groundwater wells, respectively. Between 2000 and 2018, surface water represented approximately 65 percent of the COR water supply (an annual average of approximately 18,100 acre-feet [AF]), whereas approximately 35 percent of the COR water supply was sourced from groundwater (an annual average of approximately 10,100 AF) (COR, 2019a). The total COR water supply, as well as the water supplies of ACID, Centerville CSD, and Igo-Ono CSD discussed below, are not distributed solely to areas overlying the Anderson Subbasin, rather to the jurisdictional areas presented on Figure 2-5.

Locations served by COA Water Utility solely receive groundwater. Groundwater is pumped from ten groundwater wells—eight wells in the main city pressure zone and two wells in the Wooded Acres pressure zone—capable of producing approximately 9.6 million gallons per day (MGD) and 1.5 MGD, respectively (COA, 2017). Between 2000 and 2018, COA pumped an annual average of approximately 2,400 AF from its wellfield (COA, 2019).

ACID is contracted with Reclamation to receive a maximum of 125,000 AF of surface water diverted from the Sacramento River. The ACID base supply is 121,000 AF with an additional 4,000 of the CVP supply available for transfers to other districts. Between 2000 and 2018, total annual diversions averaged approximately 102,000 AF. Additionally, ACID owns two groundwater production wells, located in the Anderson Subbasin, that are used to supplement surface-water supply during years when water transfers occur. Transfers of up to 3,700 AF occurred in 2013, 2014, and 2015. During these years, groundwater was pumped in lieu of diverting an equivalent volume of surface water.

As previously discussed, Cottonwood Water District water source is solely groundwater, pumped from their five production wells in the southeast portion of the subbasin. These wells range in capacity from 154 gallons per minute (gpm) to 831 gpm (Shasta County, 2019b). Water is temporarily stored in a 0.1-million gallon (MG) tank along Vantage Drive and a 1-MG tank along Rhonda Road. Between 2006

and 2017, the annual average volume of water pumped by Cottonwood Water District was approximately 940 AF (SWRCB, 2019).

CCCSD's primary water source is surface water diverted through a contract with Reclamation for 15,300 AF of CVP water. This water is diverted from the Whiskeytown Dam, near which CCCSD has a treatment facility. After being treated, this water flows south to CCCSD through the Muletown Conduit. Reported annual diversion volumes between 2000 and 2018 averaged approximately 4,850 AF (CCCSD, 2019). CCCSD owns three groundwater production wells; however, they are reserved as a contingency for supply and have only been operated intermittently. Annual production during recent drought conditions (2014–2016) ranged from 150 to 425 AF.

The sole water source for Centerville CSD is CVP surface water diverted from Whiskeytown Reservoir at the Clair A. Hill Whiskeytown Dam. Centerville CSD shares approximately 25 percent of the capacity of the CCCSD water treatment plant. Between 2000 and 2018, the average annual volume of water diverted to Centerville CSD was approximately 1,650 AF (Centerville CSD, 2019).

Igo-Ono CSD diverts water from Rainbow Lake and North Fork Cottonwood Creek. Misselbeck Dam impounds the flow of North Fork Cottonwood Creek to form Rainbow Lake, and less than a mile downstream of Misselbeck Dam, Hoover Dam diverts water to the Happy Valley Irrigation Canal through Hoover Canal. Igo-Ono CSD holds a permit from the State Water Resources Control Board (SWRCB) to continually divert 16.8 cubic feet per second (cfs) from North Fork Cottonwood during the irrigation season (March 15 to November 1), subject to restriction during periods of shortage. Water is conveyed to customers through a system of canals and ditches, and customers are responsible for treating water for domestic use (Shasta County, 2014). Between 2008 and 2018, average annual volume of water diverted from Rainbow Lake and/or North Fork Cottonwood Creek was approximately 4,000 AF (SWRCB, 2020d).

2.3.2 Water Use Sectors

As defined in § 351 (Definitions) of the SGMA regulations, "'water use sector' refers to categories of water demand based on the general land uses to which the water is applied, including urban, industrial, agricultural, managed wetlands, managed recharge, and native vegetation." Water use sector data presented in this section represent water deliveries averaged over the period 2000–2018, or the portion of this time period for which data were available/provided. Data used in the water sector analyses were provided by the purveyors or SWRCB (COR, 2019a; COA, 2019; CCCSD, 2019; and SWRCB, 2019). Discussions of COR, ACID, and Centerville deliveries represent their entire service areas respectively, rather than deliveries only to areas overlying the Anderson Subbasin. Further evaluation of current and projected water use by sector will be provided in Chapter 4, Water Budgets. Water use sectors include the following:

- **Urban**. Urban water use is assigned to non-agricultural water uses in the cities and census-designated places (i.e., towns). For the purposes of this analysis, domestic use outside of towns is considered urban use in the rural residential category. COR Water Utility averages 25,000 AF of urban water use annually (single-family, multiple-family, commercial/institutional, and other/unknown uses), nearly 98 percent of its total deliveries. COA averages 1,650 AF of urban water use annually (residential), 78 percent of its total deliveries. The water sector associated with the remaining 22 percent (approximately 460 AF) of the deliveries is unavailable, but is assumed to be commercial/industrial/institutional. CCCSD averages approximately 1,840 AF of urban water use annually, 41 percent of its total deliveries. Between 2014 and 2017, Cottonwood Water District averaged approximately 760 AF of urban water use annually (single-family, multiple-family, and commercial/institutional uses), 98 percent of its total deliveries. Centerville CSD services mostly residential customers, and nearly 100 percent of its deliveries are considered urban, averaging approximately 1,400 AF annually between 2013 and 2018.
- **Industrial**. There is limited industrial use in the subbasin. COR Water Utility averages 500 AF of industrial water use annually, 2 percent of its total deliveries. Cottonwood Water District averages approximately 16 AF of industrial water use annually, 2 percent of its total deliveries. Centerville CSD averages approximately 5.1 AF of industrial deliveries annually, 0.4 percent of its total deliveries.

- **Agricultural**. For the purposes of this analysis, the agricultural water use sector is assumed to cover outdoor water use including irrigated agriculture and landscape irrigation. COR Water Utility averages approximately 30 AF of agricultural water delivery annually (irrigation), which is less than 1 percent of its total deliveries. ACID supplies water solely for agricultural use, representing 100 percent of the district's deliveries. CCCSD averages approximately 2,630 AF of agricultural water use annually, 59 percent of its total deliveries. Cottonwood Water District and Centerville CSD supply approximately 7.5 and 4.5 AF of water on average annually, respectively. This represents less than 1 percent of the deliveries for these districts.
- **Managed wetlands**. DWR land use records indicate that there are approximately 480 acres of managed wetlands in the subbasin (CNRA, 2020a). These areas are presented on Figure 2-4. Major water purveyors within the subbasin have not reported deliveries to support managed wetlands within the Anderson Subbasin.
- **Managed recharge**. There is no managed recharge in the subbasin. Although the temporary clean-water holding reservoirs and some wastewater ponds are unlined, recharge from these sources is considered to be negligible and has not been quantified. The ACID distribution system consists of a series of unlined canals and laterals that contribute to recharge of the underlying groundwater system. Previous work has estimated a volume of 44,000 AF/yr (30,000 AF/yr from the main canal and 14,000 AF/yr from the laterals) (CH2M HILL, 2001).
- **Native vegetation**. Most of the subbasin comprises commercial, industrial, agricultural, or residential land uses, while only approximately 2.7 percent is identified as "Habitat Protection/Open Space." Consumptive use by native vegetation will be refined through numerical modeling being conducted as part of this GSP.

2.4 Existing Well Types, Numbers, and Density

Well density data were obtained from the database of wells that DWR specifically developed for use in GSPs (CNRA, 2020b). The well completion dataset represents counts of logs filed with DWR. Upon review of the database, it became apparent that some of the logs must have been input to the DWR database more than once, resulting in an over-estimate of well density. Furthermore, some of the wells included in the DWR database might have been abandoned or otherwise destroyed; therefore, the counts described herein might not be reflective of existing infrastructure. However, the DWR database is considered the best available well log information repository.

DWR's Well Completion Report Map Application classifies wells as domestic, production, and public (municipal). Figures 2-6, 2-7, and 2-8 show the density of domestic, public, and production wells, respectively, in the subbasin. Well counts in the subbasin are summarized in Table 2-2. Over 90 percent of the wells in the DWR dataset are domestic wells. Many of the domestic wells identified by DWR may be classified as de minimis extractors, defined as pumping less than 2 AF per year (AF/yr) for domestic purposes. Production wells account for most of the remaining wells, approximately 5.3 percent. The majority of wells classified as production wells are assumed to be used for agricultural irrigation, with some production wells used for industrial purposes. Approximately 1.4 percent of wells in the subbasin are classified as public supply wells. As previously discussed, public (municipal) wells are pumped intermittently to augment surface-water supplies.

Table 2-2. Anderson Subbasin Well Density

Category	Number of Wells	Percentage of Total
Domestic	3,812	93.3
Public Supply	59	1.4
Production	216	5.3
Total	**4,087**	

2.5 Existing Groundwater-level Monitoring Programs

2.5.1 California Statewide Groundwater Elevation Monitoring Program

The California Statewide Groundwater Elevation Monitoring Program (CASGEM) was instituted as a result of the passing of SB X7-6 in 2009. CASGEM is overseen by DWR. CASGEM is intended to facilitate collaboration between state and local entities in support of the collective goal of more sustainably managing groundwater resources, as required under SGMA (DWR, 2019a). CASGEM requires the collection and analysis of groundwater data across the state and requires the collected information be made publicly available. Monitoring and reporting is conducted by local monitoring parties under groundwater monitoring and management programs, as well as DWR. There are nine locations with 20 CASGEM wells in the Anderson Subbasin; they are shown on Figure 2-9. Shasta County is the CASGEM monitoring entity for the Anderson Subbasin. Shasta County gauges well 30N/06W-03M01, whereas DWR gauges the remaining 19 CASGEM wells.

2.5.2 DWR Continuous Groundwater Elevation Monitoring

The DWR continuously collects groundwater elevation data from a network of 20 wells within the Anderson Subbasin, as shown on Figure 2-9. The period of record varies by well location, but monitoring frequency is generally monthly (DWR, 2019b). Eighteen of these wells are also monitored under the CASGEM program. Two of the wells (30N/04W-10H02 and 30N/04W-10H03) are no longer monitored and have been replaced by continuous gauging at replacement wells 30N/04W-10H04 and 30N/04W-10H05.

2.5.3 DWR Periodic Groundwater Elevation Monitoring

DWR has periodically collected groundwater elevation data from a network of up to 20 wells within the Anderson Subbasin, as shown on Figure 2-9. The period of record varies by well location as does the monitoring frequency. Wells have typically been accessed biannually, but as frequently as quarterly (DWR, 2019b).

2.5.4 U.S. Geological Survey Groundwater Elevation Monitoring

As shown on Figure 2-9, U.S. Geological Survey (USGS) has periodically gauged six wells within the Anderson Subbasin (USGS, 2019a). USGS has recently begun monitoring well 30N/06W-35L01, which has historically been monitored by DWR. USGS has monitored each well location once, with measurement dates ranging between January 2018 and April 2019.

2.6 Groundwater Extraction Monitoring Programs

Purveyors in California that supply drinking water to residents (public water systems) are required to submit annual reports regarding water supply and delivery volumes to the SWRCB Division of Drinking Water (DDW) (Large Water System or Small Water System Reports). The DDW defines a public water system as “a system for the provision of water for human consumption through pipes or other constructed conveyances that has 15 or more service connections or regularly serves at least 25 individuals daily at least 60 days out of the year.”[2] Groundwater-related information reported to the DDW includes the number and location of groundwater production wells and the volume of groundwater pumped from each well per month. COR, COA, Cottonwood Water District, and CCCSD monitor groundwater production from their wellfields for internal use as well as for reporting purposes.

[2] State Water Resources Control Board, Division of Drinking Water Public Water System Legal Definitions, https://www.waterboards.ca.gov/drinking_water/certlic/drinkingwater/publicwatersystems.html

2.7 Groundwater Quality Monitoring Programs

2.7.1 State Water Resources Control Board Division of Drinking Water

The DDW maintains groundwater quality data records for both active and inactive public drinking water wells (systems with at least 15 connections or serving at least 25 people per day) (SWRCB, 2020b). Groundwater quality data reported by purveyors and maintained by DDW generally reflect untreated groundwater and might not be representative of drinking water supplied to customers. The DDW groundwater quality monitoring program in Anderson Subbasin includes 95 groundwater wells sampled between 1951 and 2019; however, the period of record and sampling frequency varies by well. Figure 2-10 presents the location of wells sampled between 2000 and 2019 (80 wells).

