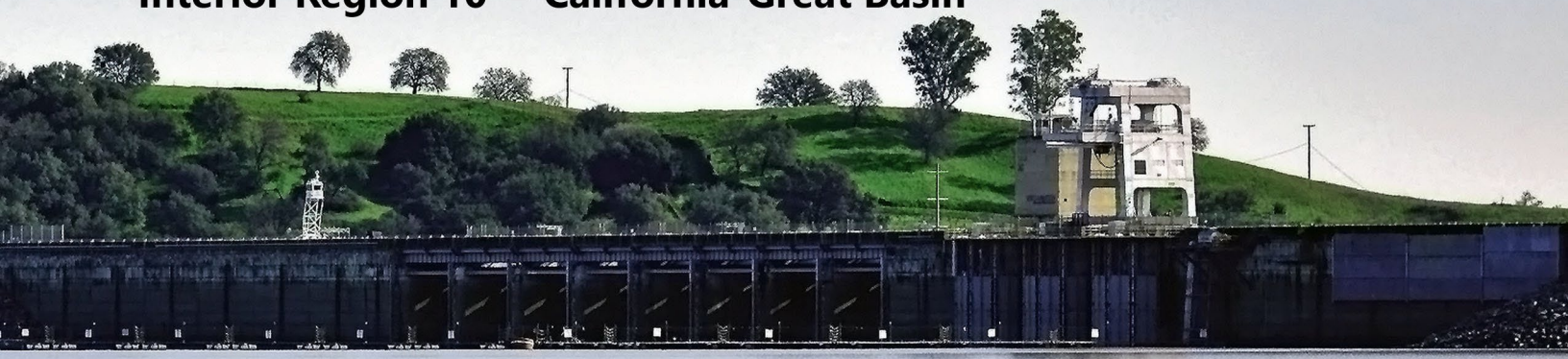
BUREAU OF RECLAMATION

Appendix D

Development of Urban and Agricultural Demands

American River Basin Study
Interior Region 10 – California-Great Basin



Note: This appendix is a record of analysis for the ongoing study (2018 - 2022).
The main report may have updated information that is not reflected in this appendix.

U.S. Department of the Interior

March 2022

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Abbreviations and Acronyms

AF	acre-feet
ARBS	American River Basin Study
AWMP	Agricultural Water Management Plan
CCTAG	Climate Change Technical Advisory Group
CO_2	carbon dioxide
CU	Consumptive Use
CWC	California Water Commission
DAU	Detailed Analysis Unit
DSA	Depletion Study Area
DWR	California Department of Water Resources
EDCWA	El Dorado County Water Agency
EID	El Dorado Irrigation District
ET_0	evapotranspiration
ETc	crop evapotranspiration
GCM	Global Circulation Model
GDPUD	Georgetown Divide Public Utility District
GPCD	gallon per capita per day
IWRMP	Integrated Water Resources Management Plan
OCA	Other County Areas
PA	Planning Area
PCWA	Placer County Water Agency
PUD	Public Utility District
PWSS	Public Water System Statistics
RDCP	Regional Drought Contingency Plan
RWA	Regional Water Authority
RWRP	Regional Water Reliability Plan
SEI	Stockholm Environment Institute
SSJBS	Sacramento-San Joaquin Basin Study
TAF	thousand acre-feet
UWMP	Urban Water Management Plans
WBA	Water Budget Area
WEAP	Water Evaluation and Planning System
WRDMP	Water Resources Development and Management Plan
WSIP	Water Storage Investment Program
WTP	Water Treatment Plant

Chapter 1
Introduction

Purpose of Document

This technical memorandum (TM) describes the methods and data sources used to develop the Urban and Agricultural water demands for the American River Basin Study (ARBS or Study) CalSim 3.0 model. Demands are developed to support model runs for four planning horizons: Existing, 2050, 2070 and 2085 levels of development.

Background

The purpose of the ARBS is to develop a more detailed understanding of water supplies and demands in the American River Basin and identify potential imbalances between supplies and demands under a range of potential future climate conditions. The objectives of the ARBS are aligned with the recently completed Sacramento and San Joaquin Rivers Basin Study (SSJRBS), which evaluates the potential impacts of projected climate change on water supply and demand, water quality and critical habitat within California's Central Valley. Where the 60,000 square-mile study area of the SSJRBS encompasses all main tributaries within the Central Valley and the Sacramento-San Joaquin Delta, the ARBS takes a more focused view to outline potential impacts over a range of possible future climate conditions on various natural resources and presents portfolios specifically within the American River Basin.

For the ARBS, CalSim 3.0 is the primary analytical tool used to perform the supply-demand gap analysis. CalSim 3.0 is a water resources planning model jointly developed by the California Department of Water Resources (DWR) and the U.S. Department of the Interior, Bureau of Reclamation (Reclamation), which simulates operations of the State Water Project (SWP), the Central Valley Project (CVP) and much of the water resources infrastructure in the Central Valley of California and the Sacramento-San Joaquin Delta region.

The representation of the American River Basin in CalSim 3.0 utilizes a higher resolution demand structure than was used in the SSJRBS. Although the SSJRBS study has temporally extensive demand projections, they are more spatially coarse than the CalSim 3.0 requirements for the ARBS. The ARBS will leverage information developed for the SSJRBS and additional data sources described in this technical memorandum to develop spatially and temporally appropriate urban and agricultural demand projections for CalSim 3.0 to fulfill the objectives of the ARBS.

Study Area

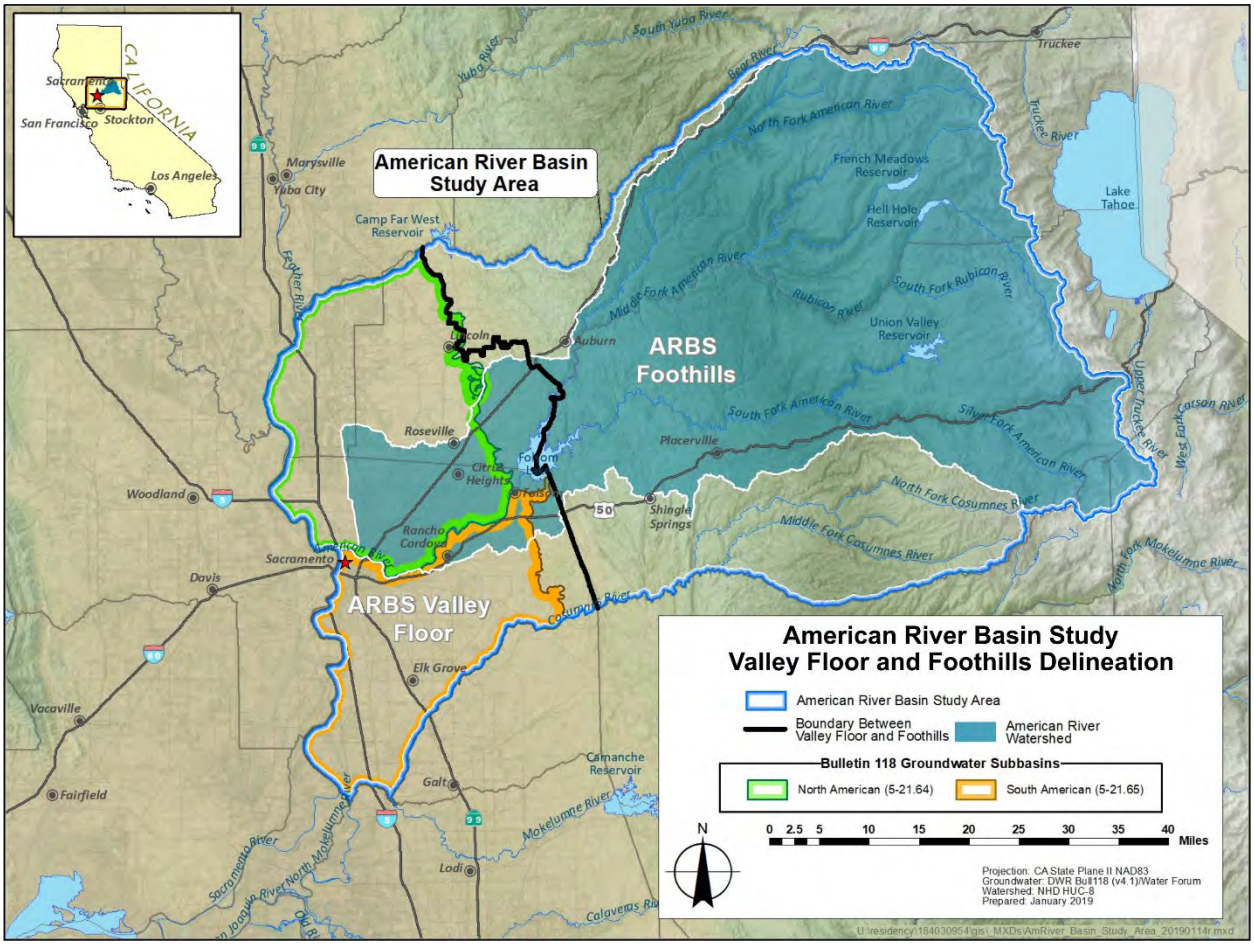
Figure 1-1 shows the Study Area, which is bounded by the Bear River to the north, the Cosumnes River to the south, the Sierra Nevada mountain range to the east, and the Feather and Sacramento rivers to the west. The Study Area encompasses three parts:

- **American River Watershed** – This watershed covers 2,140 square miles from Sacramento to the peaks of the northern Sierra Nevada mountains west of Lake Tahoe. It includes the sub-basins of the American River: Lower American River Sub-basin (U.S. Geological Survey hydrological unit code (HUC) 18020111), North Fork American River Sub-basin (HUC 18020128), and South Fork American River Sub-basin (HUC 18020129).

- **ARBS Non-Federal Partners' Service Areas Outside of the American River Watershed** – This represents areas outside of the American River Watershed in adjacent watersheds of the Bear River and Cosumnes River that are served by non-Federal Partners with American River water.

- **North and South American Groundwater Subbasins** – The North American Subbasin and South American Subbasin of the Sacramento Valley Groundwater Basin groundwater basins in the west side of the Study area are separated by the American River, and their eastern boundary represents the approximate edge of the alluvial basin, where little or no groundwater flows into or out of the groundwater basins from the Sierra Nevada basement rock. In addition to surface water from the American River, local water agencies use groundwater for their water supply needs.

Figure 1-1 also shows the boundary between the ARBS Valley Floor and the ARBS Foothills. The boundary line between the Valley Floor and Foothills follows the El Dorado County line, the bifurcation between upper and lower Placer County Water Agency (PCWA) Zone 6, City of Lincoln sphere of influence and DWR bulletin 118 North American groundwater subbasin. Water purveyors in the ARBS Foothills do not have access to groundwater as part of their normal supplies. They include El Dorado Irrigation Water District (EID), PCWA Upper Zone 6, Georgetown Divide Public Utility District (GDPUD), and Nevada Irrigation District (NID).



CalSim 3.0 Water Budget Areas and Demand Units

CalSim 3.0 divides the valley floor model domain into Water Budget Areas (WBAs) (**Figure 1-2**). WBAs describe large regions with similar characteristics and serve the following purposes:

- Provide a structure to simplify the organization, explanation, and presentation of CalSim 3.0 data, code, and results.
- Define the boundary of non-district agricultural water users within a region who are aggregated to a single demand in CalSim 3.0.
- Define the boundary of scattered water users whose water supplies for domestic (or industrial) use are self-produced, who rely on groundwater, and who are represented in CalSim 3.0 by a single demand.
- Define the spatial resolution of climate input data; temperature and precipitation are assumed to be uniform across the WBA.

CalSim 3.0 further divides each WBA in to "demand units" to represent water demands and water use. Demand units are the smallest computational units within CalSim 3.0. A demand unit is defined as a collection of water users who share similar characteristics, have the same physical, legal, and contractual access to water, and have similar land uses, water delivery systems, and water use efficiencies.

Demand unit names comprise a one- to three-character WBA prefix, followed by a three-character "contract and water use" suffix. After the WBA prefix, the first letter of the demand unit indicates whether it represents a group of Central Valley Project/State Water Project contractors (designated by "P") or "non-project" water users (Designated by "N"). A second letter after the prefix indicates the purpose of the water use: agricultural ("A"), urban ("U"). Finally, in cases when two demand units would share the same name, a number is appended to the suffix to distinguish between them.

ARBS Water Budget Areas and Demand Units Delineation

Figure 1-3 shows the delineation of WBAs within the Study Area. WBAs within the ARBS Study Area primarily cover the valley floor portion of the Study Area. The Valley Floor includes WBA-22, WBA-23, WBA-24, WBA-26N, and WBA-26S. It also includes a portion of the lands on the left bank of the Sacramento River below the American River confluence that lie within the legal boundary of the Delta. CalSim 3.0 represents the Delta as a separate region in a manner that is consistent with DSM2, DWR's hydrodynamic and water quality model.

Figure 1-4 shows the urban and agricultural "demand units" in the Valley Floor and the Foothills. **Table 1-1** lists the urban demand units within the ARBS area. **Table 1-2** lists the agricultural demand units within the ARBS Planning Area. Appendix A includes maps that show the urban and agricultural demand units within each WBA. Note that one geographic area may be represented by both an urban demand unit and an agricultural demand unit. Urban and agricultural demand within that area will be assigned to the corresponding demand unit. If there is shift in land use, for example from agricultural to urban, the corresponding demands within the urban and agricultural demand units will be adjusted accordingly.