2.7.2 California Department of Water Resources

As part of DWR's Groundwater Ambient Monitoring and Assessment Program (GAMA), the department periodically samples wells to evaluate groundwater quality relative to a basin or subbasin's beneficial uses (SWRCB, 2020b). Figure 2-10 presents the location of 14 wells sampled by DWR between 2000 and 2019.

2.7.3 U.S. Geological Survey

USGS has periodically collected groundwater quality data under the GAMA program (SWRCB, 2020b). Figure 2-10 presents the location of 32 wells sampled between 2000 and 2019.

2.7.4 Environmental Compliance Monitoring

As discussed further in Chapter 3, there are multiple sites at which groundwater quality monitoring is conducted as part of investigation or compliance monitoring programs through the Regional Water Quality Control Board (RWQCB) and/or California Department of Toxic Substances Control (DTSC). Figure 2-10 presents the location of 295 wells sampled between 2000 and 2019 for environmental compliance purposes (SWRCB, 2020b).

2.7.5 Other Groundwater Quality Monitoring

In addition to the aforementioned groundwater quality monitoring programs, municipal and community water purveyors routinely collect water quality samples for compliance monitoring and reporting. Below are summaries of water purveyors and their monitoring programs.

The COA and COR Public Works Departments, Cottonwood Water District, CCCSD, and Centerville CSD each provide an annual Consumer Confidence Report to their customers (COA, 2018; COR, 2020b; Cottonwood Water District, 2020; CCCSD, 2020; Centerville CSD, 2020). Consumer Confidence Reports are designed to provide their customers with summary information on the purveyor's water supply sources, the levels of any detected contaminants, and compliance with drinking water regulations.

2.8 Surface Water Monitoring Programs

2.8.1 U.S. Geological Survey Stream Gauges

USGS currently operates two streamflow gauges in the Anderson Subbasin (Figure 2-11; USGS, 2019a):

- Clear Creek near Igo (USGS Site #11372000)
- Cottonwood Creek near Cottonwood (USGS Site #11376000)

2.8.2 Sacramento Watershed Coordinated Monitoring Program

The Sacramento Watershed Coordinated Monitoring Program (SWCMP) is a coordinated effort between DWR and Central Valley RWQCB to monitor ambient surface-water quality at locations on the Sacramento River and at the lower reaches of tributaries to the Sacramento River (SRWP, 2020). The locations extend from north of Lake Shasta to as far south as Verona, California, and include two locations in the Anderson Subbasin: Clear Creek near Redding and Cottonwood Creek near Cottonwood. The program was initiated in November 2008 and has since engaged in quarterly sampling for several chemical, physical, and biological parameters and annual monitoring of water column and sediment toxicity.

2.9 Incorporating Existing Monitoring Programs into the GSP

Incorporation of existing monitoring programs into the GSP is discussed in Chapter 5, Sustainable Management Criteria.

2.10 Limits to Operational Flexibility

The existing monitoring programs are not anticipated to limit the operational flexibility of this GSP.

2.11 Existing Management Plans

2.11.1 Northern Sacramento Valley Integrated Regional Water Management Plan

The Sacramento Valley Integrated Regional Water Management Plan (IRWMP) was published in December 2006 as part of the regional planning process consistent with DWR's Bulletin 160 (California Water Plan), the SWRCB's Strategic Plan, its Watershed Management Initiative, and the basin planning process, and other authorities, such as the Groundwater Management Act of 1992 (AB 3030) and SB 1938 (NCWA, 2006).

In 2014, six counties in the northern Sacramento Valley (i.e., Butte, Colusa, Glenn, Shasta, Sutter, and Tehama) published the Northern Sacramento Valley (NSV) IRWMP (Butte County et al., 2014). The IRWMP is intended to provide a framework and forum to guide the development of water resources policies, programs, and projects with the overarching statement of intent, which reads as follows:

> *To establish a regional collaborative structure with the objective of ensuring an affordable, sustainable water supply that supports agricultural, business, environmental, recreational, and domestic needs of the Northern Sacramento Valley.*

To meet this intent, the NSV IWRMP identifies the following six goals:

- Water supply reliability
- Flood protection and planning
- Water quality protection and enhancement
- Watershed protection and management
- Integrated regional water management (IRWM) sustainability
- Public education and information dissemination

Between four and twelve objectives are associated with each goal. These objectives are ranked as foundational (essential for determining baseline conditions), critical (directly addresses public health and safety), high (addresses economic health), and medium (addresses environmental concerns). The NSV IRWMP further provides a description of the plan development, potential project ranking and selection processes as well as future project solicitation procedures (updated in 2016 to include open solicitation of potential projects at any time), resources management strategies considered during potential project selection, and an overview of plan implementation strategy. The appendixes of the NSV IRWMP include lists of both the over 100 ranked potential projects submitted for consideration (currently housed in an

online project database) and unranked projects to track ("*included in the IRWMP to acknowledge projects that may be on the horizon for future consideration but which are not yet developed enough to be ranked according to the criteria of the prioritization process*").

In March 2020, the NSV Board approved updates to the NSV IRWMP.[3] These updates are included as Appendix N to the NSV IRWMP. Updates to the plan are intended to bring the NSV IRWMP into compliance with California Proposition 1 (Water Bond). This includes amendments to:

- Chapter 1: Governance and Region Description
  - If the IRWM region has areas of nitrate, arsenic, perchlorate, or hexavalent chromium contamination, the plan must describe location, extent, and impacts of the contamination; actions undertaken to address the contamination; and any additional actions needed to address the contamination.
  - Describe likely climate change impacts on their region as determined from the vulnerability assessment.
- Chapter 2: Goals and Objectives
  - Address adapting to changes in the amount, intensity, timing, quality, and variability of runoff and recharge.
  - Consider the effects of sea level rise (SLR) on water supply conditions and identify suitable adaptation measures.
- Chapter 3: Plan Development Process, Schedule, and Phasing
  - Present a public process that provides outreach and opportunity to participate in the IRWMP; and specifically, coordination with Native American Tribes is to be conducted on a government-to-government basis.
  - Identify process to involve and facilitate stakeholders during development and implementation of IRWMP regardless of ability to pay; include description of any barriers to involvement.
- Chapter 4: Resource Management Strategies
  - Consider all 32 California Water Plan (CWP) resource management strategy criteria listed in the CWP Update 2013. Identify resource management strategies incorporated in the IRWMP.
  - Factor climate change effects on the IRWM region into resource management strategies. Identify and implement, using vulnerability assessments and tools such as those provided in the Climate Change Handbook, resource management and adaptation strategies that address region-specific climate change impacts.
- Chapter 5: Project Selection Process and Procedure
  - Include a set of eight climate change and greenhouse gas emissions considerations in review factors.
  - Discuss how the plan relates to these other planning documents and programs. Water Code § 10562 (b)(7) requires the development of a stormwater resource plan and compliance with these provisions to receive grants for stormwater and dry-weather runoff capture projects. Upon development of the stormwater resource plan, the Regional Water Management Group shall incorporate it into IRWMP. The IRWMP should discuss the processes to incorporate such plans.
  - Demonstrate information sharing and collaboration with regional land use planning to manage multiple water demands throughout the state, adapt water management systems to climate change, and potentially offset climate change impacts to water supply in California.

[3] https://nsvwaterplan.org/category/nsv-irwmp-news/

- Chapter 6: Implementation Strategy
  - Ensure efficient use of available data, access to data, and ensure the data generated by IRWMP implementation activities can be integrated into existing State databases.
- General Amendments Addressing Climate Change
  - Consider the effects of SLR on water supply conditions and identify suitable adaptation measures for areas of the State that receive water imported from the Sacramento-San Joaquin River Delta, the area within the Delta, and areas served by coastal aquifers.
  - Contain a plan, program, or methodology for further data gathering and analysis of prioritized vulnerabilities.
  - Address adapting to changes in the amount, intensity, timing, quality, and variability of runoff and recharge.

2.11.2 Redding Basin Water Resources Management

Phase 1 of the Redding Basin Water Resources Management Plan, also referred to as the Shasta County Water Resources Master Plan, was completed in 1997 as a first step toward ensuring the water supply needs of RAGB would be met as population expanded. This study was funded by the Redding Area Water Council (RAWC), a group of water purveyors, industries, and private interests in an effort to identify current and long-term water supply needs. Although RAGB is bisected by the Sacramento River and has abundant natural water supply, water purveyors have been challenged by severe cutbacks on their annual contracted surface-water supply. Accounting for increasing demand, driven primarily by increasing population, it became clear that water purveyors would have to begin using RAGB to ensure an ample water supply. This master plan provided a regional planning framework, quantifying projected water demand through the year 2030 and identifying objectives for subsequent phases.

Phase 2, completed in 2003, consisted of three documents: Phase 2A, Phase 2B, and Phase 2C (CH2M HILL, 1997; 1999; 2003). Phase 2A identified the main problems facing water purveyors and users, and set relevant goals to develop a comprehensive groundwater management plan. Three main purposes for the plan were as follows:

- Avoid or minimize conditions that adversely affect groundwater availability and quality within the basin
- Develop a monitoring and data collection program to help protect local beneficial use of groundwater resources
- Implement the elements of the groundwater management plan by achieving basinwide consensus

Phase 2B, initiated in March 1999, sought to implement the now-developed Water Resources Management Plan by investigating a variety of actions aimed at increasing the reliability of water supply. To help achieve this end, Phase 2B included development of an integrated water resources model for the basin and engaged in extensive public outreach in the cities of Redding, Anderson, and Shasta Lake. Phase 2C outlined and evaluated several water resources management alternatives, developed from actions identified in Phase 2B. Two committees, the Policy Advisory Committee and the Technical Advisory Committee, reviewed draft work products and planning assumptions, and made appropriate adjustments to develop three conceptual alternatives. These alternatives included varying degrees of reliance of surface water and groundwater as well as other management actions.

Phase 3, completed in 2007, consists of an Environmental Impact Report, seeking to investigate long-term implementation of each alternative (CH2M HILL, 2007). Each alternative was evaluated, and a recommendation was made to accept the alternative that maximized operational flexibility, making use of both surface-water and groundwater supplies.

2.11.3 Anderson-Cottonwood Irrigation District Groundwater Management Plan

The ACID groundwater management plan (GMP), released in 2006, describes the ACID system, including information on water supply sources, historical and projected water use through 2030, water quality, and water shortage contingency measures (ACID, 2006). As previously described, ACID relies primarily on surface water from the CVP and augments their surface-water supply with groundwater from their two production wells (although the district wells were installed subsequent to the GMP). The ACID GMP describes that it is a priority for ACID to increase water supply reliability, in part by expanding groundwater use to decrease reliance on CVP water.

ACID established a pre-1914 water right for diversions from Sacramento River and its tributaries and, in 1967, entered into a contracted agreement with Reclamation that quantified their entitlement as a "Base Supply" of 165,000 AF and 10,000 AF of "Project Water" for a total contracted entitlement of 175,000 AF. As of 2006, this contract was renegotiated to a total of 125,000 AF—121,000 AF Base Supply and 4,000 AF Project Water. ACID has two diversion points on the Sacramento River. The main supply is diverted from the Sacramento River at Caldwell Park in the COR, and a supplemental supply is diverted from the Churn Creek Lateral Pump Station on the southern edge of Redding, near the South Bonnyview Bridge.

ACID's service area encompasses approximately 32,000 acres and directly serves approximately 7,000 acres. This includes areas within the Enterprise, Anderson, and Bowman Subbasins of the RAGB. Approximately 90 percent of the water supplied by ACID is used to irrigate pasture, with the remaining 10 percent supplied to orchards and food crops. No potable water is supplied by ACID.

2.12 Urban and Federal Water Management Plans

2.12.1 City of Anderson Urban Water Management Plan

The COA Urban Water Management Plan (UWMP) was produced in accordance with the Urban Water Management Planning Act of 1983 and released in 2017 (COA, 2017). This UWMP describes the COA water system, including information on water supply sources, historical and projected water use through 2035, water quality, water supply reliability, water shortage contingency planning, and water conservation/ demand management measures. COA Water Utility supplies consist solely of groundwater pumped from the RAGB through 10 active groundwater wells. Eight of the city's wells are located in the main City pressure zone, and the other two are in the Wooded Acres pressure zone. The eights wells in the City pressure zone produce 90 percent of COA water supply. The effective capacity of the 10 wells operated by the COA is suitable to meet projected demand through 2035.