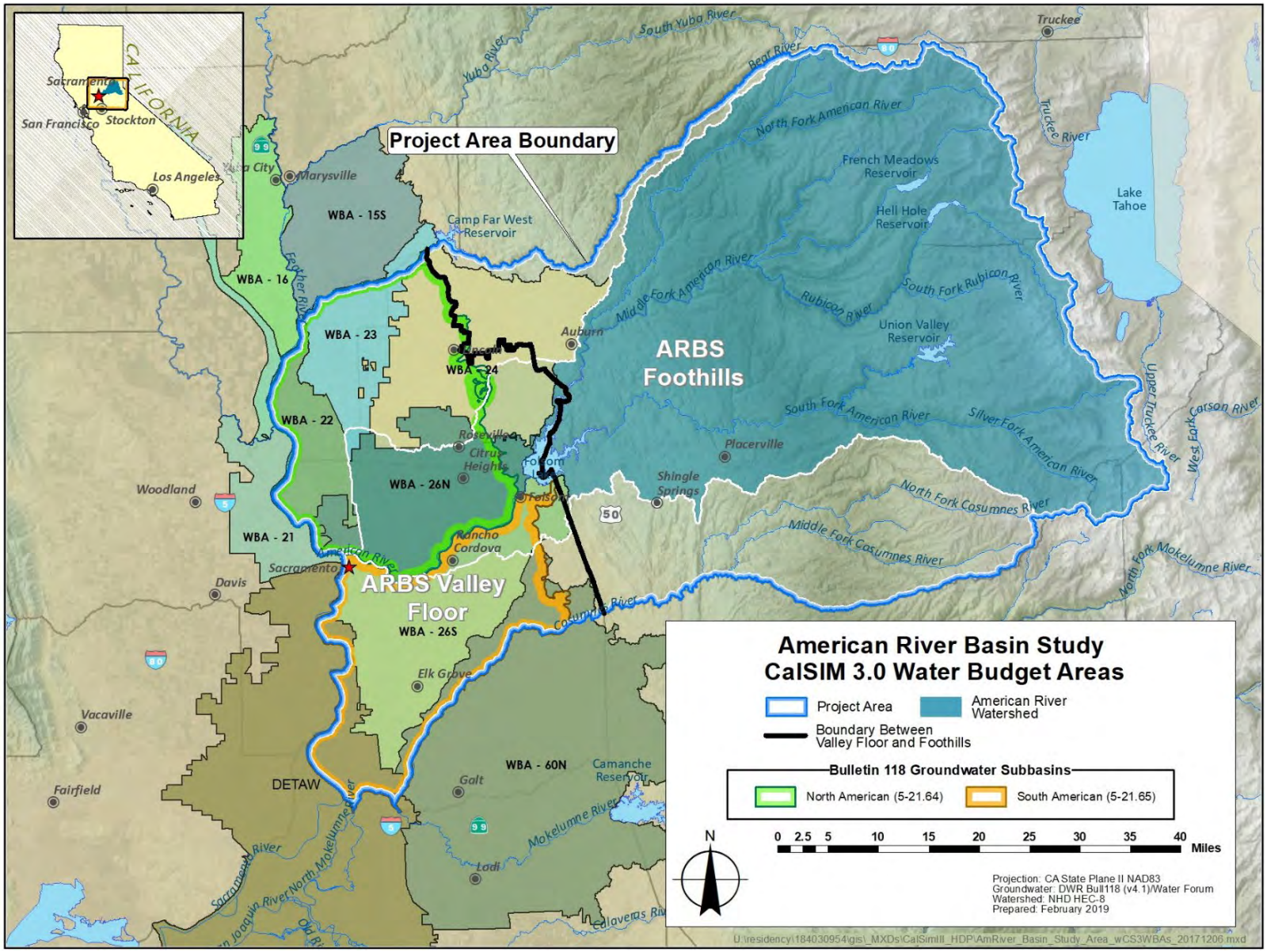


Figure 1-3. CalSim 3.0 Water Budget Areas within American River Basin Study Area.

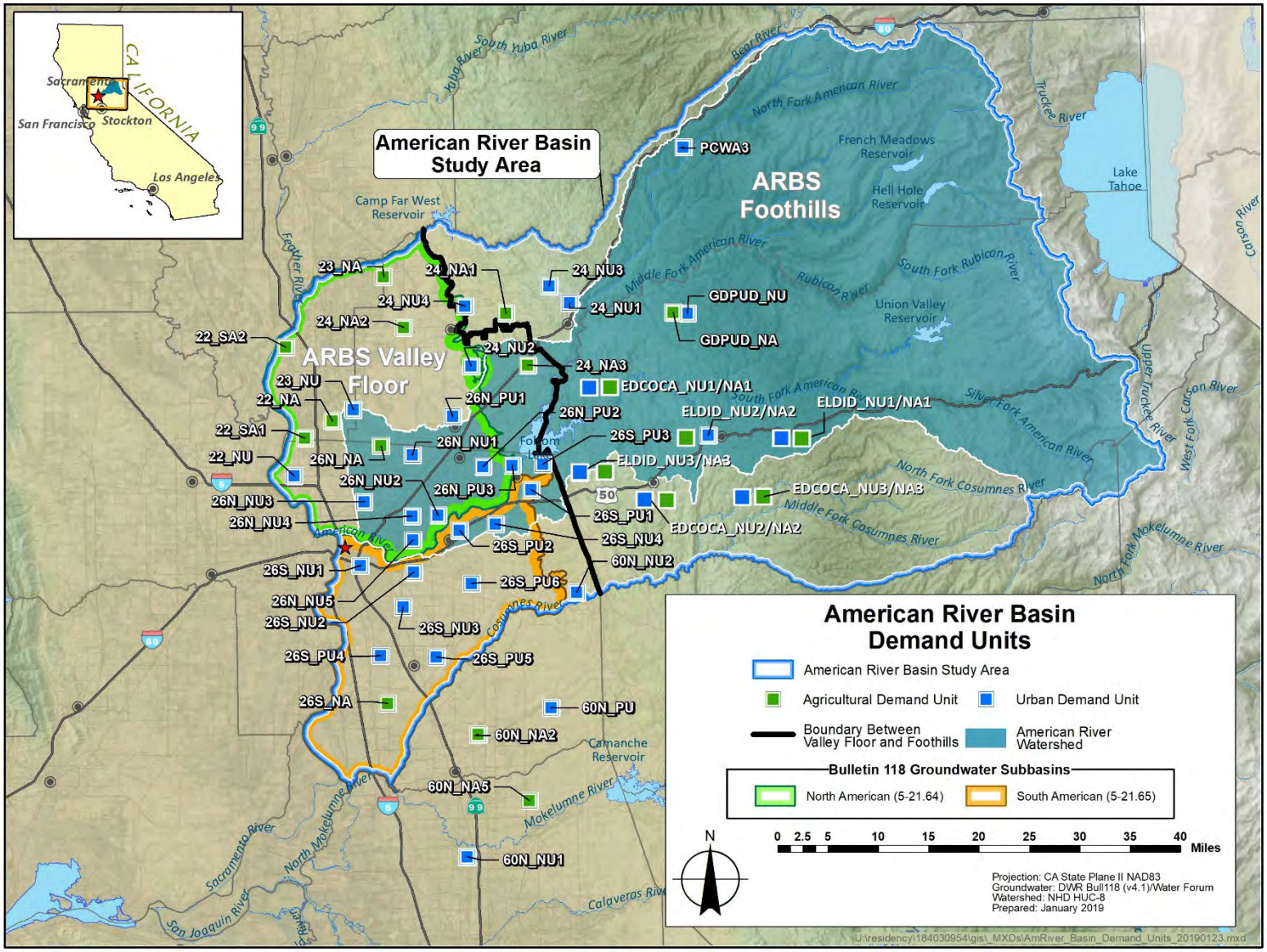


Figure 1-4. CalSim 3.0 Urban and Agricultural Demands Units within ARBS Foothills and ARBS Valley Floor Areas.

Table 1-1. Urban Demand Units in the American River Basin Study Area

Demand Unit	Cities, Towns, and Communities	Water Agency Retail (Wholesale)	Water Source		
			GW	SW	Point of Diversion
22_NU	Sacramento International Airport	(City of Sacramento)	■	-	N/A
	Metro Air Park	Sacramento County WA Zone 41 (City of Sacramento)	-	-	N/A
	Northgate 880	Sacramento County WA Zone 41	■	-	N/A
	Small communities	Self-supplied	■	-	N/A
23_NU	Small communities	Self-supplied	■	-	N/A
24_NU1	Auburn, Bowman	Placer County WA – Upper Zone 1	-	■	Bear River – Bear River Canal
	Christian Valley Park	Christian Valley Park CSD	-	■	Boardman Canal
24_NU2	Loomis, Newcastle, Penryn, Rocklin, Granite Bay (Portion), Roseville (Portion)	Placer County WA - lower Zone 1	■	■	Bear River – Bear River Canal, North Fork American River
	Lincoln	City of Lincoln (Placer County WA, Nevada ID)	■	■	Bear River – Bear River Canal
	West Placer	Cal-Am WC (Placer County WA)	■	-	Bear River – Bear River Canal
24_NU3	North Auburn	Nevada ID	-	■	Bear River – Bear River Canal
24_NU4	Small communities	Self-supplied	■	-	N/A
26N_NU1	Northridge, McClellan Business Park	Sacramento Suburban WD – NSA13, McClellan (Placer County WA)	■	■	Folsom Lake
	Arcade – North Highlands	Sacramento Suburban WD – NSA12 (Placer County WA)	■	■	Folsom Lake
	Antelope	Cal-Am WC	■	-	Folsom Lake
	Lincoln Oaks	Cal-Am WC	■	-	Folsom Lake
	Rio Linda, Elverta	Rio Linda Elverta CWD	■	-	Folsom Lake
26N_NU2	Carmichael	Carmichael WD	■	■	Lower American River
26N_NU3	City of Sacramento – North	City of Sacramento	■	■	Lower American and Sacramento Rivers
26N_NU4	Arcade	Sacramento Suburban WD – SSA (City of Sacramento)	■	■	Lower American River
26N_NU5	Arden	Golden State WC	■	-	N/A
	Del Paso Service Area	Del Paso Manor WD	■	-	N/A
	Arden Park Vista Service Area	Sacramento County WA Zone 41	■	-	N/A
	Arden	Cal-Am WC	■	-	N/A
26N_PU1	Roseville	City of Roseville	■	■	Folsom Lake
26N_PU2	San Juan Retail Service Area	San Juan WD	-	■	Folsom Lake
26N_PU3	Orange Vale	Orange Vale WC (San Juan WD)	■	■	Folsom Lake
	City of Citrus Heights	Citrus Heights WD (San Juan WD)	■	■	Folsom Lake
	Fair Oaks	Fair Oaks WD (San Juan WD)	■	■	Folsom Lake
	City of Folsom – Ashland	City of Folsom (San Juan WD)	-	■	Folsom Lake
26S_NU1	City of Sacramento – South	City of Sacramento	■	■	Lower American and Sacramento Rivers

Table 1-1. Urban Demand Units in the American River Basin Study Area (contd.)

Demand Unit	Cities, Towns, and Communities	Water Agency Retail (Wholesale)	Water Source[1]		
			GW	SW	Point of Diversion
26S_NU2	Parkway	Cal-Am WC (City of Sacramento)	■	■	Lower American River
	Suburban	Cal-Am WC (City of Sacramento)	■	■	Lower American River
	Rosemont	Cal-Am WC (City of Sacramento)	■	■	Lower American River
26S_NU3	Florin	Florin County WD	■	-	N/A
	Fruitridge	Fruitridge Vista WC	■	-	N/A
	Tokay Park	Tokay Park WC (Zone 41)	■	-	N/A
26S_NU4	Groundwater remediation	Aerojet	■	■	Folsom Lake
26S_PU1	City of Folsom	City of Folsom	■	■	Folsom Lake
	Folsom State Prison	Folsom State Prison	-	■	Folsom Lake
26S_PU2	Rancho Cordova	Golden State WC	■	■	Folsom South Canal
26S_PU3	Folsom Lake shoreline	California Parks and Recreation	-	■	Folsom Lake
26S_PU4	Laguna	Sacramento County WA – SSA (Zone 40)	■	■	Sacramento River
26S_PU5	City of Elk Grove	Elk Grove WD, Tariff Area No.2 (Sacramento County WA)	■	■	Sacramento River
		Elk Grove WD, Tariff Area No.1	■	-	N/A
26S_PU6	Vineyard	Sacramento County WA – CSA (Zone 40)	■	-	N/A
	Mather-Sunrise	Sacramento County WA – NSA (Zone 40)	■	-	N/A
	Sunrise/Security Park	Cal-Am WC (Sacramento County WA)	■	-	N/A
60N_NU1	Galt	City of Galt	■	-	N/A
	Lodi	City of Lodi	■	-	N/A
	Small communities	Self-supplied	■	-	N/A
60N_NU2	Rancho Murieta	Rancho Murieta CSD	-	■	N/A
60N_PU	Rancho Seco Power Plant	Sacramento Municipal Utility District	-	■	Folsom South Canal
GDPUD	Georgetown	Georgetown Divide Public Utility District	-	■	Stumpy Meadows Reservoir/Pilot Creek
ELDID_NU1	EID Eastern water supply region	El Dorado ID	-	■	El Dorado Forebay, Jenkinson Lake
ELDID_NU2	EID Western water supply region	El Dorado ID	-	■	El Dorado Forebay, Jenkinson Lake
ELDID_NU3	EID EDH water supply region	El Dorado ID	-	■	Folsom Lake, Stumpy Meadows Reservoir/Pilot Creek
EDCOCA_NU1	EDC OCA (N. SFA)	Outside of existing purveyor boundaries[2]	-	■	Folsom Lake, El Dorado Forebay, Jenkinson Lake
EDCOCA_NU2	EDC OCA (S. SFA, west of Hwy 49)	Outside of existing purveyor boundaries[2]	-	■	Folsom Lake, El Dorado Forebay, Jenkinson Lake
EDCOCA_NU3	EDC OCA (S. SFA, east of Hwy 49)	Outside of existing purveyor boundaries[2]	-	■	El Dorado Forebay, Jenkinson Lake
PCWA3	Alta, Dutch Flat, Colfax, Applegate, Meadow Vista	Dutch Flat MWC, Weimar WC, Midway Heights County WD, Heather Glen CSD, Meadow Vista County WD (Placer County WA)	-	■	Lower Boardman Canal

Notes:

[1] • indicates use of groundwater or surface water

[2] Assumed to rely on water supply assets held by EID and GDPUD

Key:
CSA = Central Service Area
CSD = Community Service District
EDC = El Dorado County
GW = groundwater
MWC = Mutual Water Company
N/A = not applicable
NSA = North Service Area
OCA = Other County Areas
SSA = South Service Area
SW = surface water
WA = Water Agency
WC = Water Company
WD = Water District

Table 1-2. Agricultural Demand Units in the American River Basin Study Planning Area

Demand Unit	Water District or Agency	Water Provider	Water Source		
			GW	SW	Point of Diversion
22_NA	Non-district	N/A	■	■	Sacramento River
22_SA1	Natomas Central MWC, Pleasant Grove-Verona MWC, misc. settlement contractors	CVP	■	■	Sacramento River, Cross-Canal
22_SA2	Feather River diverters (non-district)	N/A	-	■	Feather River
23_NA	Camp Far West ID, South Sutter WD, non-district	South Sutter WD	■	■	Bear River
24_NA1	Nevada ID	Nevada ID	■	■	Combie Canal, Auburn Ravine
24_NA2	Placer County WA Zone 5, non-district	Placer County WA	■	■	Auburn Ravine
24_NA3	Placer County WA Zone 1	Placer County WA	■	■	Lower Boardman Canal, South Canal
26N_NA	Non-district	N/A	■	-	N/A
26S_NA	Non-district	N/A	■	-	N/A
60N_NA2	Omochumne-Hartnell WD, Clay WD, Galt ID	N/A	■	-	N/A
60N_NA5	Non-district, riparian diverters	N/A	■	■	N/A
ELDID_NA1	EID Eastern water supply region	EID	-	■	El Dorado Forebay, Jenkinson Lake
ELDID_NA2	EID Western water supply region	EID	-	■	El Dorado Forebay, Jenkinson Lake
ELDID_NA3	EID El Dorado Hills supply region	EID	-	■	Folsom
GDPUD_NA	Georgetown Divide PUD	GDPUD	-	■	Stumpy Meadows Reservoir/Pilot Creek
EDCOCA_NA1	Potential Ag demands in OCA, north of the South Fork American River.	N/A[1]	-	■	Folsom Lake, El Dorado Forebay, Jenkinson Lake
EDCOCA_NA2	Potential Ag demands in OCA, south of the South Fork American River (west of Hwy 49)	N/A[1]	-	■	Folsom Lake, El Dorado Forebay, Jenkinson Lake
EDCOCA_NA3	Potential Ag demands in OCA, south of the South Fork American River (east of Hwy 49)	N/A[1]	-	■	El Dorado Forebay, Jenkinson Lake

Notes;
[1] For modeling future conditions, assumed to rely on water supply assets held by EID and GDPUD
Key:
CVP = Central Valley Project
EID = El Dorado Irrigation District
GDPUD = Georgetown Divide PUD
GW = Groundwater
ID = Irrigation District
MWC = Mutual Water Company
OCA = Other County Areas in El Dorado County, outside of existing purveyor boundaries
N/A = Not available
SW = Surface Water
WA = Water Agency

Organization of Document

Following this introduction chapter, the document is organized as follows:

- Chapter 2 describes the approach used for developing the urban water demands for the ARBS in the entire CalSim 3.0 domain for existing and future planning horizons.

- Chapter 3 describes the approach used for developing the agricultural land uses and water demands for the ARBS in the entire CalSim 3.0 domain for existing and future planning horizons.

- Chapter 4 summarizes the results of urban demands and agricultural land use development.

- Chapter 5 includes references used in the collection of data and preparation of this technical memorandum.

- Attachment A presents CalSim 3.0 WBAs within the Study Area and associated urban and agricultural demand units.

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Chapter 2
Urban Water Demand Methodology

This chapter describes the methods and data sources used to develop the urban water demands for CalSim 3.0 for four planning horizons: Existing, 2050, 2070 and 2085 levels of development.

CalSim 3.0 Simulation of Urban Demands

CalSim 3.0 water demands are based on a mix of production and population data and represent demand at the water treatment plant or wellhead. Water demands include transmission and distribution losses. Downstream from the transmission and distribution system, urban water use is divided into indoor and outdoor water use. All indoor water is assumed to return to a wastewater treatment plant (or septic system for smaller communities). Treated wastewater is removed through spray irrigation and evaporation, percolation to groundwater from holding lagoons, or discharged to streams and rivers. Outdoor water use is assumed to be 80 percent consumed, with the remaining 20 percent percolating to groundwater.

In the latest available version of CalSim 3.0 released in 2017 (referred to as the 2017 CalSim 3.0 model), the water demands are set equal to the average 2006-2010 production. The demands were based on production data obtained from DWR's Public Water System Statistics (PWSS) database and supplemented with data from 2010 Urban Water Management Plans (UWMP). For small scattered communities, water demands are based on an assumed per capita demand and population data from the U.S. 2010 census.

For most of the urban demand units in the CalSim 3.0 domain, the monthly pattern of demands is based on historical production data for water years 2006 to 2010 (as available) from the PWSS database. Where no delivery data are available for cities and communities within a demand unit, the monthly delivery pattern is set equal to that of a similar, often adjacent, urban demand unit. Typically, industrial water use is aggregated with municipal water use and represented by a single demand unit. However, CalSim 3.0 includes several demand units uniquely for industrial water use. In cases where no monthly delivery data were available for these industrial demand units, monthly demands are assumed to be constant throughout the year.

Indoor urban demands are estimated as a fixed amount throughout the year represented by the month of lowest demand in any year, for each demand unit. Outdoor urban demands are estimated as the portion of the demand above the fixed indoor demand (see illustration to the right).

Urban indoor demand is represented by the month of lowest demand in any year. Urban outdoor demand is the remaining portion of the urban demand.

ARBS Valley Floor Region

Existing Conditions

The California Water Conservation Act of 2009, also known as Senate Bill X7-7, established a goal to reduce urban per capita water use by 20 percent by the year 2020. Each retail urban water supplier must determine its baseline water use during their baseline period, and a target water use for the years 2015 and 2020 in order to help the State achieve the 20 percent reduction. The 2015 UWMPs document the urban demands under existing conditions, which reflects the interim targets towards the 20x2020 target.

The 2017 CalSim 3.0 nominal demands for existing conditions (2006-2010) were updated to reflect the 2011-2013 averages representing adopted statewide water conservation measures. Demand updates used information from the Regional Drought Contingency Plan/Regional Water Reliability Plan (RWRP) (Regional Water Authority, 2017) and 2015 UWMPs.

Urban demands during the period 2014-2015 reflected the effects of temporary emergency drought conservation measures imposed state-wide. Data from this period is not used to update the existing urban demand. Furthermore, in 2018 the Governor signed two bills which build on the ongoing efforts to "make conservation a California way of life." Senate Bill 606 and Assembly Bill 1668 will create new urban efficiency standards for urban water suppliers, which will impact a supplier's demand. These drought conservation measures are considered adaption measures to address the effects of future climate change and are not included in the baseline demands.

2050, 2070, and 2085 Levels of Development

The following data sources were used to develop the projection of urban demands for the future planning horizons (2050, 2070, and 2085):

- 2015 UWMPs includes estimates of demands to year 2035, and some plans include projected demands to 2040 or 2045, reflecting estimates of buildout.

- Regional Drought Contingency Plan (RDCP)/RWRP (RWA, 2017) compiled estimates of buildout urban demand for each of the RWA's member agencies, which relied on the 2015 UWMPs and other correspondence with agency staff.

- SSJRBS developed projections of urban water demands through 2100. The demand projections were developed using WEAP-based Planning Area model under various population, growth, and climate change scenarios. DWR, as part of California Water Plan, 2018 Update has further updated the SSJRBS model simulations using revised climate change scenarios. Urban water demands in the WEAP Planning Area model are typically developed at the resolution of DWR's Planning Areas (**Figure 2-1**).

- Outdoor urban demands were adjusted to reflect projected changes in monthly mean evapotranspiration.

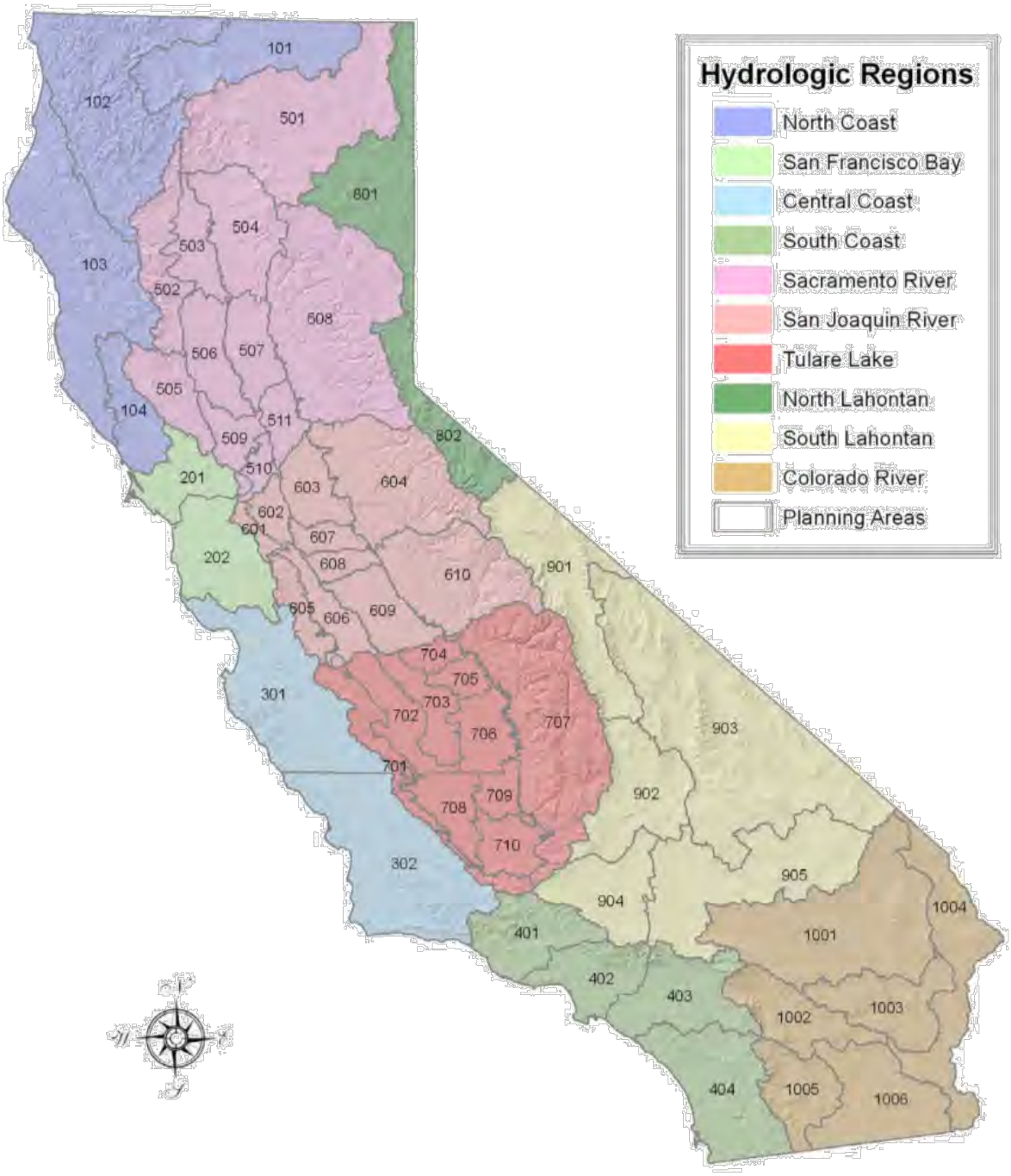

Figure 2-1. California Department of Water Resources State-wide Planning Areas.

Demand projection for 2050, 2070, and 2085 levels of development are generally outside the planning horizon of UWMPs and other local planning documents. The WEAP Planning Area model provides projections of demand trends through 2100 using three socioeconomic scenarios:

- Expansive Growth – projects high population growth and low urban density.
- Current Trends – maintains current trends of population growth and urban density.
- Slow Growth – projects low population growth and high urban density.

For this analysis, the demand trends corresponding to the current socioeconomic trend were selected to project future demands. The trend applied to each demand unit corresponds to the Planning Area encompassing the targeted demand unit. The higher end demands is not used in this analysis. It can be considered for sensitivity analysis along with the lower end demands.

Table 2-1. Conceptual Growth Scenarios (Sacramento River Hydrologic Region Averages)

Scenario	Population Growth	Development Density	Change in Population (2006-2050)	Change in Urban Density (2006-2050)	Change in Irrigated Crop Area (2006-2050)
LOP-HID	Lower than Current Trends	Higher than Current Trends	35%	16%	-0.3%
LOP-CTD		Current Trends	35%	18%	-0.5%
LOP-LOD		Lower than Current Trends	35%	20%	-0.7%
CTP-HID	Current Trends	Higher than Current Trends	56%	27%	-1.4%
CTP-CTD*		Current Trends	56%	30%	-1.7%
CTP-LOD		Lower than Current Trends	56%	33%	-2.0%
HIP-HID	Higher than Current Trends	Higher than Current Trends	104%	44%	-3.2%
HIP-CTD		Current Trends	104%	51%	-3.8%
HIP-LOD		Lower than Current Trends	104%	57%	-4.5%

Source: Tables SR-21, SR-22, and SR-23 California Water Plan Update 2013 (DWR).

Notes:
* CTP- CTD represent the current trend for population grown and pattern of development density. CTP-CTD current socioeconomic trend is selected to forecast future demands for the ARBS.

The projection of future demands was conducted for each demand unit based on available information from UWMPs and other planning documents as follows:

- If buildout demand is provided, and/or future demands are not increasing (i.e., assumed buildout):
    a. If buildout demand would occur beyond a planning horizon, then interpolate demand for 2050, 2070 or 2085.
    b. Otherwise, demand for any planning horizon occurring after buildout is set equal to the buildout demand.

- If no buildout demand information, and future demands are increasing (i.e., buildout occurring beyond 2085):

    a. If most distant demand projection would occur after the planning horizon, then interpolate demand for 2050, 2070 or 2085.

    b. Otherwise, the most distant demand projection is extrapolated to years 2050, 2070, and 2085 using the demand trends corresponding to "current socioeconomic" scenario.