2.12.2 City of Redding Urban Water Management Plan

The COR UWMP was produced in accordance with the UWMP Act of 1983 and released in 2015 (COR, 2015). The UWMP describes the COR water system, including information on water supply sources, historical and projected use through 2035, water quality, and water shortage contingency measures. COR water supplies described in the plan are as follows:

- Surface water from the Sacramento River – 21,000 AF/yr
- Surface water from Whiskeytown Lake – 6,140 AF/yr
- Groundwater pumped from the RAGB – 11,000 to 13,400 AF/yr
- Transfers of up to 4,000 AF/yr from ACID as a supplemental water supply, if needed

Furthermore, the COR UWMP describes demand management measures to meet the conservation requirements established by the Water Conservation Act of 2009 SB X7-7, a 20 percent reduction in water use by 2020. Forecasts indicated that the city's diverse water supply would be more than sufficient, even during multiple dry-year events. Furthermore, the city's water consumption was on a declining trend coming into 2015, helping the city to achieve 20 percent reduction in usage. The city included a Water

Use Reduction Plan that sought to combat overuse through education, outreach, aggressive leak detection, and infrastructure updates. It is anticipated that an update to this plan will be released in 2021.

2.12.3 City of Redding Federal Water Management Plan

The City of Redding Federal Water Management Plan includes a description of the COR Water Utility, including population, land use and water supply infrastructure, an inventory of water resources, best management practices for agricultural and urban contractors, and water inventory tables (COR, 2016).

2.12.4 Clear Creek Community Services District Water Management Plan

The CCCSD Water Management Plan (WMP) consists of four sections: description of the district, inventory of water resources, best management practices (BMPs) for agricultural contractors, and BMPs for urban contractors (CCCSD, 2015). Section 1 of the WMP describes the district's history, facilities and infrastructure, physical setting, operating rules, billing structure, and water shortage allocation policies. Section 2 of the WMP provides an overview of the district's surface and groundwater resources, water quality monitoring practices, and water use within the district. Sections 3 and 4 describe BMPs for agricultural and urban water users.

2.13 Existing Groundwater Regulatory Programs

2.13.1 Groundwater Export Permitting

Section 18.08 of the *Codification of the General Ordinances of Shasta County, California* (Municode, 2020a) specifies that:

> *It is unlawful to extract groundwater underlying lands in Shasta County for export of that groundwater, either directly or indirectly, without first obtaining a permit as provided in this chapter. For purposes of this section, the extraction of groundwater to replace a surface water supply which has been, is being, or will be exported for commercial purposes shall be considered an extraction of groundwater that is subject to this chapter.*

The general ordinances further describe exclusions to the permit process (such as to prevent flooding) and the procedures for filing and processing a groundwater export permit (such as conducting environmental review required under the California Environmental Quality Act). The ordinance states that:

> *The permit may only be granted if there is a majority of the total membership of the commission present at the required public meeting and a majority of the total membership of the commission finds that the proposed groundwater extraction will not have significant detrimental impacts on the affected groundwater basin by determining that:*
>
> *A. The proposed extraction will not cause or increase an overdraft of the groundwater underlying the county;*
>
> *B. The proposed extraction will not adversely affect the long-term ability for storage or transmission of groundwater within the aquifer;*
>
> *C. The proposed extraction will not exceed the annual yield of the groundwater underlying the county and will not otherwise operate to the injury of the reasonable and beneficial uses of overlying groundwater users;*
>
> *D. The proposed extraction will not result in an injury to a water replenishment, storage or restoration project operating in accordance with statutory authorization;*
>
> *E. The proposed extraction is in compliance with Water Code Section 1220; and*
>
> *F. The proposed extraction will not be otherwise detrimental to the health, safety and welfare of property owners overlying or in the vicinity of the proposed extraction site(s).*

2.13.2 Title 22 Drinking Water Program

As described in Section 2.7, the DDW regulates public water systems in California to ensure the delivery of safe drinking water to the public. Public water systems are those that provide potable water that has at least 15 service connections or regularly serves at least 25 individuals daily at least 60 days out of the year. Private domestic wells, wells associated with drinking water systems with less than 15 residential service connections, industrial, and irrigation wells are not regulated by the DDW.

The DDW enforces the monitoring requirements established in Title 22 of the CCR for public water system wells. In addition, Title 22 specifies the maximum contaminant levels (MCLs) for various waterborne contaminants.

2.13.3 Clean Water Act

The Federal Water Pollution Control Act was initially adopted in 1948. Modifications to portions of the act in 1972, 1977, and 2002 became known as the Clean Water Act (CWA) (33 United States Code 1251 to 1376). The CWA establishes the basis for regulating discharges of pollutants into surface waters of the United States and regulating water quality standards for stated beneficial uses. Section 303 of the CWA requires states to adopt water quality standards for all surface waters of the United States. As defined by the CWA, water quality standards consist of two elements: (1) designated beneficial uses of the water body in question and (2) criteria that protect the designated uses. Section 304(a) requires the U.S. Environmental Protection Agency (EPA) to publish advisory water quality criteria that accurately reflect the latest scientific knowledge on the kind and extent of all effects on health and welfare that may be expected from the presence of pollutants in water. Where multiple uses exist, water quality standards must protect the most sensitive use.

EPA is generally directly responsible for implementing CWA provisions, although the CWA also authorizes states to implement portions of CWA through a delegation process. Through an agreement between EPA and the State of California, SWRCB has been designated, along with the nine RWQCBs, to develop and enforce water quality objectives and implementation plans in California to identify beneficial uses and water quality criteria to protect those beneficial uses.

2.13.4 Porter-Cologne Water Quality Control Act

The Porter-Cologne Water Quality Control Act (Porter-Cologne Act) established surface-water and groundwater quality regulations that set limits on water quality constituents for the purpose of protecting beneficial uses[4] and provided the authority for SWRCB to protect the state's surface water and groundwater. The nine RWQCBs were established to oversee and implement specific water quality activities in their geographic jurisdictions. The Porter-Cologne Act requires the RWQCBs to establish water quality objectives while acknowledging that water quality may change without unreasonably affecting beneficial uses. Therefore, water quality objectives are references, as opposed to rules, for meeting federal and State requirements for water quality control.

The Porter-Cologne Act also requires that each RWQCB develop basin plans that establish and periodically review the beneficial uses and water quality objectives for surface water and groundwater bodies within its jurisdiction. Water quality objectives provide specific water quality guidelines to protect groundwater and surface water to maintain designated beneficial uses. SWRCB, through the RWQCBs, is the permitting authority in California to administer National Pollutant Discharge Elimination System and waste discharge requirements for regulation of waste discharges.

Article 4 of the Porter-Cologne Act (specifically § 13160. Federal Water Pollution Control Act) states that "The state board is designated as the state water pollution control agency for all purposes stated in the

[4] "Beneficial uses" of the waters of the state that may be protected against quality degradation include, but are not limited to, domestic, municipal, agricultural, and industrial supply; power generation; recreation; aesthetic enjoyment; navigation; and preservation and enhancement of fish, wildlife, and other aquatic resources or preserves.

Federal Water Pollution Control Act and any other federal act, heretofore or hereafter enacted…" Although EPA has delegated implementation of portions of the CWA to the SWRCB, those portions of state or regional Water Quality Control Plans or amendments to the plans that are consistent with and under the jurisdiction of the CWA require approval by both SWRCB and EPA.

2.14 Conjunctive Use Programs

The term conjunctive use "*refers to the coordinated and planned use and management of both surface-water and groundwater resources to maximize the availability and reliability of water supplies in a region to meet various management objectives*" (DWR, 2016). COR and CCCSD use a combination of both surface water and groundwater pumped by city or district wells to meet water demands within their administrative areas. Furthermore, ACID has periodically participated in water transfer programs, in which groundwater is pumped from district-owned wells, located in the Anderson Subbasin, in lieu of diverting an agreed-upon volume of surface water from the Sacramento River. ACID's water transfer program has been exercised in 2013, 2014, and 2015 with an additional program planned for 2020.

2.15 Land Use Plans

Shasta County has jurisdiction over land use planning for unincorporated portions of the Anderson Subbasin, and COR and COA have jurisdiction over land use planning within their respective city limits. Implementation of the Anderson Subbasin GSP may be affected by the policies and regulations outlined in the Shasta County General Plan, as well as the General Plan for COR and COA, given that the long-term land use planning decisions that would affect the Anderson Subbasin are under the jurisdiction of the County, COR, and COA.

This section describes how implementation of the Shasta County and COR general plans may change water demand in the subbasin and the GSP's ability to achieve sustainability. Due to the presence of Shasta Lake, Whiskeytown Lake, and the Sacramento River in the area, water resources in the RAGB are usually abundant; but the County and incorporated cities recognize that this will not necessarily protect residents from shortages during drought periods or in the event of significant growth. As a result, the general plans have shown dedication to preserving water resources and increasing the sustainability of water systems.

2.15.1 Shasta County General Plan

The current Shasta County General Plan was adopted by the Board of Supervisors in 2004, apart from a Housing Element amendment added in 2018 (Shasta County, 2004). This document outlines a set of objectives, formulated through a broad-based citizen participation effort, that provide the basis for policies within the County. These objectives focus on five major ideas: accommodating growth as a means of preserving quality of life; the relationship between geographic distribution, growth, and public services; recognition of the plan as a decision-making tool that requires periodic revisions; growth accommodation across a variety of living environments; and an interjurisdictional approach to planning issues.

The Shasta County General Plan recognizes that the preservation of natural resources in the County is essential to maintaining the quality of life of its residents; thus, the General Plan encourages growth only in places well suited for development and supply infrastructure. This aids Shasta County in ensuring water is available to its residents. The General Plan explains that water management is made more complicated by the complex state-legal system, which establishes water rights in the Central Valley. The General Plan also cites population growth within Shasta County and overdraft of other California groundwater basins as reasons to conserve water resources. The goals of the Shasta County General Plan, therefore, are consistent with the goals of this GSP.

2.15.2 City of Anderson General Plan

The COA General Plan was adopted in 2007 and outlines the city's vision for Anderson through 2027. Emphasized in the General Plan is preservation of Anderson's "small town" characteristics. That is,

prioritizing quality of life of current residents and access to open space above quantitative measures of growth (COA, 2007). Objectives of the COA General Plan are as follows:

1) Land Use: To maintain the orderly growth and stable physical development of the City of Anderson while enhancing the physical, social, economic and environmental characteristics of the community; and ensure the continuance of the City's "small town" atmosphere.
2) Circulation: To maximize the development of a multimodal circulation system that will be both safe and efficient.
3) Conservation: To ensure the planned management of the community's natural resources consistent with community goals and prevention of their misuse.
4) Open Space: To establish open space areas for the following: the preservation of natural resources, the managed production of resources, outdoor recreation, public health and safety, mitigation areas, wetland banking, and to ensure the preservation and maintenance of these spaces consistent with community need.
5) Health and Safety: To provide all City residents with public services for a safe and healthy community.
6) Noise: To mitigate noise, maintaining a livable environment in the City of Anderson.
7) Housing: To ensure that the City of Anderson offers the opportunity for adequate and safe housing in a suitable environment for all economic groups. This consists of the conservation and rehabilitation of existing and older neighborhoods as well as planning of new and innovative residential developments.

2.15.3 City of Redding General Plan

The COR General Plan, adopted in 2000, outlines a vision for Redding's future and provides principles and policies to guide development through 2020 (COR, 2000). The development of the Redding General Plan was a collaborative effort involving the community and the City Planning Commission. The plan recognizes the importance of natural resources to the community and seeks to balance protection and responsible management policies, echoing the objectives of the Shasta County General Plan. Among these objectives are commitments to prevent the discharge of contaminated water into the environment, to prevent excessive pumping and water consumption, and to encourage opportunities for groundwater recharge. A new General Plan or an updated version is anticipated in 2020, but this document is not yet available. Objectives of the COR General Plan are as follows:

1) Continue community/neighborhood planning efforts that will put in place actions geared to the development and redevelopment of key neighborhoods and districts.
2) Increase efforts to attract new industry to the area and to retain existing high-paying jobs.
3) Contribute to the quality of life of Redding's citizens by investing in cultural, recreational, and open-space projects.
4) Focus development efforts on building neighborhoods, rather than just approving subdivisions.
5) Ensure that public and private development is well-designed, functional, complementary to surrounding buildings and lands, and contributes its fair share to providing necessary infrastructure and services that the citizens of Redding have come to expect.
6) Continue to ensure that necessary infrastructure is planned, funded, and constructed so as to maintain the standards expected by the community.

2.15.4 Well Permitting

A valid permit must be obtained from the Shasta County Environmental Health Division to drill, destroy, deepen, or recondition a water well in the Anderson Subbasin. Work shall be performed by a C-57 licensed driller or contractor. Drillers are held to California Water Well Standards set forth by DWR.

2.15.5 Land Use Plans Outside of the Basin

Land use plans outside of the Anderson Subbasin are not expected to affect implementation of this GSP.

2.15.6 Effects of Land Use Plan Implementation on Water Demand

The GSA does not have authority over land use planning. However, the GSA will coordinate with Shasta County, COA, and COR on general plans and land use planning/zoning as needed when implementing the GSP.

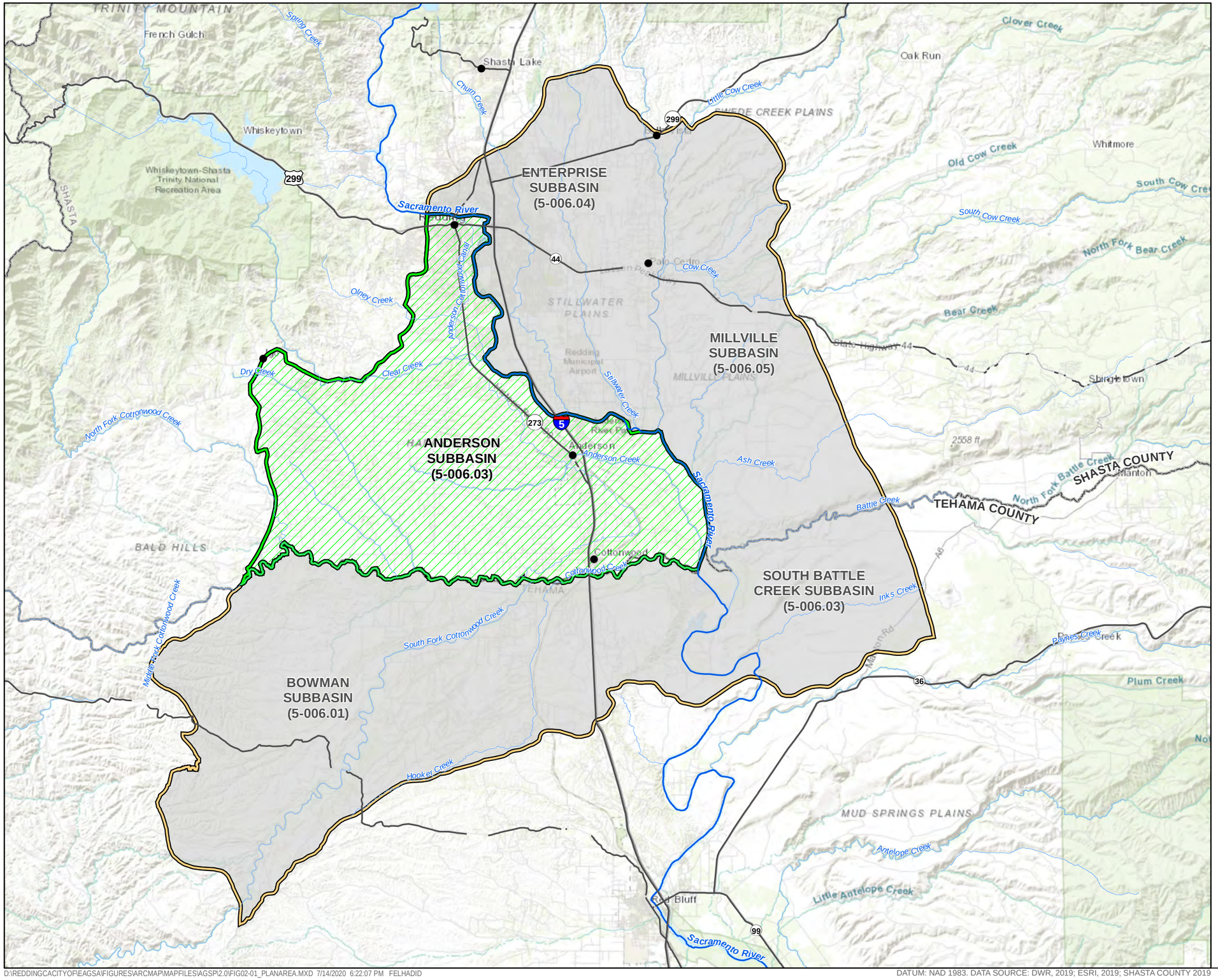
2.15.7 Effects of GSP Implementation on Water Supply Assumptions

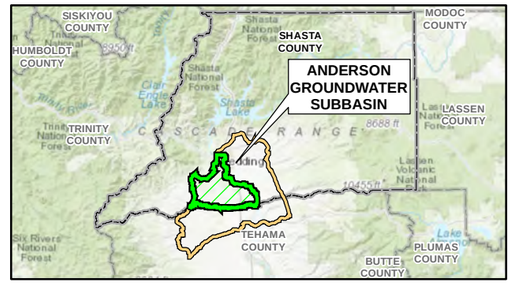
Implementation of this GSP is not anticipated to affect water supply assumptions of relevant land use plans over the planning and implementation horizon. Further information will be provided as additional components of this GSP are developed.

2.16 Additional GSP Elements *(Reg. § 354.8 g)*

One or more of the following subjects may be incorporated into a future version of this GSP:

- Control of saline water intrusion
- Wellhead protection
- Migration of contaminated groundwater
- Well abandonment and well destruction program
- Replenishment of groundwater extractions
- Conjunctive use and underground storage
- Well construction policies
- Groundwater contamination cleanup, recharge, diversions to storage, conservation, water recycling, conveyance, and extraction projects
- Efficient water management practices
- Relationships with State and federal regulatory agencies
- Land use plans and efforts to coordinate with land use planning agencies to assess activities that potentially create risks to groundwater quality or quantity
- Impacts on groundwater-dependent ecosystems





LEGEND

- CITY
- SACRAMENTO RIVER
- RIVER/STREAM
- COUNTY BOUNDARY LINE
- INTERSTATE/HIGHWAY
- ANDERSON GROUNDWATER SUBBASIN (5-006.03 PLAN AREA)
- REDDING AREA GROUNDWATER BASIN
- COUNTY BOUNDARY LINE

NOTE:

SERVICE LAYER CREDITS: SOURCES: ESRI, HERE, GARMIN, INTERMAP, INCREMENT P CORP., GEBCO, USGS, FAO, NPS, NRCAN, GEOBASE, IGN, KADASTER NL, ORDNANCE SURVEY, ESRI JAPAN, METI, ESRI CHINA (HONG KONG), SWISSTOPO, © OPENSTREETMAP CONTRIBUTORS, AND THE GIS USER COMMUNITY

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FIGURE 2-1
PLAN AREA
Anderson Subbasin Groundwater Sustainability Plan

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DATUM: NAD 1983. DATA SOURCE: DWR, 2019; ESRI, 2019; SHASTA COUNTY 2019

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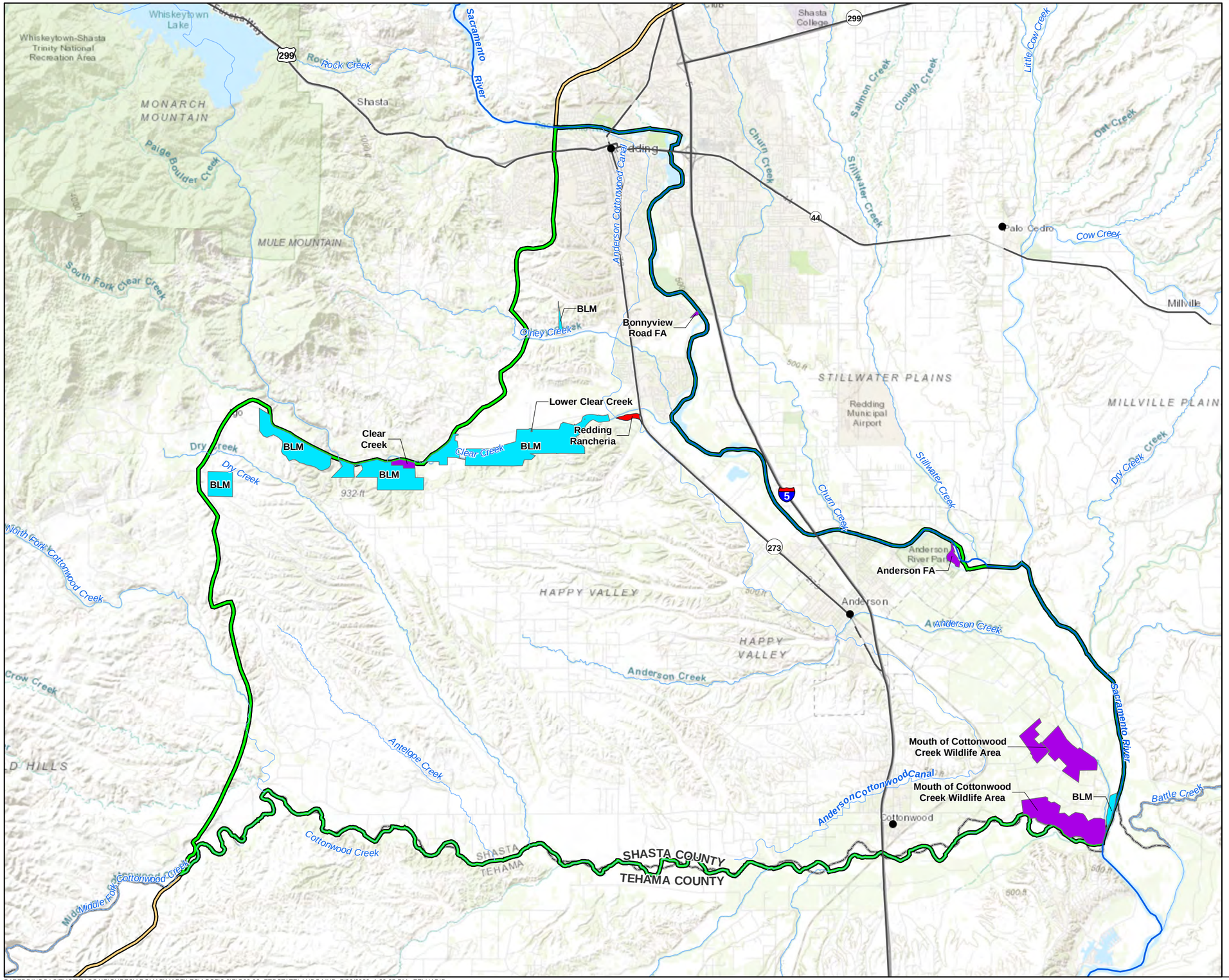

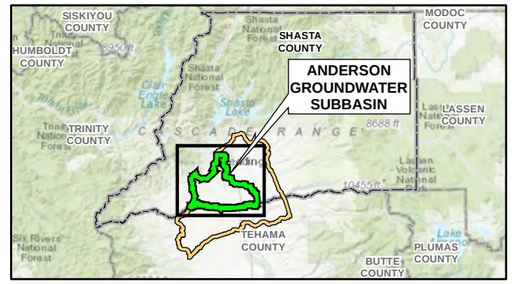

LEGEND

- CITY
- SACRAMENTO RIVER
- RIVER/STREAM
- INTERSTATE/HIGHWAY
- COUNTY BOUNDARY LINE
- ANDERSON GROUNDWATER SUBBASIN (5-006.03 PLAN AREA)
- REDDING AREA GROUNDWATER BASIN
- CALIFORNIA DEPARTMENT OF FISH AND WILDLIFE
- US BUREAU OF LAND MANAGEMENT (BLM)
- BUREAU OF INDIAN AFFAIRS LAND AREA REPRESENTATION

NOTES:

DATA SOURCES: HTTPS://WWW.CALANDS.ORG (CALANDS, 2020) AND BIA, 2020

SERVICE LAYER CREDITS: SOURCES: ESRI, HERE, GARMIN, INTERMAP, INCREMENT P CORP., GEBCO, USGS, FAO, NPS, NRCAN, GEOBASE, IGN, KADASTER NL, ORDNANCE SURVEY, ESRI JAPAN, METI, ESRI CHINA (HONG KONG), SWISSTOPO, © OPENSTREETMAP CONTRIBUTORS, AND THE GIS USER COMMUNITY

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FIGURE 2-2
FEDERAL, STATE, AND TRIBAL JURISDICTIONAL AREAS
Anderson Subbasin Groundwater Sustainability Plan