ARBS Foothills Region

Water purveyors in the ARBS Foothills region include EID, PCWA Upper Zone 6, GDPUD and NID. Existing and future demand projections are presented for each agency. The 2017 CalSim 3.0 model did not have representation of demand units in the ARBS Foothills region. **Table 2-2** lists the new demand units created in CalSim 3.0 to represent these water purveyors. Each demand unit is complemented by connectivity (i.e., the physical means by which water is delivered), annual demands and monthly demand patterns to become an integrated part of the CalSim 3.0 model.

Table 2-2. New CalSim 3.0 Demand Units Developed for the ARBS Foothills Region.

Demand Unit	Water Purveyor	Demand Unit Domain and Description
ELDID_NU1	EID	EID Eastern water supply region supplied by RES A WTP and RES 1 WTP
ELDID_NU2	EID	EID Western water supply region supplied by RES A WTP and RES 1 WTP
ELDID_NU3	EID	EID El Dorado Hills supply region by EDHWTP
GDPUD_NU	GDPUD	Urban demands within the GDPUD service area supplied by Stumpy Meadows Project and Reservoir
EDCOCA_NU1	Outside existing purveyor boundaries	OCA urban demands north of the South Fork American River
EDCOCA_NU2	Outside existing purveyor boundaries	OCA urban demands South of the South Fork American River (west of Highway 49)
EDCOCA_NU3	Outside existing purveyor boundaries	OCA urban demands south of the South Fork American River (east of Highway 49)
24_NU1	PCWA Lower Zone 6	Bowman and Auburn water treatment plants
PCWA3	PCWA Upper Zone 6	Alta, Monte Vista, Colfax, and Applegate water treatment plants
24_NU3	NID	North Auburn treated water system

Key:
EDHWTP = El Dorado Hill Water Treatment Plant
EID = El Dorado Irrigation Water District
GDPUD = Georgetown Divide Public Utilities District
NID = Nevada Irrigation District
WTP = Water Treatment Plant
OCA = Other County Areas in El Dorado County outside of existing purveyor boundaries

Existing Conditions

Development of existing level of demand of each water purveyors in the ARBS Foothills region is discussed below. Note that results of the demand estimates are presented in Chapter 4.

El Dorado Irrigation District

Existing annual demands for El Dorado Irrigation District were referenced from the 2014 West Slope Update Water Resources Development and Management Plan (WRDMP) and the 2015 EID UWMP. The 2011-2013 average from the 2015 EID UWMP is approximately 39 thousand acre-feet (TAF)/year, which includes potable water served to agricultural customers, potable water wholesaled to the City of Placerville, and recycled water served to residential and commercial customers.

The demand units representing EID in CalSim 3.0 are defined at the water treatment plant level, so the final demands used in the model are calculated by subtracting recycled water supplies from the 39 TAF/year demands from the EID UWMP. EID recycled water supply production varies annually. For this analysis, an average of production rate of 2.5 TAF/year is assumed. Therefore, the existing conditions demand for EID used in CalSim 3.0 is 36.5 TAF/year.

The total EID demand is disaggregated into three CalSim 3.0 demand units: ELDID_NU1, ELDID_NU2 and ELDID_NU3. The total demands are distributed among the three demand units using water treatment plant production data for RES A WTP, RES 1 WTP and El Dorado Hills WTP. Under these assumptions, ELDID_NU1 and ELDID_NU2 account for 85 percent of total EID demands and ELDID_NU3 accounts for 15 percent of total EID demands.

Monthly urban demand patterns were developed using data from the EID 2013 Integrated Water Resource Management Plan (IWRMP), which provides monthly water treatment plant production data for El Dorado Irrigation District's Reservoir A Water Treatment Plant (WTP), Reservoir 1 WTP and El Dorado Hills WTP for 2008. Indoor demands are estimated as a fixed amount throughout the year represented by the month of lowest demand.

Georgetown Divide Public Utilities District

Georgetown Divide Public Utilities District urban demands are represented by GDPUD_NU, which is supplied by the Stumpy Meadows Project and Reservoir, which is the only existing water source for the District. There is currently no recycled water being used in the District's service area and there are no opportunities in the area to use recycled water because there are no sewer systems on the Divide. Therefore, demand estimates for GDPUD, based on the production data from the Stumpy Meadows Project, were not adjusted.

Monthly demand patterns were developed using data from PWSS Database. Indoor demands are estimated as a fixed amount throughout the year represented by the month of lowest demand. Outdoor demand is the remaining portion of the demand.

Grizzly Flats Community Services District

Grizzly Flats Community Services District (GFCSD) relies on groundwater for its water supplies. Urban demands within the GDSCS are not included in the CalSim 3.0 representation of the ARBS Foothills region.

Other El Dorado County Areas

Areas in El Dorado County that are outside existing water service boundaries of EID, GDPUD, and GFCSD are collectively referred to as Other County Areas (OCA). In OCA, water is typically supplied by individual property owners and small privately-owned water providers from wells and springs. Since 1999, the El Dorado County Local Agency Formation Commission (LAFCO) has approved 40 annexations to water purveyor's Service Areas to provide water service to an area of approximately 5,000 acres. Majority of these annexations have occurred in the El Dorado Hills area within the EID Service Area. The existing demands for EID and GDPUD include demands from Favorable Areas within the OCA that have been annexed into their Service Areas since 1999.

Urban OCA demands in El Dorado County are represented collectively by three demand units: EDCOCA_NU1, EDCOCA_NU2 and EDCOCA_NU3. EDCOCA_NU1 represents the portion of OCA urban demands north of the South Fork American River. EDCOCA_NU2 represents the portion of OCA urban demands South of the South Fork American River west of Highway 49. EDCOCA_NU3 represents the portion of OCA urban demands south of the South Fork American River east of Highway 49.

The urban demands in OCA are not reallocated to EID or GDPUD and are assumed to be satisfied with individual wells. Therefore, OCA demands are assumed to be zero for existing conditions.

Placer County Water Agency

Foothills urban demands for PCWA Zone 6 are represented by two CalSim 3.0 demand units: 24_NU1 and PCWA3. 24_NU1 represents demands on Auburn and Bowman WTPs because of their common contractual access to water (Bear and Yuba river diversions). PCWA3 represents water systems in what was previously referred to as PCWA Zone 3 and consists of the demands from the following water treatment plants: Alta (0.55 million gallon per day (MGD)), Monte Vista (0.10 MGD), Colfax (1.58 MGD), and Applegate (0.065 MGD). Both 24_NU1 and PCWA3 are primarily supplied by PG&E's Drum-Spaulding system.

PCWA does not own or operate any wells in the Foothills area, as all existing and future wells are within the North American Groundwater Basin and characterized within the Valley Floor area. Additionally, PCWA does not anticipate utilizing groundwater to support its normal year water deliveries.

Monthly demand patterns were developed using data from PWSS Database. Indoor demands are estimated as a fixed amount throughout the year represented by the month of lowest demand.

Nevada Irrigation District

Nevada Irrigation District's North Auburn treated water system is inside the Foothills region of the ARBS planning area and is represented by demand unit 24_NU3. Existing demand for 24_NU3 were calculated using the existing population multiplied by interim water consumption target (gallon per capita per day (GCPD) from NID 2015 UWMP. NID's North Auburn represents approximately 12.4 percent of NID population and serves 12.3 percent of the total connections.

NID does not utilize groundwater as an existing or planned source of water supply due to limited groundwater availability. Majority of NID has no groundwater aquifer per DWR's Bulletin 118 except the very small portion of NID's service area in Lincoln, which is on the eastern boundary of the Sacramento River Basin, North American Sub-Basin.

Monthly demand patterns were developed using data from PWSS Database. Indoor demands are estimated as a fixed amount throughout the year represented by the month of lowest demand.

2050, 2070, and 2085 Levels of Development

Development of projected 2050, 2070, and 2085 level of demand of each water purveyors in the ARBS Foothills region is discussed below. Note that results of the demand estimates are presented in Chapter 4.

El Dorado County Areas

The 2014 West Slope WRDMP provides urban water demands estimates for 2012, 2030, and buildout conditions (Table 2-2). Urban demand estimates for the future planning horizons (2050. 2070, and 2085) were linearly interpolated using the projected demands in **Table 2-3**, and the assumed buildout date. Monthly demand patterns for all the future planning horizons are assumed to be consistent with existing conditions.

In the future, it is assumed that water demand within some portion of the OCA would be provided with a public water supply via annexation into the Service Area of the EID or GDPUD. These areas are identified as "Favorable Areas." The future demand projections for EID and GDPUD include estimated 25 percent of that demand, which is assumed to require access to a public water supply at some time in the future. An estimated 75 percent of the urban demands in OCA are not reallocated to EID or GDPUD and are assumed to be satisfied with individual wells. For modeling of future conditions, it is assumed that OCA demands would rely on water supply assets held by EID and GDPUD.

Table 2-3. West Slope Urban Demands (including State Mandated Urban Conservation).

Water Purveyor	Urban Demand (acre-feet)			Forecasted Buildout Year
	2012	2030	Buildout	
El Dorado Irrigation District	40,237	51,403	79,316	2075
Georgetown Divide Public Utility District	3,001	4,120	9,581	2100
Grizzly Flats Community Services District	153	187	313	2085
Other County Areas	-	-	12,336 [1,2]	2085
Western Slope Total	***43,391***	***55,710***	***101,546***	

Source Table ES-1 from the 2014 West Slope Water Resources Development Master Plan.
Notes:
[1] Includes latent demand of 5%.
[2] Assumes all 2004 General Plan/2007 WRDMP projected commercial demand (578 AF) is reallocated to EID and GDPUD

Placer County Water Agency

Future estimates of foothills urban demands for PCWA Zone 6 (demand units 24_NU1 and PCWA3) were obtained from PCWA 2015 UWMP. The 2015 UWMP forecasts future demands at 5 years increment (2020 to 2045) and buildout. For PCWA3, buildout demand is that for Zone 3. For 24_NU1, buildout demand is assumed to be 14 percent of total PCWA Zone 1 buildout

demand. Demands at future planning horizons (2050, 2070, 2085) are set equal to the buildout demand in each demand unit. Monthly demand patterns for all the future planning horizons are assumed to be consistent with existing conditions.

Nevada Irrigation District

Future estimates of foothills urban demands for NID's North Auburn treated water system (demand units 24_NU3) were obtained by projecting estimated 2040 demands using the WEAP planning area model trends to estimate future demand at 2050 (buildout). The 2040 demands are estimated using the projected population estimate multiplied by the targeted GCPD (2015 NID UWMP). For 2070 and 2085, demands remained unchanged from 2050. Monthly demand patterns for all the future planning horizons are assumed to be consistent with existing conditions.

CalSim 3.0 Model Domain Outside the ARBS Area

Existing Conditions

The areas outside the Study Area are not the focus of ARBS demand-supply imbalance analysis. Therefore, for these areas, the existing demands and monthly demand patterns were not adjusted from the information include in the 2017 CalSim 3.0. The water demands reflect the average 2006-2010 production levels, consistent with the 2010 UWMPs. The demand in the areas outside the Study area was not updated to reflect the 2015 UWMPs information. This update is outside the scope and focus of the ARBS. Demands within the Study are updated to reflect the 2015 UWMPs.

For small scattered communities outside the ARBS area, water demands are based on an assumed per capita demand and population data from the U.S. 2010 census. The monthly pattern of demands is based on historical production data for water years 2006 to 2010.

2050, 2070, and 2085 Levels of Development

The existing levels of demands (2006-2010) averages were adjusted to 2050, 2070, 2085 levels of demand using the 2010 to 2100 demand trends from the WEAP Planning Area model. For this analysis, the demand trends corresponding to the current socioeconomic trend were selected. Note that demand trends vary across Planning Areas, and each Planning Area encompasses a different set of demand units.

Climate Change Analysis for Urban Demands

Outdoor urban demand is a function of irrigated landscape area and will be affected by climate change. Higher rates of evapotranspiration would result in higher outdoor irrigation demand. To reflect the increased outdoor urban demands due to climate change, an outdoor urban demand adjustment factor was developed for each climate change scenario and applied to the outdoor portion of urban demands. The adjustment factor was developed by comparing the future and existing evapotranspiration rates for a reference crop with similar characteristics to irrigated landscaping turf. The adjustment factors were applied to all the urban demand units in the CalSim 3.0 domain (inside and outside of the ARBS area).

Alfalfa and irrigated pasture were used as the reference crop for this analysis. Crop evapotranspiration data for future climate change scenarios were developed by Reclamation Technical Services Center (TSC) using the VIC model developed for the California Water Commission Water Storage Investment Program.

It is assumed that indoor urban demand will not be affected by climate conditions.

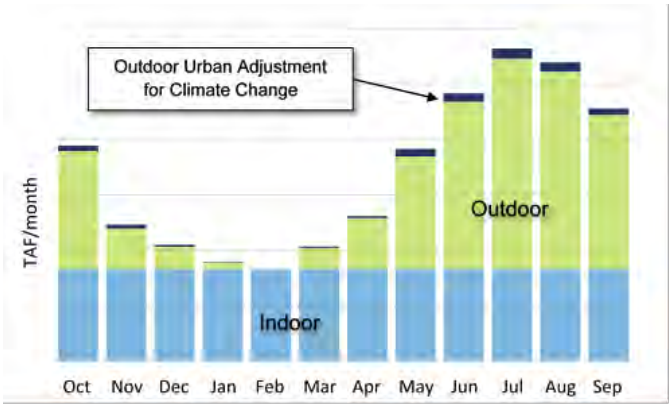

Table 2-4. Percent Increase in Urban Demands Attributed to Climate Change for the ARBS Area

	2050 Planning Horizon					2070 Planning Horizon					2085 Planning Horizon				
Climate Scenario	WW	WD	CT	HW	HD	WW	WD	CT	HW	HD	WW	WD	CT	HW	HD
Urban Demand Increase	2%	3%	3%	4%	4%	3%	3%	5%	5%	6%	2%	4%	5%	5%	7%

Notes:

1. Evapotranspiration data was developed for five climate scenarios (WW, WD, CT, HW and HD) for each of the years 2050, 2070 and 2085. Unless otherwise noted, the demands presented in the document are for the CT scenario.
2. Climate change adjustments are applied after the urban demand projection increases are calculated. This tables shows only the percentage increase due to the climate change adjustment.

Key:

WW: Warm-Wet
WD: Warm-Dry
CT: Central Tendency
HW: Hot-Wet
HD: Hot-Dry

Chapter 3
Agricultural Water Demand Methodology

This section describes the approach used to develop estimates of existing and future irrigated crop areas and agricultural demands for the CalSim 3.0 agricultural demand units. Agricultural areas are defined consistent with State-wide information available from DWR.

CalSim 3.0 Simulation of Agricultural Demands

Agricultural water demands are developed by estimating crop water demands for each agricultural demand unit using the CalSim 3.0 pre-processor, CalSimHydro. To estimate crop water demands, CalSimHydro requires the following input data:

- Irrigated area by crop type
- Precipitation
- Reference crop evapotranspiration (ET_0)
- Crop coefficients
- Planting and harvest dates
- Field application efficiency.

2017 CalSim 3.0 has estimates of the existing level of agricultural demands for the Valley Floor (both within and outside the Study Area).

To estimate crop demands for future planning horizons (2050, 2070, 2085) for the Valley Floor (both within and outside ARBS area), the following approach and available data sources are used:

- Irrigated Crop Area: CalSim 3.0 land use for existing conditions is the average of 1998-2007 data developed by DWR Division of Statewide Integrated Water Management for the California Water Plan, Update 2013. For future conditions, land use data are available from the WEAP Planning Area model developed for the SSJBS. Annual data are available for the period 2006-2100. The spatial resolution of these data is DWR's Planning Areas (**Figure 2-1**). Land area is specified for 20 crops, a multi-crop category, and fallow land. The WEAP data (2006-2100) was used to project the existing conditions data to 2050, 2070, and 2085 planning horizons.
- Precipitation: Precipitation data for future climate change scenarios was developed by Reclamation Technical Services Center (TSC) for the ARBS.

- Reference crop evapotranspiration data for future climate change scenarios is developed by Reclamation TSC using the VIC model developed for the California Water Commission (CWC) Water Storage Investment Program (WSIP).

- Crop coefficients: Standard crop coefficients are available from DWR for 20 crop categories for each county and Detailed Analysis Unit across the State. Crop coefficients are used to calculate crop evapotranspiration (ETc) by adjusting the reference crop evapotranspiration (ET_0).

- Planting and Harvest Dates: Information available in CalSimHydro for existing conditions is used for future planning horizons.

- Field Application Efficiency: Crop specific values were determined for each WBA using results from the joint DWR-UC Davis 2010 Statewide Survey of Irrigation Technology. These estimates are used for future planning horizons. Note that increases in irrigation efficiency in the future will be simulated as adaption measures.

The following sections describes the development of irrigated crop areas for ARBS Valley Floor region, and the CalSim 3.0 Model outside the ARBS area.

ARBS Valley Floor Region

Table 3-1 lists the agricultural demand units within the ARBS Valley Floor region.

Table 3-1. CalSim 3.0 Agricultural Demand Units within the ARBS Valley Floor Region

Demand Unit	Demand Unit Description
22_NA	Non-District
22_SA1	Natomas Central Mutual Water Company (MWC), Pleasant Grove-Verona MWC, miscellaneous Settlement Contractors
22_SA2	Feather River Diverters (non-district)
23_NA	Camp Far West Irrigation District, South Sutter Water District, non-district
24_NA2	Placer County Water Agency (PCWA) Zone 5, non-district
24_NA3	PCWA Zone 1
26N_NA	Non-District
26S_NA	Non-District
60N_NA2	Omochumne-Hartnell Water District, Clay Water District, Galt Irrigation District
60N_NA5	Non-District, Riparian Diverters

Existing Conditions

The 2017 CalSim 3.0 model includes estimates of existing irrigated crop areas and associated agricultural demands for the ARBS Valley Floor. However, the land use data is pre-2010. To update the estimates of existing agricultural lands in the ARBS area to reflect 2010-2016 conditions, the data sources listed in **Table 3-2** were used.

County-wide agricultural lands areas were adjusted by scaling the exiting CalSim 3.0 estimates using the updated County Commissioner Reports. County Commissioner Reports were verified for accuracy using the other data sources in **Table 3-2**.

Area of agricultural lands within each demand unit was adjusted while preserving the original total area of the demand unit. An increase in agricultural lands results in a decrease in native vegetation, and a decrease in agricultural lands results in an increase in native vegetation. Changes in land use due to urbanization is reflected by a decrease in total agricultural areas, with corresponding increase in urban water demands within affected urban demand units.

The distribution of crop types within each demand unit is unchanged, from the 2017 CalSim 3.0 model.

Table 3-2. Data Sources Used to Update Agricultural Lands within ARBS Area

Region	Data Source
El Dorado County	• Agricultural Water Management Plans (2015) • DWR Agricultural Land & Water Use Estimates (2010) • DWR Land Use Surveys (2009) • County Crop Reports (1998-2016) • 2014 West Slope Water Resources Development Master Plan (El Dorado County Water Agency)
Nevada County	• Agricultural Water Management Plan (2015) (NID)
Placer County	• Urban Water Management Plan (2015) (PCWA) • DWR Agricultural Land & Water Use Estimates (2010) • DWR Land Use Surveys (1994) • County Crop Reports (1998-2016)
Sacramento County	• Agricultural Water Management Plans (2015) • DWR Agricultural Land & Water Use Estimates (2010) • DWR Land Use Surveys (2015) • County Crop Reports (1998-2016)
Sutter County	• Agricultural Water Management Plans (2015) • DWR Agricultural Land & Water Use Estimates (2010) • DWR Land Use Surveys (2004) • County Crop Reports (1998-2016)

2050, 2070, and 2085 Levels of Development

Projected land use data for the period 2006 to 2100, for each of the crop types, are available from the WEAP model (developed for SSJBS and used for the 2018 California Water Plan Update). The WEAP model data is at the level of DWR Planning Area, which is a coarser resolution the CalSim 3.0 WBAs. Land use data and crop types are presented in Chapter 4.

Scaling factors were developed for each crop type and for each Planning Area to reflect the change in WEAP agricultural areas between the existing conditions and the future planning horizons (2050, 2070, 2085).

Existing CalSim 3.0 irrigated crop area across all demand units within a Planning Area, are adjusted using the same scaling factors to develop projected irrigated crop area for each of the future planning horizons (2050, 2070, 2085).

ARBS Foothills Region

Agriculture demands in the ARBS Foothills region are not calculated using CalSimHydro pre-processor. Instead, demands from available planning studies are integrated directly into new agricultural demand units created for the ARBS Foothills region (**Table 3-3** and **Figure 1-4**).

Table 3-3. CalSim 3.0 Agricultural Demand Units within the ARBS Foothills Region

Demand Unit	Demand Unit Description
24_NA1	Nevada ID
24_NA3	PCWA Zone 4
ELDID_NA1	EID Eastern water supply region
ELDID_NA2	EID Western water supply region
ELDID_NA3	EID El Dorado Hills supply region
GDPUD_NA	Georgetown Divide PUD
EDCOCA_NA1	Potential Ag demands in OCA, north of the South Fork American River.
EDCOCA_NA2	Potential Ag demands in OCA, south of the South Fork American River (west of Hwy 49)
EDCOCA_NA3	Potential Ag demands in OCA, south of the South Fork American River (east of Hwy 49)

Key:
EID = El Dorado Irrigation Water District
PUD = Public Utilities District
OCA = Other County Areas in El Dorado County outside of existing purveyor boundaries

Existing Conditions

El Dorado County Areas

Existing and buildout agricultural demands of each water purveyors in the West Slope area of El Dorado County are summarized in **Table 3-4**. Monthly agricultural demand patterns are assumed to be consistent with those from adjacent CalSim 3.0 water budget areas.

Table 3-4. West Slope Agricultural Demands.

Water Purveyor	Agricultural Demand (acre-feet)			Forecasted Buildout Year
	2012	2030	Build-Out	
El Dorado Irrigation District	7,977	9,515	19,218	2085
Georgetown Divide Public Utility District	7,121	7,621	10,349	2085
Grizzly Flats Community Services District	-	-	-	-
Other County Areas	-	-	17,476	2085
Western Slope Total	***15,098***	***17,136***	***47,043***	

Source Table ES-1 from the 2014 West Slope Water Resources Development Master Plan.

Placer County Water Agency

A portion of demand unit 24_NA3 (PCWA zone 3) falls within the boundary of the Foothill region (refer to Figure A-7). However, since the majority of the demand unit is within the Valley Floor region, it is considered part of the Valley Floor region. Water demand for 24_NA3 is estimated using the crop water demand approach described above for the Valley Floor region.

Nevada County Irrigation District

Agricultural demand in NID is represented by demand unit 24_NA1. Although demand unit 24_NA1 is considered part of the Foothill region, its demand is estimated using the crop water demand approach described above for the Valley Floor region.

2050, 2070, and 2085 Levels of Development

El Dorado County Areas

Buildout agricultural demands presented in Table 3-4 are assumed to occur at the year 2085. Linear interpolation was used to calculate demands for the other planning horizons of 2050 and 2070. The demands were distributed to EDCOCA_NA1, EDCOCA_NA2 and EDCOCA_NA3 using a proportion of agricultural land use attributed to each demand unit. In the future, it is assumed that projected agricultural demand within the OCA would be provided through newly developed infrastructure for the lands outside the EID and GDPUD Service Areas.

Monthly demand patterns for all the future planning horizons are assumed to be similar to existing conditions, which is based on the monthly demand pattern of adjacent CalSim 3.0 water budget areas.

Placer County Water Agency

Demand unit 24_NA3 (PCWA Zone 3) is considered part of the Valley Floor region (only a small fraction falls within the Foothills region). Water demand for 24_NA3 is estimated using the crop water demand approach described above for the Valley Floor region.

Nevada County Irrigation District

Water demand for 24_NA1 (NID) is estimated using the crop water demand approach described above for the Valley Floor region.

CalSim 3.0 Model Domain Outside the ARBS Area

Although not focus of the ARBS, demands for areas outside the ARBS area have been updated to ensure consistent information throughout the model domain. In addition, changes in hydrology and demands outside the ARBS area have effect on the system-wide operations that also affect Folsom operations; therefore, affecting local supplies.

Existing Conditions

The 2017 CalSim 3.0 model has irrigated crop areas and associated agricultural demands that reflects the average of 1998-2007 land use data. These existing agricultural demands were considered adequate for this analysis, which focuses primarily on the supply-demand imbalance within the ARBS area. Therefore, no updates to the existing agricultural demands were performed for CalSim 3.0 model domain outside the ARBS area.

2050, 2070, and 2085 Levels of Development

Projected irrigated crop areas for the future planning horizons (2050, 2070, 2085) were developed similarly to the ARBS Valley Floor region.

Projected land use data for the period 2006 to 2100, for each of the crop types, are available from the WEAP model. Scaling factors, to reflect the change in WEAP estimated agricultural areas between the existing conditions and the future planning horizons (2050, 2070, 2085), were developed for each crop type and for each Planning Area.

Existing CalSim 3.0 irrigated crop areas across all demand units within a Planning Area are adjusted using the same scaling factors to develop projected irrigated crop area for each of the future planning horizons (2050, 2070, 2085).

Chapter 4 Summary of Results

This section summarizes the results of urban water demands, and agricultural water demands and land use with the Study Area.

Urban Water Demands

Figure 4-1 and Table 4-1 present the urban water demands estimates within the Study Area for each of the four planning horizons (existing, 2050, 2070, 2085). **Table 4-2** lists the assumptions and data sources used to develop the existing and future urban demand estimates. **Figure 4-2** and **Table 4-3** present the monthly urban water demand pattern. The demand patterns are applied for each of four planning horizons (existing, 2050, 2070, 2085).

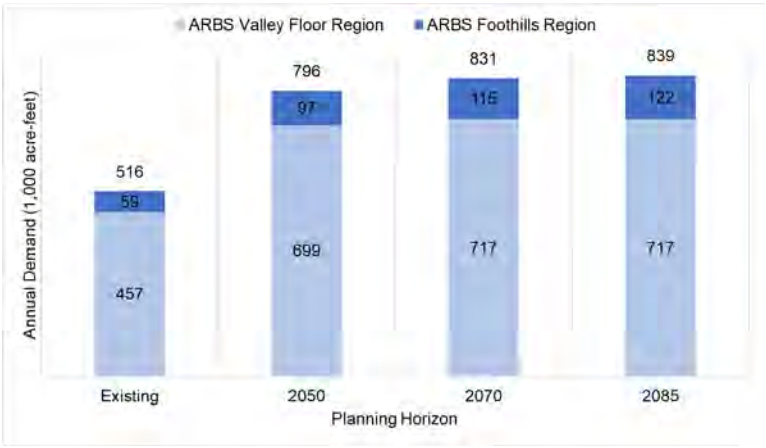

Figure 4-1. Urban Water Demand Estimates within the Study Area (Existing, 2050, 2070, 2085).

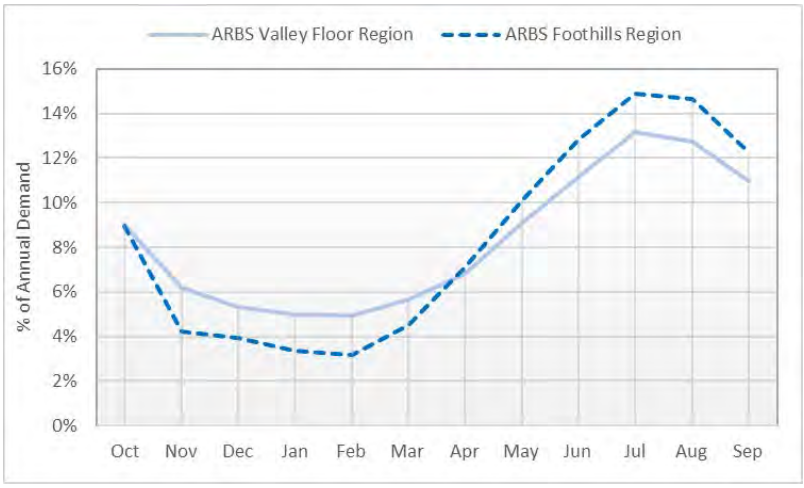

Figure 4-2. Urban Water Demand Patterns within the Study Area (average across all demand units; refer to Table 4-3).