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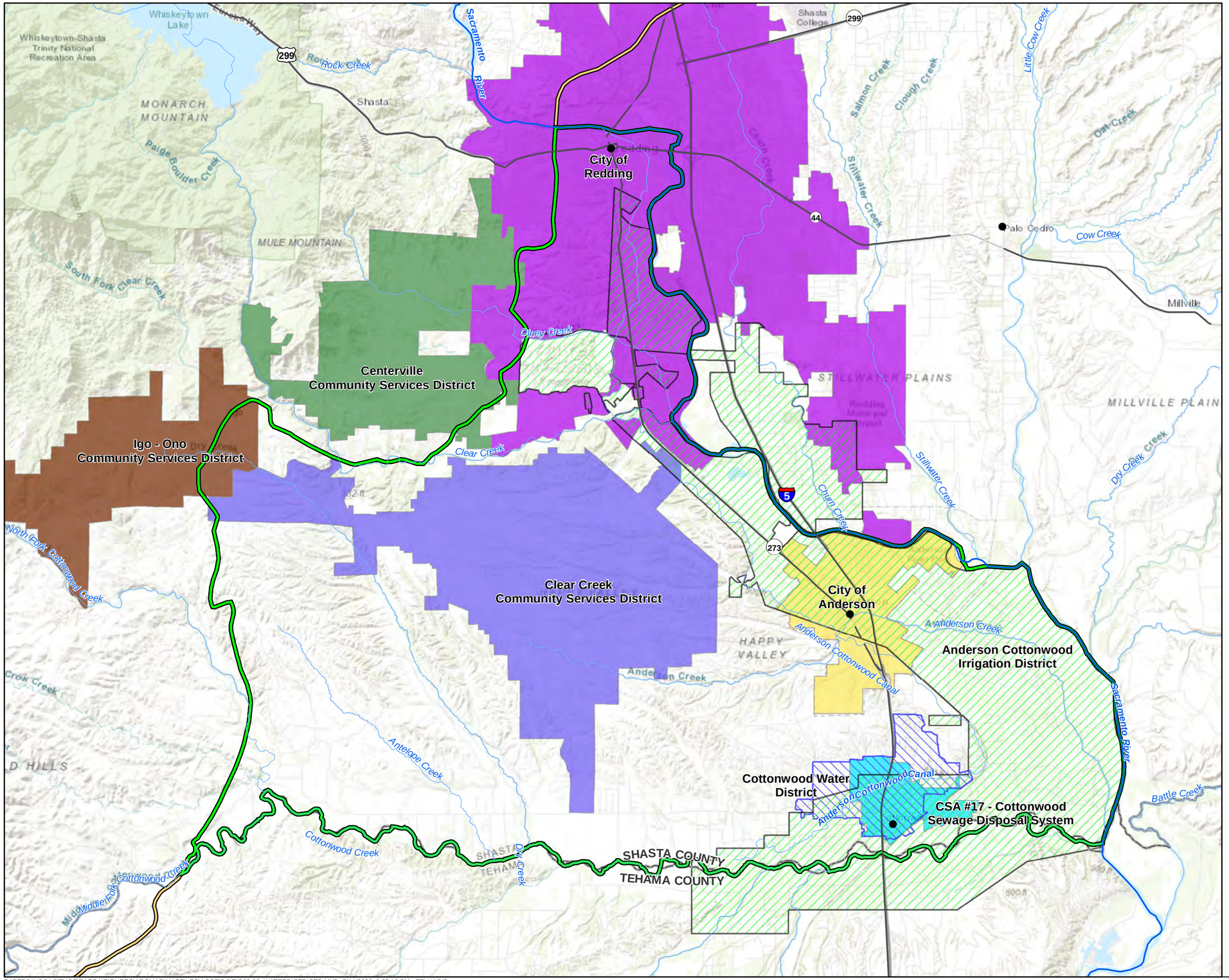

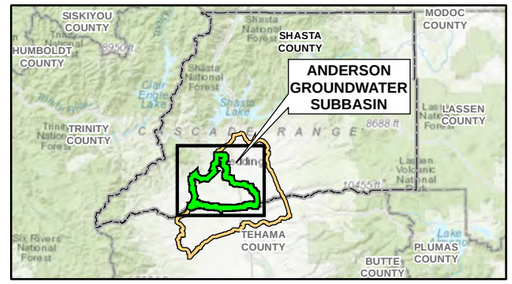

LEGEND

- CITY
- SACRAMENTO RIVER
- RIVER/STREAM
- INTERSTATE/HIGHWAY
- COUNTY BOUNDARY LINE
- ANDERSON GROUNDWATER SUBBASIN (5-006.03 PLAN AREA)
- REDDING AREA GROUNDWATER

AGENCY NAME

- ANDERSON COTTONWOOD IRRIGATION DISTRICT
- CITY OF
- CITY OF REDDING
- CENTERVILLE COMMUNITY SERVICES DISTRICT
- CLEAR CREEK COMMUNITY SERVICES DISTRICT
- COTTONWOOD WATER DISTRICT
- COUNTY SERVICE AREA (CSA) #17 - COTTONWOOD SEWAGE DISPOSAL SYSTEM
- IGO - ONO COMMUNITY SERVICES DISTRICT

NOTES:

DATA SOURCES: ACID, 2015; COA, 2019; COR, 2020a; AND SHASTA COUNTY, 2019a

SERVICE LAYER CREDITS: SOURCES: ESRI, HERE, GARMIN, INTERMAP, INCREMENT P CORP., GEBCO, USGS, FAO, NPS, NRCAN, GEOBASE, IGN, KADASTER NL, ORDNANCE SURVEY, ESRI JAPAN, METI, ESRI CHINA (HONG KONG), SWISSTOPO, © OPENSTREETMAP CONTRIBUTORS, AND THE GIS USER COMMUNITY

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FIGURE 2-3
CITY, COUNTY SERVICE AREAS, AND WATER DISTRICT JURISDICTIONAL AREAS
Anderson Subbasin Groundwater Sustainability Plan

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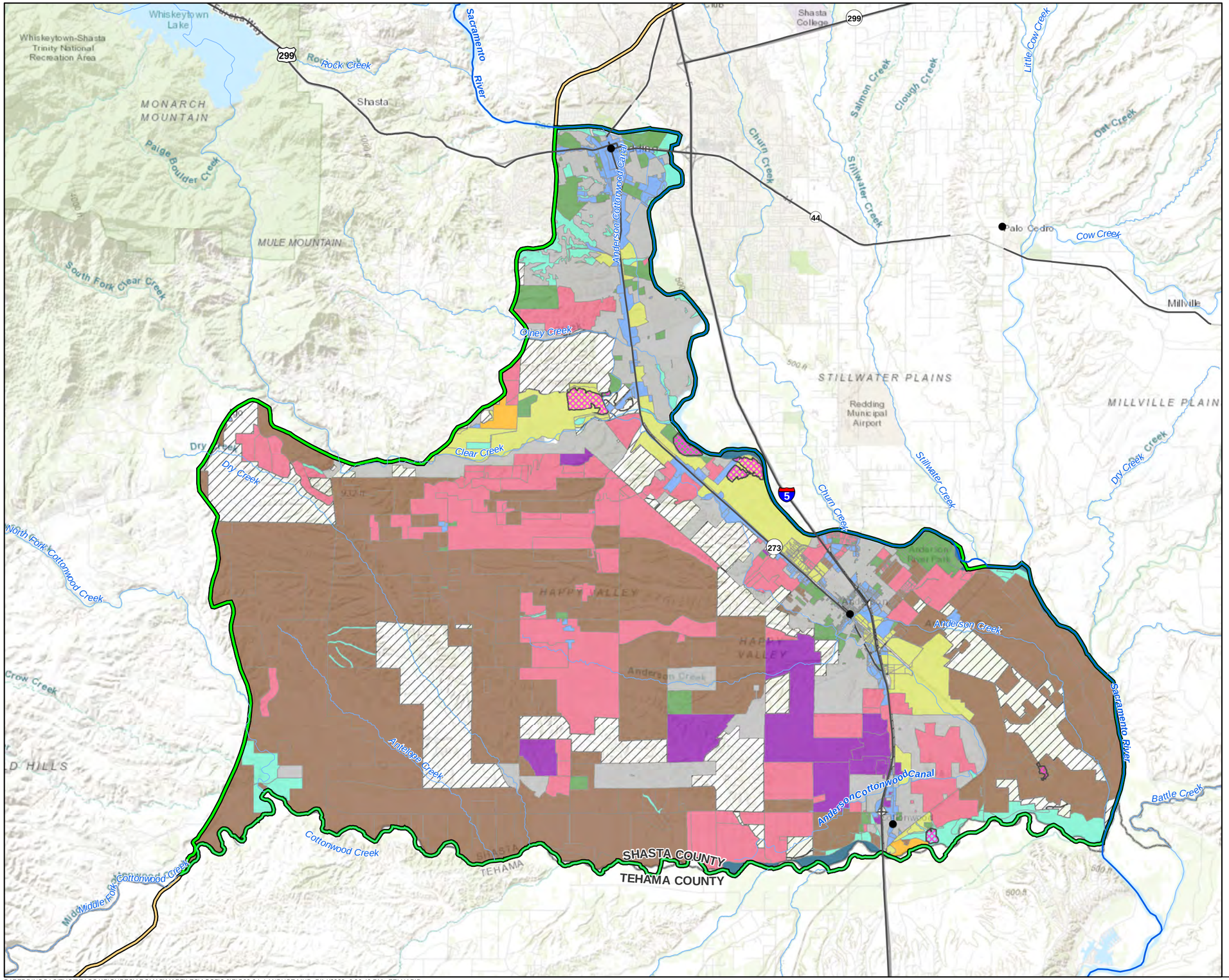

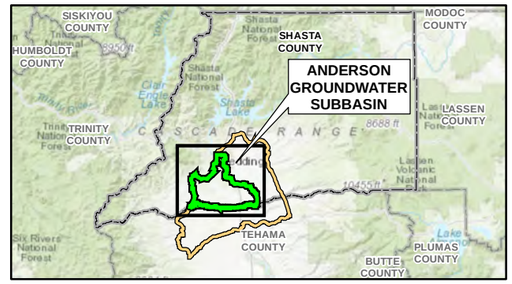

LEGEND

- CITY
- SACRAMENTO RIVER
- RIVER/STREAM
- INTERSTATE/HIGHWAY
- COUNTY BOUNDARY LINE
- ANDERSON GROUNDWATER SUBBASIN (5-006.03 PLAN AREA)
- REDDING AREA GROUNDWATER BASIN

LAND USE TYPE

- AGRICULTURE
- COMMERCIAL
- FLOODWAY
- HABITAT PROTECTION/OPEN SPACE
- INDUSTRIAL
- PUBLIC/INSTITUTIONAL
- MANAGED WETLANDS
- MINERAL RESOURCE
- PLANNED DEVELOPMENT
- RESIDENTIAL (RURAL)
- RESIDENTIAL (URBAN)
- UNCLASSIFIED

NOTES:

DATA SOURCE: MODIFIED FROM SHASTA COUNTY, 2020, COR, 2020a, AND COA, 2020; CNRA, 2020a

SERVICE LAYER CREDITS: SOURCES: ESRI, HERE, GARMIN, INTERMAP, INCREMENT P CORP., GEBCO, USGS, FAO, NPS, NRCAN, GEOBASE, IGN, KADASTER NL, ORDNANCE SURVEY, ESRI JAPAN, METI, ESRI CHINA (HONG KONG), SWISSTOPO, © OPENSTREETMAP CONTRIBUTORS, AND THE GIS USER COMMUNITY

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FIGURE 2-4
2019/2020 LAND USE
Anderson Subbasin Groundwater Sustainability Plan