Table 4-1. Urban Water Demands within the Study Area (1,000 acre-feet/year).

Demand Unit	Demand Unit Description	Existing	2050	2070	2085
ARBS Valley Floor Region					
22_NU	Northgate 880	2.7	6.4	6.4	6.4
23_NU	Self-Supplied	1.4	1.4	1.4	1.4
24_NU2.1	PCWA: Lower Zone 6, Foothill-Sunset WTP	22.7	51	51	51
24_NU2.2	PCWA: City of Lincoln (FO-SU)	10.1	37	37	37
24_NU4	Self-supplied	0.4	1.0	1.0	1.0
26N_NU1.1	SSWD – NSA (Arcade NH)	4.2	4.7	4.7	4.7
26N_NU1.2	SSWD – NSA (Northridge)	15.7	17.4	17.4	17.4
26N_NU1.3	McClellan	-	0.0	0.0	0.0
26N_NU1.4	Cal-Am WC – Antelope	5.6	5.4	5.4	5.4
26N_NU1.5	Lincoln Oaks	7.9	6.4	6.4	6.4
26N_NU1.6	Cal-Am-WC - West Placer	0.8	6.8	6.8	6.8
26N_NU1.7	Rio Linda Elverta CWD	5.8	10.5	10.5	10.5
26N_NU2	Carmichael WD	9.9	10.3	10.3	10.3
26N_NU3	City of Sac (N)	39.7	68.9	73.5	73.5
26N_NU4	SSWD - SSA	17.5	19.3	19.3	19.3
26N_NU5.1	Golden State WC – Arden	1.1	1.1	1.1	1.1
26N_NU5.2	Del Paso Manor WD	1.5	1.5	1.5	1.5
26N_NU5.3	SCWA Zone 41 – Arden Park Vista	3.8	3.8	3.8	3.8
26N_NU5.4	Cal-Am WC – Arden	1.7	1.7	1.7	1.7
26N_PU1	City of Roseville	31.8	53.7	55.0	55.0
26N_PU2	San Juan WD	13.8	20.4	20.4	20.4
26N_PU3.1	Orange Vale WC	4.6	5.6	5.6	5.6
26N_PU3.2	Citrus Heights WD	14.1	20.5	20.5	20.5
26N_PU3.3	Fair Oaks WD	11.7	14.3	14.3	14.3
26N_PU3.4	City of Folsom (Ashland)	1.5	1.7	1.7	1.7
26S_NU1	City of Sacramento (S)	73.7	128.0	136.6	136.6
26S_NU2.1	Cal-Am WC – Parkway	11.1	20.4	20.4	20.4
26S_NU2.2	Cal-Am WC – Suburban	5.9	8.1	8.1	8.1
26S_NU2.3	Cal-Am WC – Rosemont	5.9	8.1	8.1	8.1
26S_NU3.1	Florin	1.6	1.0	1.0	1.0
26S_NU3.2	Fruitridge Vista	0.1	0.1	0.1	0.1
26S_NU3.3	Tokay Park	4.5	3.0	3.0	3.0
26S_NU4	Aerojet	2.7	2.7	2.7	2.7
26S_PU1	Folsom	23.6	28.8	32.0	32.0
26S_PU2	Golden State WC	17.5	22.0	22.0	22.0
26S_PU3	California Parks and Recreation	1.0	1.0	1.0	1.0
26S_PU4	SCWA – SSA (Zone 40)	11.8	27.0	27.0	27.0
26S_PU5	EGWD	7.8	8.1	8.1	8.1
26S_PU6.1	SCWA – CSA, Vineyard	16.3	39.8	39.8	39.8
26S_PU6.2	SCWA – NSA, Mather-Sunrise	3.8	9.4	9.4	9.4
26S_PU6.3	Security Park	0.0	0.0	0.0	0.0
60N_NU1	Galt, Lodi	21.1	32.0	32.0	32.0
60N_NU2	Rancho Murieta CSD	1.7	2.9	2.9	2.9
60N_PU	SMUD – Rancho Seco Power Plant	16.8	16.8	16.8	16.8
	Subtotal ARBS Valley Floor Region	**456.9**	**699.0**	**716.7**	**716.7**

Demand Unit	Demand Unit Description	Existing	2050	2070	2085
ARBS Foothills Region					
PCWA3	Alta, Dutch Flat, Colfax, Applegate, Meadow Vista	11.3	10.3	10.3	10.3
24_NU1	PCWA: Upper Zone 1 (AU-BO)	6.6	12	12	12
24_NU3	Nevada ID – North Auburn	1.5	2.7	2.7	2.7
ELDID_NU1	EID Eastern water supply region	14.2	24.9	29.7	30.9
ELDID_NU2	EID Western water supply region	13.9	24.2	29.0	30.1
ELDID_NU2	EID EDH water supply region	8.4	14.7	17.5	18.2
EDCOCA_NU1	EDC OCA (N. SFA)	-	0.9	1.5	2.1
EDCOCA_NU2	EDC OCA (S. SFA, west of Hwy 49)	-	2.3	3.8	5.2
EDCOCA_NU3	EDC OCA (S. SFA, east of Hwy 49)	-	2.3	3.8	5.2
GDPUD	Georgetown Divide PUD	3.0	5.5	7.0	8.0
	Subtotal ARBS Foothills Region	**58.9**	**97.2**	**114.6**	**122.2**
	Total	**515.8**	**796.2**	**831.3**	**838.9**

Key:
CSA = Central Service Area
CSD = Community Service District
EDH = El Dorado Hills
EDC = El Dorado County
EGWD = Elk Grove Water District
EID = El Dorado Irrigation District
NSA = North Service Area
OCA = Other County Areas outside of existing purveyor boundaries in EDC
PCWA = Placer County Water Agency
ID = Irrigation District
PUD = Public Utility District
SCWA = Sacramento County Water Agency
SMUD = Sacramento Municipal Utility District
SSA = South Service Area
SFA = South Fork of the American River
SSWD = Sacramento-Suburban Water District
SW = Surface Water
WC = Water Company
WD = Water District

Table 4-2. Urban Water Demand Assumptions and Data Sources

Demand Unit	Demand Unit Description	Existing Conditions Assumptions and Data Sources	Buildout Assumptions and Data Sources
ARBS Valley Floor Region			
22_NU	Northgate 880	Primary Source: 2015 UWMP, RWRP	Demand levels off at 2030; The Metro Air Park and Northgate 880 water systems do not have residential population and are expected to remain with only nonresidential customers.
23_NU	Self-Supplied	Same as CSIII 2015	Scaled based on SAC-SJR Basin Study methodology
24_NU2	PCWA: Lower Zone 1, Lincoln	Primary Source: 2015 UWMP, RWRP	Buildout value indicated by PCWA. Assume 24_NU1 is 14% of total PCWA Zone 1, even at buildout.
24_NU4	Self-supplied	Same as CSIII 2015	Estimated 1 TAF for buildout value
26N_NU1	SSWD – NSA, Cal-Am Antelope, Cal-Am West Placer, Lincoln Oaks, Rio Linda	Primary Source: 2015 UWMP, RWRP	Placer Vineyards (Cal-Am-WC–West Placer) is a developing community within this demand unit. Assume 2050 Buildout; use WEAP trends after latest available projections in UWMP 2035.
26N_NU2	Carmichael WD	Primary Source: 2015 UWMP, RWRP	Assumed leveled-off demand as buildout value
26N_NU3[1]	City of Sac (N)	Primary Source: 2015 UWMP, RWRP	Used DOF county growth projections and projected per-capita water use to extend projected 2040 demands (from the 2015 UWMP) to 2060
26N_NU4	SSWD – SSA	Primary Source: 2015 UWMP, RWRP	According to UWMP, District is "Close to Buildout", so assume 2035 demand to be Buildout
26N_NU5	Arden, Del Paso Manor WD, Arden Park Vista	Primary Source: 2015 UWMP, RWRP	Assumed to be already at buildout
26N_PU1	City of Roseville	Primary Source: 2015 UWMP, RWRP	Calculated: Roseville General Plan Buildout Population multiplied by the 20X2020 GPCD Target
26N_PU2	San Juan WD	Primary Source: 2015 UWMP, RWRP	Assumed 2040 UWMP value for buildout
26N_PU3	Orange Vale, Citrus Heights, Fair Oaks, Folsom	Primary Source: 2015 UWMP, RWRP	Assumed 2035 UWMP value for buildout
26S_NU1	City of Sac(S)	Primary Source: 2015 UWMP, RWRP	Used DOF county growth projections and projected per-capita water use to extend projected 2040 demands (from the 2015 UWMP) to 2060
26N_PU2	San Juan WD	Primary Source: 2015 UWMP, RWRP	Assumed 2040 UWMP value for buildout
26N_PU3	Orange Vale, Citrus Heights, Fair Oaks, Folsom	Primary Source: 2015 UWMP, RWRP	Assumed 2035 UWMP value for buildout
26S_NU1	City of Sac(S)	Primary Source: 2015 UWMP, RWRP	Assumed 2040 UWMP value for buildout
26S_NU2	Cal-Am WC – Parkway, Suburban, Rosemont	Primary Source: 2015 UWMP, RWRP	Assumed 2035 UWMP value for buildout
26S_NU3	Florin, Fruitridge Vista, Tokay Park	Primary Source: 2015 UWMP, RWRP	Sacramento County UWMP
26S_NU4	Aerojet	Primary Source: 2015 UWMP. Aerojet Raw (2278 AF @ year 2015; 2731 AF after year 2015)	Assumed to be the same as Existing Conditions
26S_PU1	Folsom	Primary Source: 2015 UWMP, RWRP	Indicated in City of Folsom UWMP
26S_PU2	Golden State WC	Primary Source: 2015 UWMP, RWRP	Assumed 2040 UWMP value for buildout
26S_PU3	California Parks and Recreation	Estimated: 1 TAF. Same as CSIII 2015	Estimated to be 1 TAF

Table 4-2. Urban Water Demand Assumptions and Data Sources (contd.)

Demand Unit	Demand Unit Description	Existing Conditions Assumptions and Data Sources	Buildout Assumptions and Data Sources
ARBS Valley Floor Region			
26S_PU4	SCWA Zone 41 – SSA (Zone 40)	Primary Source: 2015 UWMP, RWRP	Buildout in SCWA Zone 40 is assumed to be at 2040 in the SCWA UWMP
26S_PU5	EGWD	Primary Source: 2015 UWMP, RWRP	The District service area is expected to reach build out by 2045
26S_PU6	SCWA 41 – CSA & NSA, Sunrise/Security Park	Primary Source: 2015 UWMP, RWRP	Assumed: 2040 UWMP value for buildout
60N_NU1	Galt, Lodi	Primary Source: 2015 UWMP, RWRP	Assumed: 2040 UWMP value for buildout
60N_NU2	Rancho Murieta CSD	Primary Source: 2015 UWMP, RWRP	Rancho Murieta CSD UWMP
60N_PU	SMUD – Rancho Seco Power Plant	Assumed same as 2006-2010 Average	Assumed same as 2006-2010 Average. Solar Plant project; unknown water consumption.
ARBS Foothills Region			
PCWA3	PCWA Zone 3	PCWA 2015 UWMP	PCWA 2015 UWMP
24_NU1	PCWA Upper Zone 1	Primary Source: 2015 UWMP, RWRP	Buildout value indicated by PCWA. Assume 24_NU1 is 14% of total PCWA Zone 1, even at buildout
24_NU3	Nevada ID – North Auburn	Calculated: Existing population multiplied by interim GCPD target. NID Consists of 7 PWS. North Auburn = approximately 12.4% of NID pop. Served, 12.3% of total connections	Assume 2050 Buildout; use WEAP trends after 2040.Confirmed with communications with NID.
ELDID_NU1	EID Eastern water supply region	Annual demand volume from 2014 WRDMP	Annual demand volume from 2014 WRDMP
ELDID_NU2	EID Western water supply region		
ELDID_NU3	EID EDH water supply region		
EDCOCA_NU1	EDC OCA (N. SFA)	Estimates for Existing and 2030 were not available.	Annual demand volume from 2014 WRDMP
EDCOCA_NU2	EDC OCA (S. SFA, W. Hwy 49)		
EDCOCA_NU3	EDC OCA (S. SFA, E. Hwy 49)		
GDPUD	Georgetown Divide PUD	Annual demand volume from 2014 WRDMP	Annual demand volume from 2014 WRDMP

Notes:

[1] Natomas Joint Vision (NJV) Study Area: Water service to the North Precinct may come from Sacramento County Water Agency and City of Sacramento [3]. For the purposes of this study, the NJV area is assumed to be fully annexed by City of Sacramento by buildout. The City of Sacramento 2015 UWMP estimates the city's retail service population in 2045 to be 751,250 (including the projected population for NJV). This population is multiplied by the 20 x 2020 target to estimate the city's buildout demands.

Key:
AF = acre-feet
CSA = Central Service Area
CSD = Community Service District
EDC = El Dorado County
EDH = El Dorado Hill**s**
EGWD = Elk Grove Water District
EID = El Dorado Irrigation District
GCPD = gallon per capita per day
GDPUD = Georgetown Divide Public Utility District
ID = Irrigation District
NSA = North Service Area
PCWA = Placer County Water Agency
DOF = Department of Finance
OCA = Other County Areas outside of existing purveyor boundaries in El Dorado County
PUD = Public Utility District
RWA = Regional Water Authority
RWRP = Regional Water Reliability Plan
SAC-SJR = Sacramento-San Joaquin
SCWA = Sacramento County Water Agency
SSA = South Service Area
SFA = South Fork of the American River
TAF = 1,000 acre-feet
UWMP = Urban Water Management Plan
WC = Water Company
WD = Water District
WRDMP = Water Resources Development and Management Plan

Table 4-3. Monthly Urban Water Demand Pattern by Demand Unit (for Existing and Future Planning Horizons)

Demand Unit	Demand Unit Description	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
ARBS Valley Floor Region													
22_NU	Northgate 880	8.3%	8.3%	8.3%	8.3%	8.3%	8.3%	8.3%	8.3%	8.3%	8.3%	8.3%	8.3%
23_NU	Self-Supplied	8.3%	8.3%	8.3%	8.3%	8.3%	8.3%	8.3%	8.3%	8.3%	8.3%	8.3%	8.3%
24_NU2	PCWA: Lower Zone 1, Lincoln	9.1%	5.4%	4.5%	4.5%	3.9%	4.6%	6.2%	9.3%	11.9%	14.7%	14.0%	12.0%
24_NU4	Self-supplied	9.6%	5.7%	4.6%	4.1%	4.2%	4.8%	6.1%	9.0%	11.7%	14.5%	13.6%	12.1%
26N_NU1	SSWD – NSA, Antelope, Lincoln Oaks, Rio Linda	8.7%	5.7%	4.7%	4.5%	4.1%	5.8%	6.2%	9.2%	11.8%	14.0%	13.8%	11.6%
26N_NU2	Carmichael WD	8.9%	5.3%	4.1%	3.8%	3.6%	4.8%	6.3%	9.4%	12.8%	14.5%	14.2%	12.3%
26N_NU3	City of Sac (N)	14.1%	9.6%	8.6%	4.4%	4.0%	4.5%	4.7%	7.8%	10.3%	11.7%	10.8%	9.4%
26N_NU4	SSWD - SSA	9.3%	5.6%	4.7%	4.7%	3.8%	4.6%	6.5%	9.0%	11.5%	14.3%	14.1%	11.8%
26N_NU5	Arden, Del Paso Manor WD, Arden Park Vista	8.6%	6.4%	4.7%	4.4%	4.5%	5.6%	7.2%	9.0%	12.2%	12.8%	12.9%	11.8%
26N_PU1	City of Roseville	9.3%	5.3%	4.2%	3.9%	3.7%	5.2%	6.7%	9.8%	12.2%	14.3%	13.7%	11.7%
26N_PU2	San Juan WD	8.8%	4.7%	3.8%	3.6%	3.2%	4.4%	6.4%	9.6%	13.1%	15.4%	14.9%	12.2%
26N_PU3	Orange Vale, Citrus Heights, Fair Oaks, Folsom	8.0%	4.8%	3.8%	3.9%	3.4%	4.5%	7.0%	9.6%	12.7%	15.1%	14.6%	12.5%
26S_NU1	City of Sacramento	10.6%	7.1%	6.4%	4.9%	4.5%	5.1%	5.3%	8.8%	11.6%	13.1%	12.1%	10.5%
26S_NU2	Cal-Am WC – Parkway, Suburban, Rosemont	9.1%	6.3%	5.8%	5.1%	4.7%	5.6%	6.9%	9.0%	11.2%	12.8%	12.5%	11.0%
26S_NU3	Florin, Fruitridge Vista, Tokay Park	9.1%	5.4%	5.7%	5.1%	5.4%	6.0%	8.4%	9.0%	11.0%	14.2%	11.2%	9.6%
26S_NU4	Aerojet	7.0%	9.6%	6.8%	8.8%	12.1%	9.8%	7.0%	7.4%	6.0%	7.0%	10.8%	7.6%
26S_PU1	Folsom	7.3%	5.3%	3.7%	5.4%	4.8%	6.3%	7.5%	9.8%	11.4%	13.9%	13.0%	11.7%
26S_PU2	Golden State WC	8.7%	5.8%	4.7%	4.8%	4.3%	5.4%	6.9%	9.2%	11.5%	13.7%	13.4%	11.6%
26S_PU3	California Parks and Recreation	7.4%	7.0%	5.6%	5.6%	5.6%	7.0%	8.0%	9.0%	10.3%	12.3%	11.6%	10.6%
26S_PU4	SCWA Zone 41 – SSA (Zone 40)	8.8%	5.1%	4.2%	4.3%	4.5%	5.3%	7.6%	10.0%	12.8%	13.7%	13.3%	10.4%
26S_PU5	EGWD	9.2%	5.5%	4.6%	4.3%	3.8%	5.1%	7.0%	9.5%	11.9%	14.1%	13.4%	11.5%
26S_PU6	SCWA 41 – CSA & NSA, Sunrise/Security Park	8.8%	5.2%	4.4%	4.3%	4.4%	5.3%	7.6%	9.9%	12.6%	13.6%	13.2%	10.8%
60N_NU1	Galt, Lodi	8.7%	5.6%	4.6%	4.4%	4.0%	5.3%	7.0%	9.6%	11.9%	13.7%	13.7%	11.6%
60N_NU2	Rancho Murieta CSD	9.9%	5.6%	4.8%	3.7%	3.3%	4.4%	5.8%	9.9%	11.0%	13.8%	14.9%	12.8%
60N_PU	SMUD – Rancho Seco Power Plant	8.8%	7.4%	9.0%	7.2%	8.2%	7.0%	7.2%	8.6%	7.9%	12.8%	9.0%	7.0%
	Average	**9.0%**	**6.2%**	**5.3%**	**5.0%**	**4.9%**	**5.7%**	**6.8%**	**9.1%**	**11.2%**	**13.2%**	**12.7%**	**11.0%**

Table 4-3. Monthly Urban Water Demand Pattern by Demand Unit (Continued)

Demand Unit	Demand Unit Description	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
ARBS Foothills Region													
PCWA3	PCWA Zone 3	8.1%	5.9%	5.9%	6.1%	5.3%	5.9%	6.3%	8.6%	10.9%	13.2%	13.1%	10.6%
24_NU1	PCWA Upper Zone 1	8.9%	5.2%	4.3%	4.0%	4.0%	4.7%	6.2%	8.8%	11.6%	14.6%	14.7%	12.9%
24_NU3	Nevada ID – North Auburn	9.6%	5.7%	4.6%	4.1%	4.2%	4.8%	6.1%	9.0%	11.7%	14.5%	13.6%	12.1%
ELDID_NU1	EID Eastern water supply region	8.7%	4.1%	3.8%	3.2%	3.1%	4.6%	7.6%	10.5%	12.8%	14.7%	14.7%	12.2%
ELDID_NU2	EID Western water supply region	8.7%	4.1%	3.8%	3.2%	3.1%	4.6%	7.6%	10.5%	12.8%	14.7%	14.7%	12.2%
ELDID_NU3	EID El Dorado Hills water supply region	8.7%	4.1%	3.8%	3.2%	3.1%	4.6%	7.6%	10.5%	12.8%	14.7%	14.7%	12.2%
EDCOCA_NU1	EDC OCA (N. SFA)	8.7%	4.1%	3.8%	3.2%	3.1%	4.6%	7.6%	10.5%	12.8%	14.7%	14.7%	12.2%
EDCOCA_NU2	EDC OCA (S. SFA, west of Hwy 49)	8.7%	4.1%	3.8%	3.2%	3.1%	4.6%	7.6%	10.5%	12.8%	14.7%	14.7%	12.2%
EDCOCA_NU3	EDC OCA (S. SFA, east of Hwy 49)	8.7%	4.1%	3.8%	3.2%	3.1%	4.6%	7.6%	10.5%	12.8%	14.7%	14.7%	12.2%
GDPUD_NU	Georgetown Divide PUD	9.8%	4.6%	4.4%	3.8%	3.3%	4.3%	5.5%	8.9%	13.0%	15.5%	14.5%	12.4%
	Average	**9.0%**	**4.2%**	**4.0%**	**3.4%**	**3.2%**	**4.5%**	**7.1%**	**10.1%**	**12.9%**	**14.9%**	**14.7%**	**12.3%**

Key:
AF = acre-feet
CSA = Central Service Area
CSD = Community Service District
EDC = El Dorado County
EDH = El Dorado Hills
EGWD = Elk Grove Water District
EID = El Dorado Irrigation District
GCPD = gallon per capita per day
GDPUD = Georgetown Divide Public Utility District
ID = Irrigation District
NSA = North Service Area
OCA = Other County Areas outside of existing purveyor boundaries in EDC
PCWA = Placer County Water Agency
PUD = Public Utility District
RWA = Regional Water Authority
RWRP = Regional Water Reliability Plan
SAC-SJR = Sacramento-San Joaquin
SCWA = Sacramento County Water Agency
SSA = South Service Area
SFA = South Fork of the American River
TAF = 1,000 acre-feet
UWMP = Urban Water Management Plan
WC = Water Company
WD = Water District

Agricultural Land Use and Water Demand

Tables 4-4 presents the irrigated crop area projections in the ARBS Valley Floor Region, by demand unit, for each of the four planning horizons (existing, 2050, 2070, 2085). **Table 4-5** presents the existing agricultural water demands within the ARBS Valley Floor Region, by demand unit and crop types. The agricultural water demand is generated by CalSim 3.0 pre-processor, CalSimHydro using the distribution of crop types, presented in **Figure 4-3** and **Table 4-6** and present the distribution of crop types within the ARBS Valley Floor Region. This distribution of crop types is applied to each of the four planning horizons (existing, 2050, 2070, 2085). CalSimHudro also uses information on crop water demands adjusted to reflect projected future climate conditions.

Table 4-7 through **4-10** present the agricultural water demands within the ARBS Valley Floor Region, by demand unit and crop types, for the central tendency climate scenarios for 2050, 2070, and 2085, respectively.

Table 4-4. Total Irrigated Crop Areas Within the ARBS Valley Floor Region (1,000 acres)

Demand Unit	Demand Unit Description	Existing	2050	2070	2085
22_NA	Non-District	6.5	5.7	5.5	5.3
22_SA1	Natomas Central MWC, Pleasant Grove-Verona MWC, misc. Settlement Contractors	27.9	24.6	23.6	22.9
22_SA2	Feather River Diverters (non-district)	1.7	1.4	1.4	1.3
23_NA	Camp Far West ID, South Sutter WD, non-district	45.2	41.3	39.7	38.4
24_NA2	PCWA Zone 5, non-district	11.3	8.8	8.5	8.2
24_NA3	PCWA Zone 1	5.1	4.7	4.7	4.7
26N_NA	Non-District	3.8	3.0	2.9	2.8
26S_NA	Non-District	16.8	11.8	11.3	11.0
60N_NA2 (1)	Omochumne-Hartnell WD, Clay WD, Galt ID	7.2	5.5	5.2	4.9
60N_NA5 (1)	Non-District, Riparian Diverters	4.8	4.4	4.1	4.0
	Total	**130.3**	**111.3**	**106.9**	**103.5**

Key:
ID = Irrigation District
MWC = Mutual Water Company
PCWA = Placer Company Water Agency
WD = Water District

Notes:
[1] These demand units are only partially in the Study Area: 28% and 9% of the total areas for demand units 60N_NA2 and 60N_NA5 are within the Study Area, respectively.

Table 4-5. Agricultural Water Demand for the ARBS Valley Floor Region (1,000 acre-feet/year) for the Central Tendency Climate Change Scenario

Demand Unit	Demand Unit Description	Existing [1]	2050 [2]	2070 [2]	2085 [2]
22_NA	Non-District	26.9	26.3	25.7	24.8
22_SA1	Natomas Central MWC, Pleasant Grove-Verona MWC, misc. Settlement Contractors	157.8	147.5	143.6	138.8
22_SA2	Feather River Diverters (non-district)	5.9	6.0	5.9	5.6
23_NA	Camp Far West ID, South Sutter WD, non-district	242.9	231.8	225.8	218.4
24_NA2	PCWA Zone 5, non-district	57.5	51.2	49.9	48.3
24_NA3	PCWA Zone 1[4]	61.3	69.2	69.2	69.2
26N_NA	Non-District	12.4	12.8	12.7	12.2
26S_NA	Non-District	58.5	48.2	47.6	45.7
60N_NA2 [3]	Omochumne-Hartnell WD, Clay WD, Galt ID	24.2	18.9	18.4	17.4
60N_NA5 [3]	Non-District, Riparian Diverters	17.7	14.6	14.3	13.5
	Total	**665.1**	**626.5**	**613.1**	**593.9**

Key:
ID = Irrigation District
MWC = Mutual Water Company
PCWA = Placer Company Water Agency
WD = Water District

Notes:
[1] Existing agricultural water demands is generated by CalSim 3.0 pre-processor CalSimHydro, reflecting historical climate and hydrology, current irrigated crops area (Table 4-4), and crop distribution pattern (Table 4-5).

[2] Agricultural water demands for future horizons (2050, 2070, 2085) are to be developed using CalSim 3.0 pre-processor CalSimHydro, reflecting future precipitation, evapotranspiration, and hydrology information under climate change scenarios, and future irrigated crops area (Table 4-4), and crop distribution pattern (Table 4-5).

[3] These demand units are only partially in the Study Area: 28% and 9% of the total areas for demand units 60N_NA2 and 60N_NA5 are within the Study Area, respectively. The demands associated with these demand units are proportionally scaled to the area within the Study Area.
[4] The GIS land use dataset underestimates the irrigated acreage in demand unit 24_NA3. The demands calculated from the land-use based approach would therefore underestimate the applied water demands in this demand unit. To correct this, the demands used in the modeling were scaled up based on PCWA 2015 Urban Water Management Plan.