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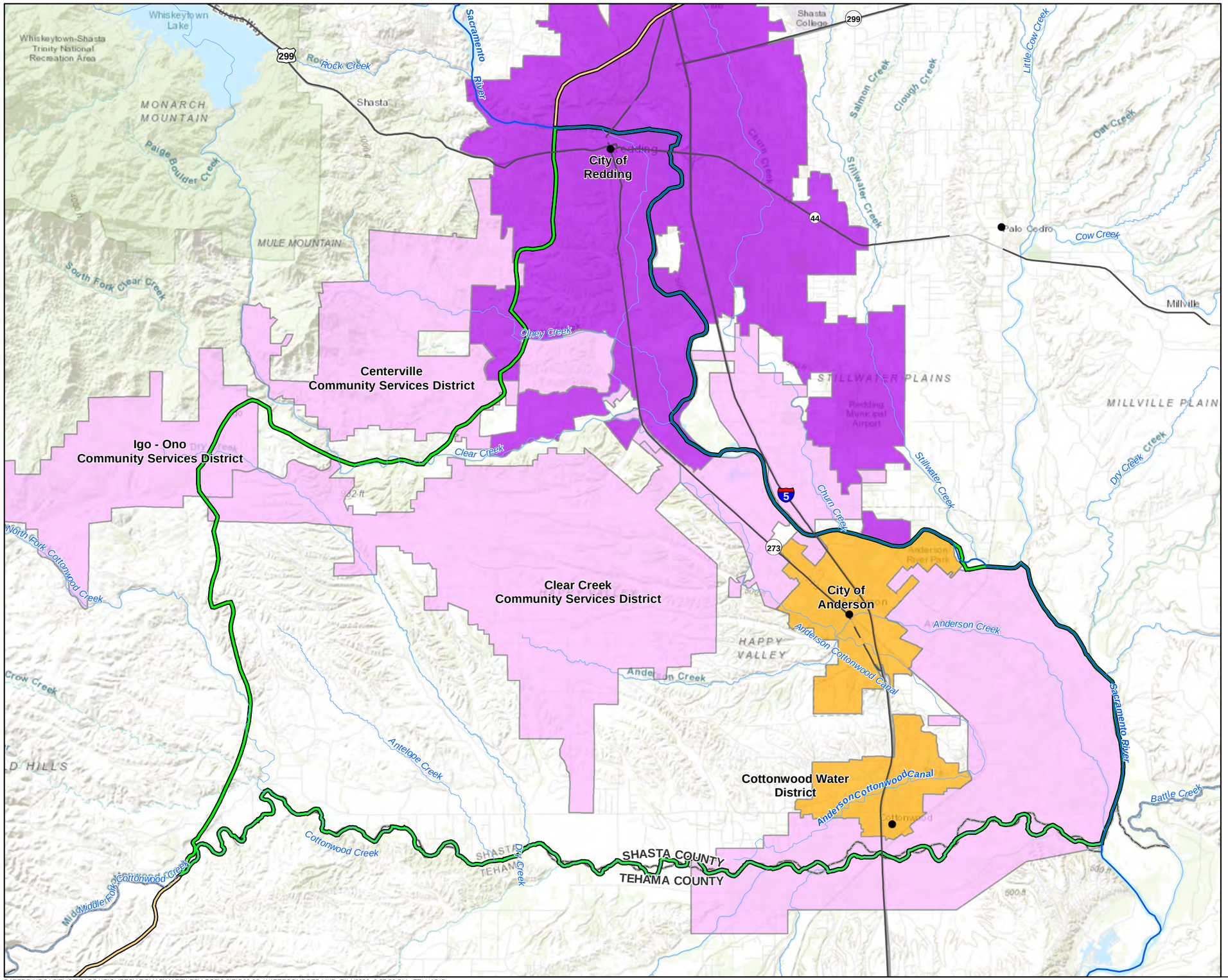

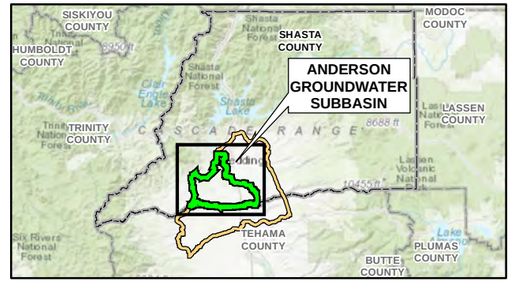

LEGEND

- CITY
- SACRAMENTO RIVER
- RIVER/STREAM
- INTERSTATE/HIGHWAY
- COUNTY BOUNDARY LINE
- ANDERSON GROUNDWATER SUBBASIN (5-006.03 PLAN AREA)
- REDDING AREA GROUNDWATER BASIN

WATER SOURCE (AGENCY NAME)

- PRIMARILY SURFACE WATER (ANDERSON COTTONWOOD IRRIGATION DISTRICT AND CENTERVILLE, CLEAR CREEK, AND IGO - ONO COMMUNITY SERVICES DISTRICTS
- GROUNDWATER ONLY (CITY OF ANDERSON AND COTTONWOOD WATER DISTRICT)
- MIXED SURFACE WATER AND GROUNDWATER (CITY OF REDDING)

NOTES:

DATA SOURCES: ACID, 2015; COA, 2019; COR, 2020a; SHASTA COUNTY, 2019a

SERVICE LAYER CREDITS: SOURCES: ESRI, HERE, GARMIN, INTERMAP, INCREMENT P CORP., GEBCO, USGS, FAO, NPS, NRCAN, GEOBASE, IGN, KADASTER NL, ORDNANCE SURVEY, ESRI JAPAN, METI, ESRI CHINA (HONG KONG), SWISSTOPO, © OPENSTREETMAP CONTRIBUTORS, AND THE GIS USER COMMUNITY

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FIGURE 2-5
WATER SOURCES
Anderson Subbasin Groundwater Sustainability Plan

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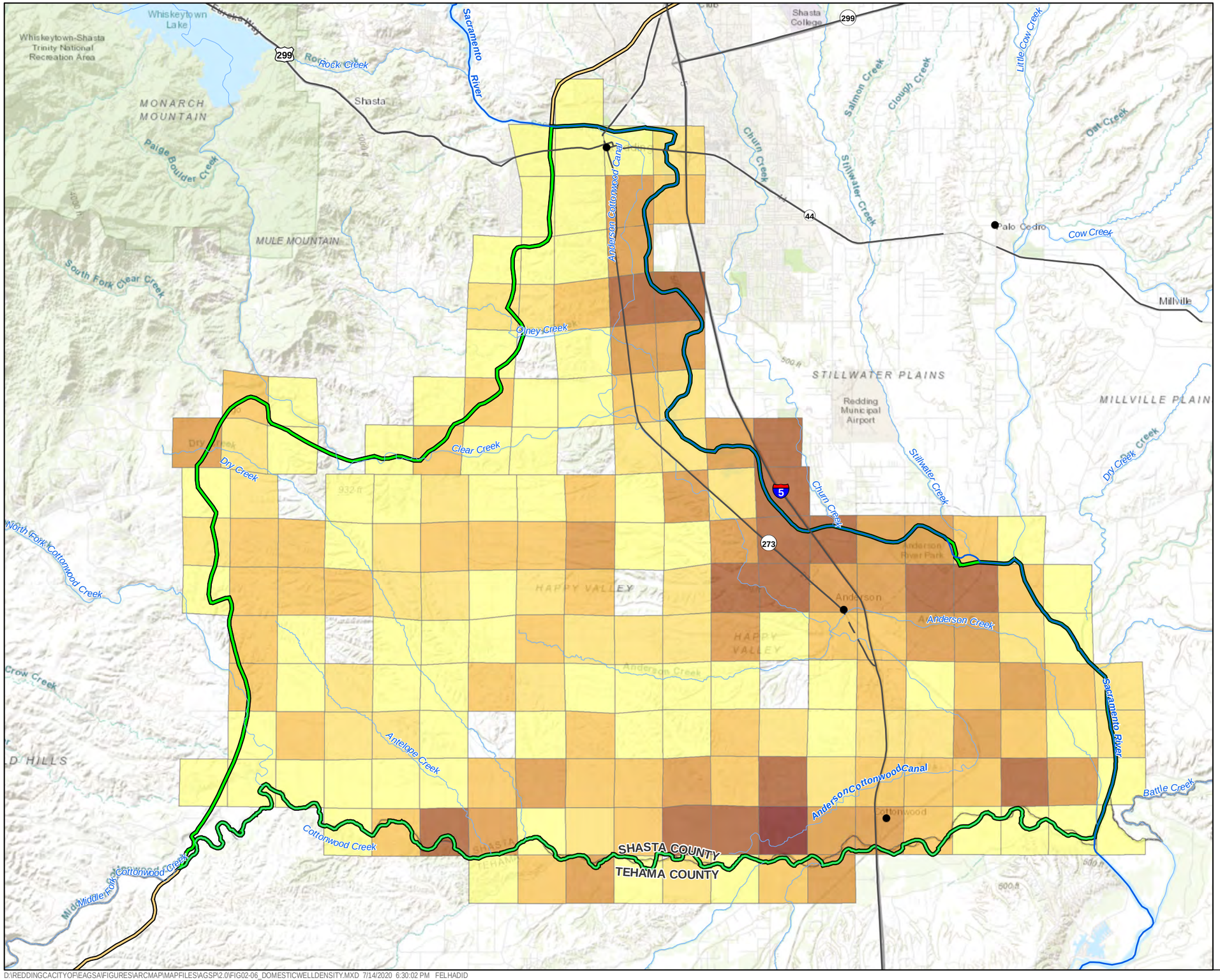

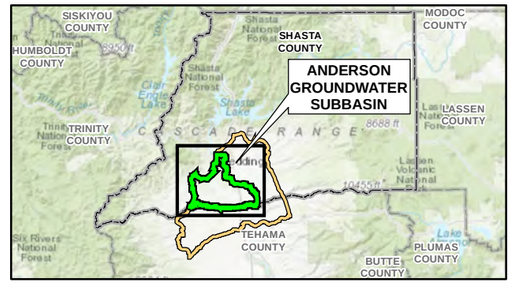

LEGEND

- CITY
- SACRAMENTO RIVER
- RIVER/STREAM
- INTERSTATE/HIGHWAY
- COUNTY BOUNDARY LINE
- ANDERSON GROUNDWATER SUBBASIN (5-006.03 PLAN AREA)
- REDDING AREA GROUNDWATER BASIN

DOMESTIC WELL COUNT

- >100
- >50 to 100
- >25 to 50
- >10 to 25
- >6 to 10
- 1 to 5

NOTES:

DATA SOURCE: CNRA, 2020b

SERVICE LAYER CREDITS: SOURCES: ESRI, HERE, GARMIN, INTERMAP, INCREMENT P CORP., GEBCO, USGS, FAO, NPS, NRCAN, GEOBASE, IGN, KADASTER NL, ORDNANCE SURVEY, ESRI JAPAN, METI, ESRI CHINA (HONG KONG), SWISSTOPO, © OPENSTREETMAP CONTRIBUTORS, AND THE GIS USER COMMUNITY

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FIGURE 2-6
DOMESTIC WELL DENSITY
Anderson Subbasin Groundwater Sustainability Plan

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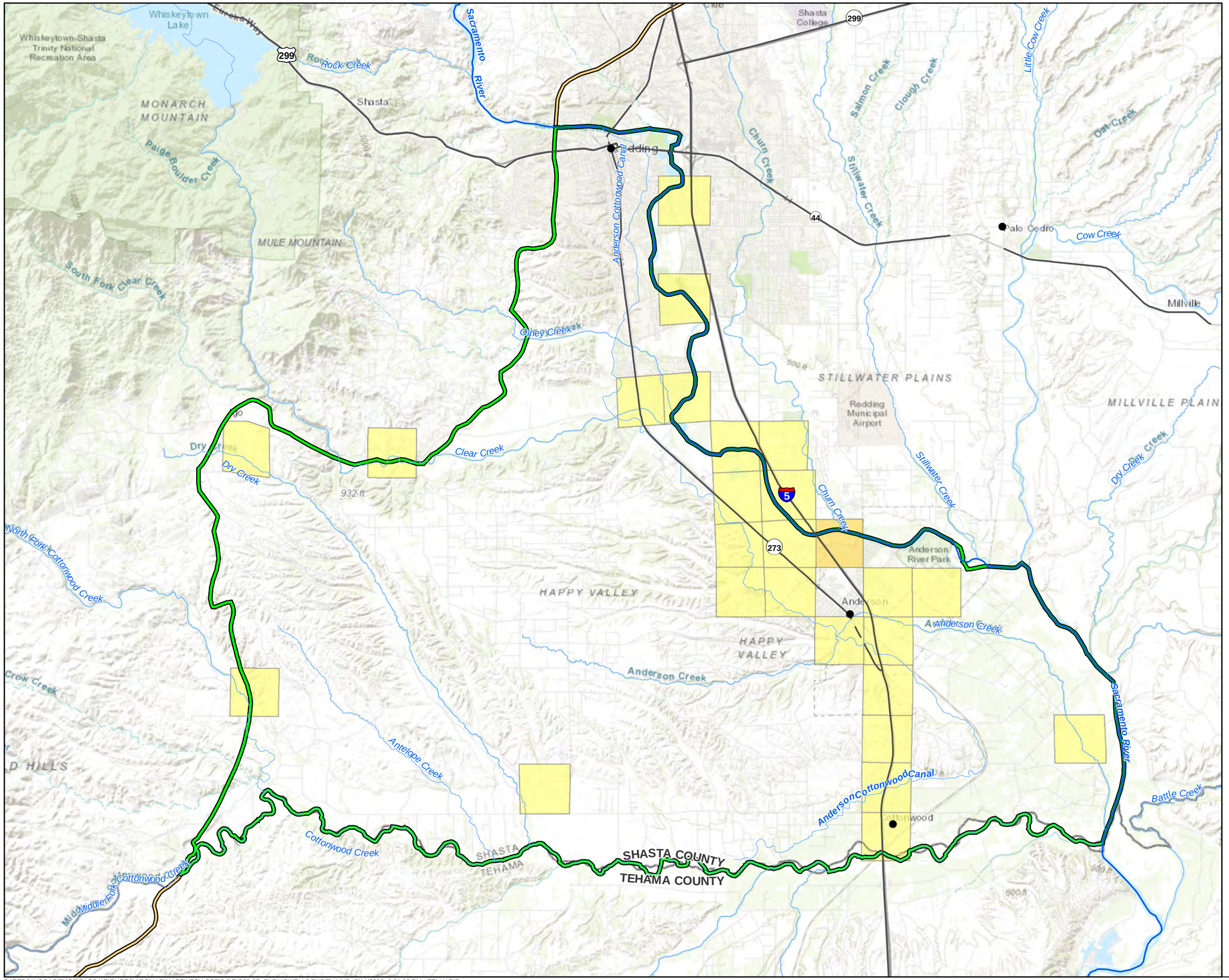

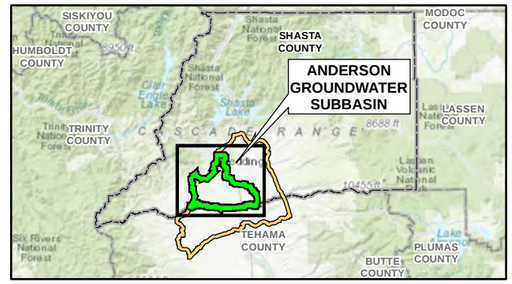

LEGEND

- CITY
- SACRAMENTO RIVER
- RIVER/STREAM
- INTERSTATE/HIGHWAY
- COUNTY BOUNDARY LINE
- ANDERSON GROUNDWATER SUBBASIN (5-006.03 PLAN AREA)
- REDDING AREA GROUNDWATER BASIN

PUBLIC WELL COUNT

- >100
- >50 to 100
- >25 to 50
- >10 to 25
- >6 to 10
- 1 to 5

NOTES:

DATA SOURCE: CNRA, 2020b

SERVICE LAYER CREDITS: SOURCES: ESRI, HERE, GARMIN, INTERMAP, INCREMENT P CORP., GEBCO, USGS, FAO, NPS, NRCAN, GEOBASE, IGN, KADASTER NL, ORDNANCE SURVEY, ESRI JAPAN, METI, ESRI CHINA (HONG KONG), SWISSTOPO, © OPENSTREETMAP CONTRIBUTORS, AND THE GIS USER COMMUNITY

0 2 4 Miles

N

FIGURE 2-7
PUBLIC WELL DENSITY
Anderson Subbasin Groundwater Sustainability Plan

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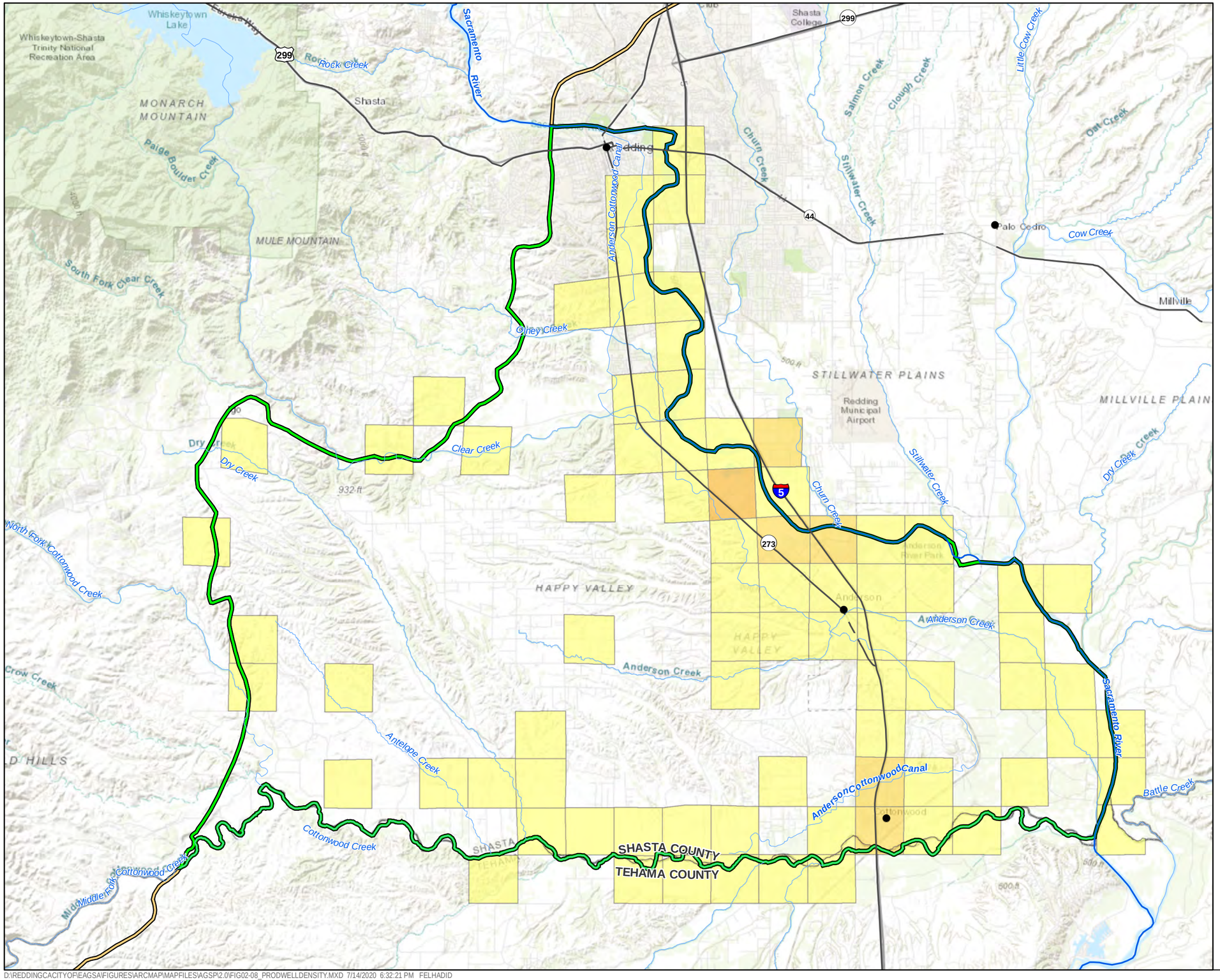

LEGEND

- CITY
- SACRAMENTO RIVER
- RIVER/STREAM
- INTERSTATE/HIGHWAY
- COUNTY BOUNDARY LINE
- ANDERSON GROUNDWATER SUBBASIN (5-006.03 PLAN AREA)
- REDDING AREA GROUNDWATER BASIN

PRODUCTION WELL COUNT

- >100
- >50 to 100
- >25 to 50
- >10 to 25
- >6 to 10
- 1 to 5

NOTES:

DATA SOURCE: CNRA, 2020b

SERVICE LAYER CREDITS: SOURCES: ESRI, HERE, GARMIN, INTERMAP, INCREMENT P CORP., GEBCO, USGS, FAO, NPS, NRCAN, GEOBASE, IGN, KADASTER NL, ORDNANCE SURVEY, ESRI JAPAN, METI, ESRI CHINA (HONG KONG), SWISSTOPO, © OPENSTREETMAP CONTRIBUTORS, AND THE GIS USER COMMUNITY

0 2 4 Miles

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FIGURE 2-8
PRODUCTION WELL DENSITY
Anderson Subbasin Groundwater Sustainability Plan

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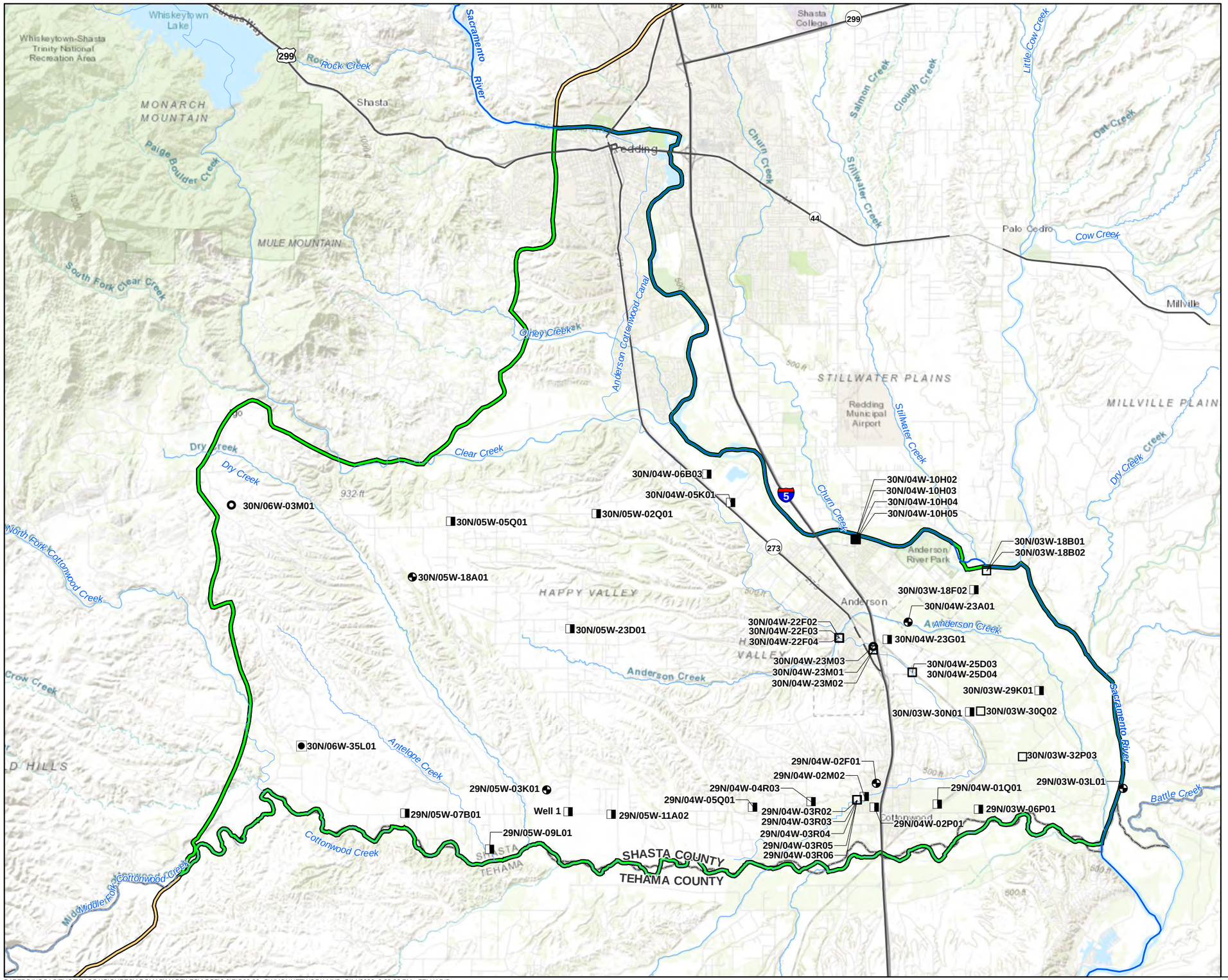

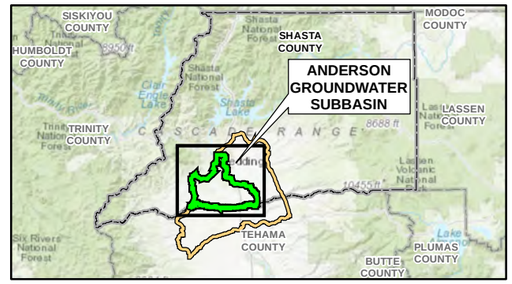

LEGEND

PROGRAM (SAMPLING FREQUENCY)

- DWR WELL (CONTINUOUS)
- DWR WELL (PERIODIC)
- DWR AND USGS WELL (PERIODIC)
- CASGEM (PERIODIC)
- CASGEM (PERIODIC) AND DWR WELL (CONTINUOUS)
- USGS WELL (PERIODIC)
- SACRAMENTO RIVER
- RIVER/STREAM
- INTERSTATE/HIGHWAY
- COUNTY BOUNDARY LINE
- ANDERSON GROUNDWATER SUBBASIN (5-006.03 PLAN AREA)
- REDDING AREA GROUNDWATER BASIN

NOTES:

DATA SOURCES: DWR, 2019a; DWR, 2019b; USGS, 2019a

CASGEM = CALIFORNIA STATEWIDE GROUNDWATER ELEVATION MONITORING PROGRAM

DWR = DEPARTMENT OF WATER RESOURCES

USGS = UNITED STATES GEOLOGICAL SURVEY

SERVICE LAYER CREDITS: SOURCES: ESRI, HERE, GARMIN, INTERMAP, INCREMENT P CORP., GEBCO, USGS, FAO, NPS, NRCAN, GEOBASE, IGN, KADASTER NL, ORDNANCE SURVEY, ESRI JAPAN, METI, ESRI CHINA (HONG KONG), SWISSTOPO, © OPENSTREETMAP CONTRIBUTORS, AND THE GIS USER COMMUNITY

0 2 4 Miles

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FIGURE 2-9
ANDERSON SUBBASIN GROUNDWATER LEVEL MONITORING NETWORK
Anderson Subbasin Groundwater Sustainability Plan

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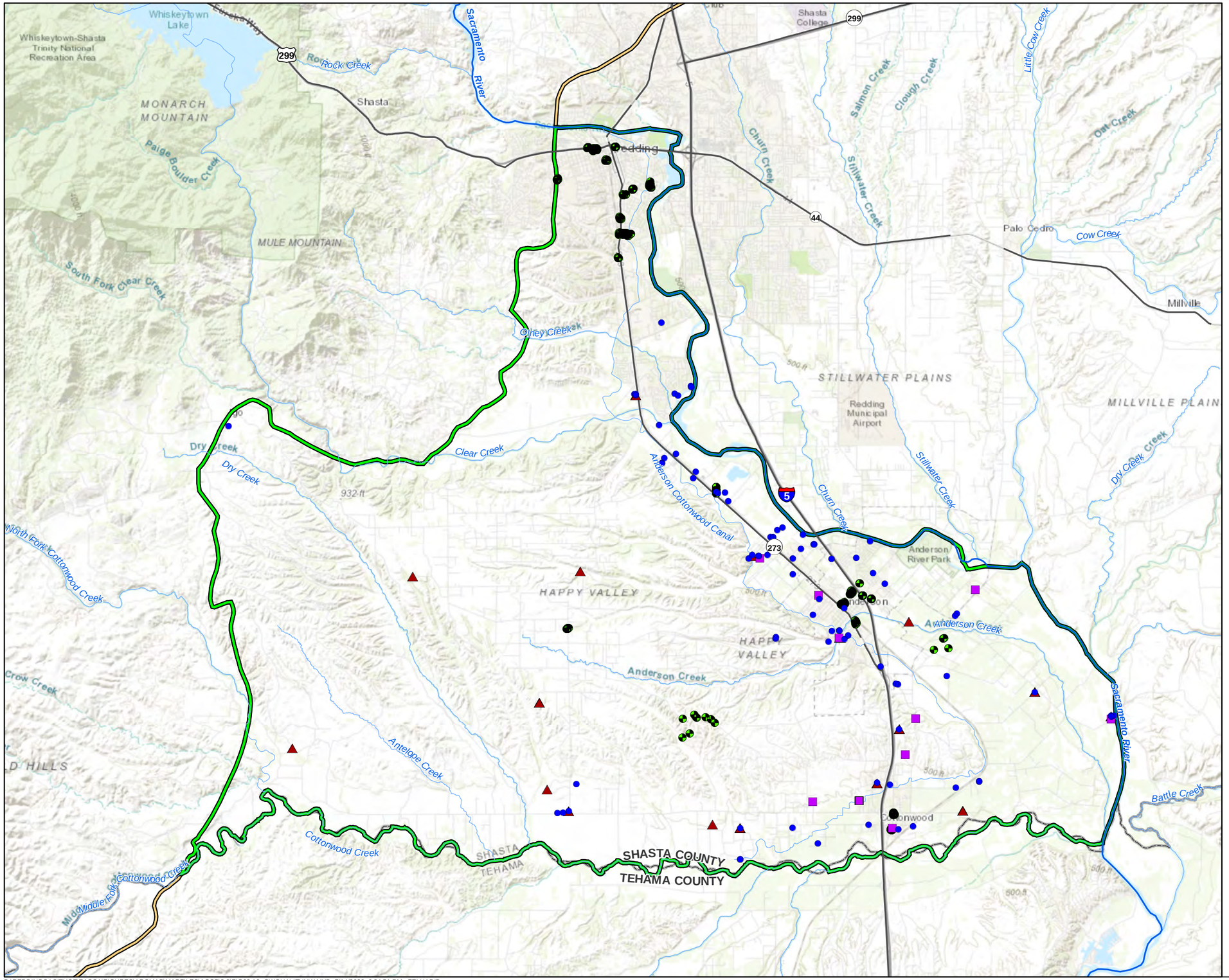

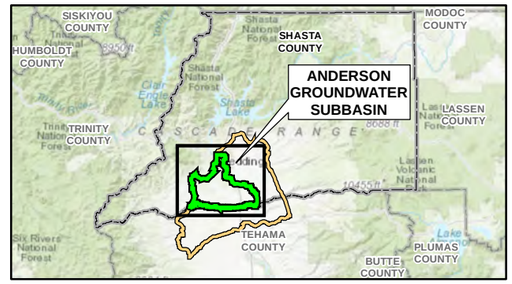

LEGEND

GROUNDWATER QUALITY NETWORK SOURCE

- SWRCB – DDW
- GAMA – DWR
- GAMA – USGS
- REGULATED SITE ENVIRONMENTAL MONITORING
- SACRAMENTO RIVER
- RIVER/STREAM
- INTERSTATE/HIGHWAY
- COUNTY BOUNDARY LINE
- ANDERSON GROUNDWATER SUBBASIN (5-006.03 PLAN AREA)
- REDDING AREA GROUNDWATER BASIN

NOTES:

LOCATIONS SAMPLED BETWEEN 2000 AND 2019.

DATA SOURCE: SWRCB, 2020b

DDW = DIVISION OF DRINKING WATER

DWR = CALIFORNIA DEPARTMENT OF WATER RESOURCES

GAMA = GROUNDWATER AMBIENT MONITORING AND ASSESSMENT PROGRAM

SWRCB = STATE WATER RESOURCES CONTROL BOARD

USGS = UNITED STATES GEOLOGICAL SURVEY

SERVICE LAYER CREDITS: SOURCES: ESRI, HERE, GARMIN, INTERMAP, INCREMENT P CORP., GEBCO, USGS, FAO, NPS, NRCAN, GEOBASE, IGN, KADASTER NL, ORDNANCE SURVEY, ESRI JAPAN, METI, ESRI CHINA (HONG KONG), SWISSTOPO, © OPENSTREETMAP CONTRIBUTORS, AND THE GIS USER COMMUNITY

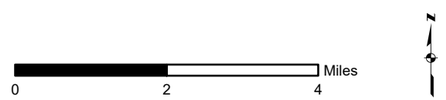

FIGURE 2-10
ANDERSON SUBBASIN GROUNDWATER QUALITY WELL NETWORK
Anderson Subbasin Groundwater Sustainability Plan

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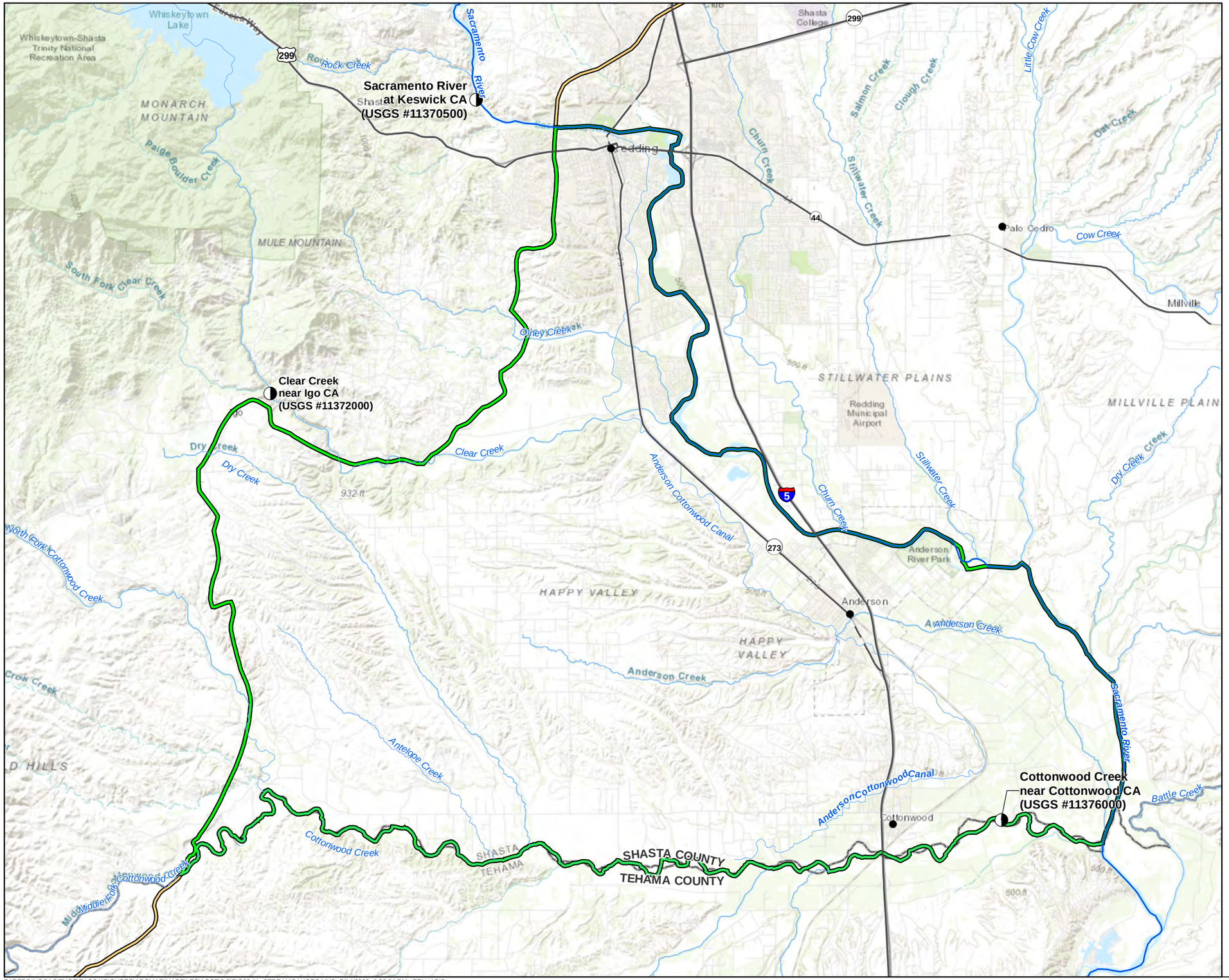

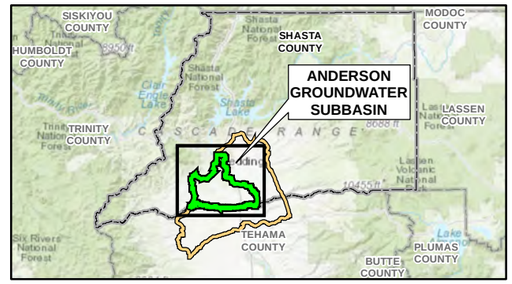

LEGEND

- STREAM GAUGE LOCATION
- CITY
- SACRAMENTO RIVER
- RIVER/STREAM
- INTERSTATE/HIGHWAY
- COUNTY BOUNDARY LINE
- ANDERSON GROUNDWATER SUBBASIN (5-006.03 PLAN AREA)
- REDDING AREA GROUNDWATER BASIN

NOTES:

DATA SOURCE: USGS, 2019a

SERVICE LAYER CREDITS: SOURCES: ESRI, HERE, GARMIN, INTERMAP, INCREMENT P CORP., GEBCO, USGS, FAO, NPS, NRCAN, GEOBASE, IGN, KADASTER NL, ORDNANCE SURVEY, ESRI JAPAN, METI, ESRI CHINA (HONG KONG), SWISSTOPO, © OPENSTREETMAP CONTRIBUTORS, AND THE GIS USER COMMUNITY

0 2 4 Miles

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FIGURE 2-11
ANDERSON SUBBASIN STREAM GAUGE LOCATIONS
Anderson Subbasin Groundwater Sustainability Plan

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