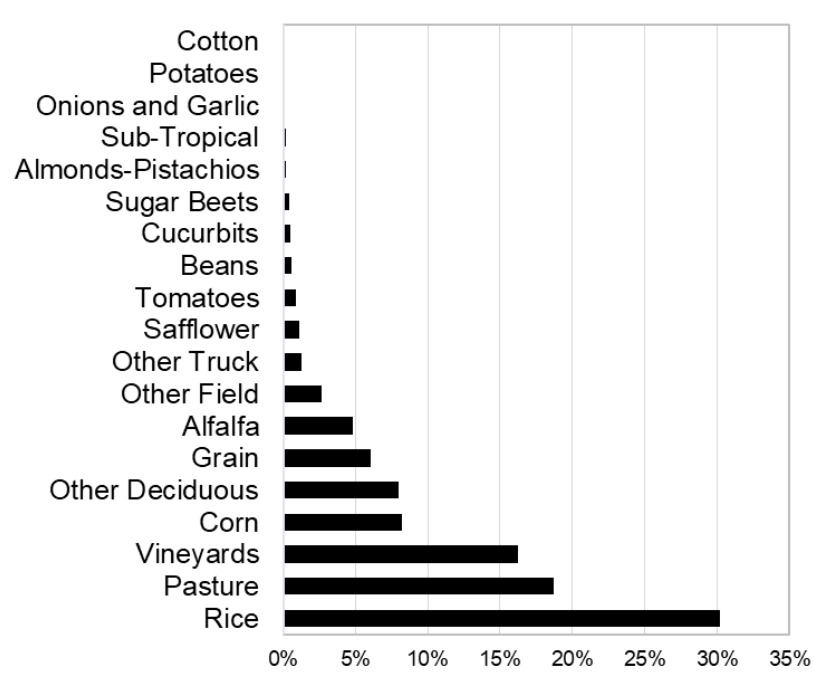

Figure 4-3. Average Distribution of Crop Types within the Study Area Valley Floor Region.

Table 4-6. Crop distributions for Irrigated Crop Areas Within the ARBS Valley Floor Region.

Crop Type	Demand Unit										
	22_NA	**22_SA1**	**22_SA2**	**23_NA**	**24_NA1**	**24_NA2**	**24_NA3**	**26N_NA**	**26S_NA**	**60N_NA2**	**60N_NA5**
Alfalfa	19.6%	3.4%	30.1%	2.6%	0.0%	0.0%	0.0%	0.0%	16.3%	4.9%	2.9%
Almonds-Pistachios	0.0%	0.0%	0.0%	0.2%	0.0%	0.0%	0.0%	2.0%	0.0%	0.2%	0.3%
Beans	2.9%	0.1%	3.7%	0.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.2%
Corn	7.9%	6.7%	13.9%	1.1%	0.0%	4.3%	0.0%	1.4%	16.3%	16.2%	10.5%
Cotton	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Cucurbits	0.3%	0.5%	0.0%	0.0%	0.0%	0.0%	0.0%	2.5%	0.0%	0.5%	1.2%
Grain	10.7%	5.1%	12.4%	4.1%	3.2%	12.2%	12.7%	25.1%	9.9%	3.1%	4.4%
Onions and Garlic	0.0%	0.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Other Deciduous	24.7%	0.7%	26.9%	17.6%	2.5%	0.9%	6.6%	3.9%	0.0%	2.5%	8.1%
Other Field	1.0%	0.7%	1.9%	1.9%	0.0%	0.9%	0.0%	0.0%	1.4%	9.8%	2.4%
Other Truck	0.5%	0.3%	0.0%	0.0%	1.8%	0.0%	1.8%	2.4%	7.8%	0.8%	1.2%
Pasture	7.1%	2.2%	2.7%	6.4%	90.1%	18.9%	76.5%	29.7%	41.7%	27.5%	22.0%
Potatoes	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Rice	21.0%	74.1%	0.0%	65.2%	1.7%	62.8%	0.0%	18.4%	0.0%	0.0%	0.3%
Safflower	2.1%	3.0%	1.0%	0.0%	0.0%	0.0%	0.0%	6.9%	1.0%	2.2%	0.3%
Sub-Tropical	0.1%	0.0%	0.0%	0.1%	0.5%	0.0%	1.3%	3.8%	0.1%	0.0%	0.1%
Sugar Beets	1.7%	1.5%	0.9%	0.1%	0.0%	0.0%	0.0%	1.2%	0.3%	0.0%	0.2%
Tomatoes	0.3%	1.4%	6.5%	0.0%	0.0%	0.0%	0.0%	0.4%	0.2%	2.0%	1.1%
Vineyards	0.0%	0.0%	0.0%	0.0%	0.2%	0.0%	1.0%	2.3%	4.9%	30.3%	43.8%
Total	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**

Table 4-7. Estimated Existing Conditions Applied Irrigation Water by Crop in the ARBS Valley Floor Region (1,000 acre-feet/year)

Crop Type	Demand Unit										
	22_NA	**22_SA1**	**22_SA2**	**23_NA**	**24_NA2**	**24_NA3**	**26N_NA**	**26S_NA**	**60N_NA2**	**60N_NA5**	**Total**
Alfalfa	6.5	4.7	2.6	5.8	0.0	0.0	0.0	12.3	1.6	0.7	**34.3**
Almonds-Pistachios	0.0	0.0	0.0	0.5	0.0	0.0	0.3	0.0	0.1	0.1	**1.0**
Beans	0.5	0.1	0.2	0.6	0.0	0.0	0.0	0.0	0.0	0.1	**1.5**
Corn	1.7	6.3	0.8	1.7	1.5	0.0	0.2	8.3	3.7	1.9	**26.1**
Cotton	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Cucurbits	0.1	0.3	0.0	0.0	0.0	0.0	0.2	0.0	0.1	0.1	**0.9**
Grain	0.4	0.7	0.1	0.9	0.5	0.8	0.4	0.7	0.1	0.1	**4.7**
Onions and Garlic	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.2**
Other Deciduous	5.2	0.7	1.5	25.2	0.3	3.1	0.4	0.0	0.4	1.0	**37.8**
Other Field	0.2	0.6	0.1	2.9	0.3	0.0	0.0	0.7	2.0	0.4	**7.2**
Other Truck	0.1	0.3	0.0	0.1	0.0	0.9	0.3	3.8	0.1	0.1	**5.6**
Pasture	2.2	2.9	0.2	13.1	9.3	55.1	4.7	29.5	8.8	5.5	**131.3**
Potatoes	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Rice	9.0	135.4	0.0	191.5	45.6	0.0	4.2	0.0	0.0	0.1	**385.8**
Safflower	0.3	2.0	0.0	0.0	0.0	0.0	0.6	0.4	0.4	0.0	**3.7**
Sub-Tropical	0.0	0.0	0.0	0.2	0.0	0.9	0.6	0.1	0.0	0.0	**1.9**
Sugar Beets	0.6	2.2	0.1	0.3	0.0	0.0	0.2	0.2	0.0	0.0	**3.6**
Tomatoes	0.1	1.3	0.4	0.0	0.0	0.0	0.0	0.1	0.4	0.2	**2.4**
Vineyards	0.0	0.0	0.0	0.0	0.0	0.5	0.3	2.4	6.6	7.4	**17.2**
Total	**26.9**	**157.8**	**5.9**	**242.9**	**57.6**	**61.3**	**12.4**	**58.5**	**24.2**	**17.7**	**665.3**

Table 4-8. Estimated 2050 (Central Tendency) Applied Irrigation Water by Crop in the ARBS Valley Floor Region (1,000 acre-feet/year)

Crop Type	Demand Unit										
	22_NA	**22_SA1**	**22_SA2**	**23_NA**	**24_NA2**	**24_NA3**	**26N_NA**	**26S_NA**	**60N_NA2**	**60N_NA5**	**Total**
Alfalfa	8.6	6.3	3.4	8.1	0.0	0.0	0.0	14.2	1.3	0.7	**42.7**
Almonds-Pistachios	0.0	0.0	0.0	0.7	0.0	0.4	0.4	0.0	0.0	0.1	**1.6**
Beans	0.4	0.1	0.1	0.4	0.0	0.0	0.0	0.0	0.0	0.1	**1.1**
Corn	0.6	2.4	0.3	0.6	0.6	0.0	0.1	3.1	0.0	0.0	**7.7**
Cotton	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Cucurbits	0.1	0.8	0.0	0.1	0.0	0.0	0.5	0.1	0.1	0.2	**1.8**
Grain	0.1	0.2	0.0	0.2	0.1	0.2	0.1	0.2	0.1	0.1	**1.3**
Onions and Garlic	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.4**
Other Deciduous	5.4	0.7	1.5	26.1	0.4	6.1	0.6	0.4	0.5	1.1	**42.7**
Other Field	0.1	0.4	0.1	1.8	0.2	0.0	0.0	1.2	2.2	0.4	**6.3**
Other Truck	0.4	0.8	0.0	0.2	0.0	1.4	0.8	7.7	0.1	0.1	**11.6**
Pasture	1.3	1.8	0.1	8.1	6.0	59.4	3.1	16.4	3.1	2.0	**101.3**
Potatoes	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Rice	8.7	130.5	0.0	184.5	43.9	0.0	4.0	0.0	0.0	0.1	**371.7**
Safflower	0.3	2.1	0.0	0.0	0.0	0.0	0.6	0.3	0.3	0.1	**3.7**
Sub-Tropical	0.1	0.1	0.0	1.0	0.0	1.4	2.4	1.0	0.1	0.0	**6.1**
Sugar Beets	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Tomatoes	0.1	1.1	0.3	0.0	0.0	0.0	0.0	0.1	0.7	0.3	**2.6**
Vineyards	0.0	0.0	0.0	0.0	0.0	0.3	0.2	3.5	10.3	9.6	**24.0**
Total	**26.3**	**147.5**	**6.0**	**231.8**	**51.2**	**69.2**	**12.8**	**48.2**	**18.9**	**14.6**	**626.5**

Table 4-9. Estimated 2070 (Central Tendency) Applied Irrigation Water by Crop in the ARBS Valley Floor Region (1,000 acre-feet/year)

Crop Type	Demand Unit										
	22_NA	**22_SA1**	**22_SA2**	**23_NA**	**24_NA2**	**24_NA3**	**26N_NA**	**26S_NA**	**60N_NA2**	**60N_NA5**	**Total**
Alfalfa	8.5	6.2	3.4	8.0	0.0	0.0	0.0	14.0	1.3	0.7	**42.0**
Almonds-Pistachios	0.0	0.0	0.0	0.7	0.0	0.4	0.4	0.0	0.0	0.1	**1.6**
Beans	0.4	0.1	0.1	0.4	0.0	0.0	0.0	0.0	0.0	0.1	**1.1**
Corn	0.6	2.3	0.3	0.6	0.6	0.0	0.1	3.1	0.0	0.0	**7.7**
Cotton	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Cucurbits	0.1	0.8	0.0	0.1	0.0	0.0	0.5	0.1	0.1	0.2	**1.8**
Grain	0.1	0.2	0.0	0.2	0.1	0.2	0.1	0.2	0.1	0.1	**1.3**
Onions and Garlic	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.3**
Other Deciduous	5.3	0.7	1.5	25.7	0.4	6.1	0.6	0.4	0.5	1.0	**42.1**
Other Field	0.1	0.4	0.1	1.8	0.2	0.0	0.0	1.2	2.1	0.4	**6.2**
Other Truck	0.4	0.8	0.0	0.2	0.0	1.4	0.8	7.6	0.1	0.1	**11.5**
Pasture	1.3	1.8	0.1	8.0	5.9	59.4	3.0	16.1	3.0	2.0	**100.6**
Potatoes	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Rice	8.4	126.8	0.0	179.2	42.7	0.0	4.0	0.0	0.0	0.1	**361.2**
Safflower	0.3	2.0	0.0	0.0	0.0	0.0	0.6	0.3	0.3	0.1	**3.7**
Sub-Tropical	0.1	0.1	0.0	1.0	0.0	1.4	2.3	1.0	0.1	0.0	**6.0**
Sugar Beets	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Tomatoes	0.1	1.1	0.3	0.0	0.0	0.0	0.0	0.1	0.7	0.3	**2.6**
Vineyards	0.0	0.0	0.0	0.0	0.0	0.3	0.2	3.5	10.1	9.3	**23.4**
Total	**25.7**	**143.6**	**5.9**	**225.8**	**49.9**	**69.2**	**12.7**	**47.6**	**18.4**	**14.3**	**613.1**

Table 4-10. Estimated 2085 (Central Tendency) Applied Irrigation Water by Crop in the ARBS Valley Floor Region (1,000 acre-feet/year)

Crop Type	Demand Unit										
	22_NA	**22_SA1**	**22_SA2**	**23_NA**	**24_NA2**	**24_NA3**	**26N_NA**	**26S_NA**	**60N_NA2**	**60N_NA5**	**Total**
Alfalfa	8.1	6.0	3.2	7.7	0.0	0.0	0.0	13.4	1.2	0.6	**40.3**
Almonds-Pistachios	0.0	0.0	0.0	0.7	0.0	0.4	0.4	0.0	0.0	0.1	**1.6**
Beans	0.4	0.1	0.1	0.4	0.0	0.0	0.0	0.0	0.0	0.1	**1.0**
Corn	0.6	2.3	0.3	0.6	0.6	0.0	0.1	3.0	0.0	0.0	**7.4**
Cotton	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Cucurbits	0.1	0.8	0.0	0.0	0.0	0.0	0.5	0.1	0.1	0.1	**1.7**
Grain	0.1	0.2	0.0	0.2	0.1	0.2	0.1	0.2	0.1	0.1	**1.2**
Onions and Garlic	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.3**
Other Deciduous	5.1	0.6	1.4	24.7	0.3	6.1	0.6	0.4	0.5	1.0	**40.6**
Other Field	0.1	0.4	0.1	1.7	0.2	0.0	0.0	1.2	2.0	0.3	**5.9**
Other Truck	0.4	0.8	0.0	0.2	0.0	1.4	0.8	7.3	0.1	0.1	**11.2**
Pasture	1.3	1.7	0.1	7.7	5.7	59.4	2.9	15.5	2.8	1.8	**99.0**
Potatoes	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Rice	8.1	122.6	0.0	173.6	41.3	0.0	3.8	0.0	0.0	0.1	**349.5**
Safflower	0.3	2.0	0.0	0.0	0.0	0.0	0.6	0.3	0.3	0.1	**3.5**
Sub-Tropical	0.1	0.1	0.0	0.9	0.0	1.4	2.2	0.9	0.1	0.0	**5.8**
Sugar Beets	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Tomatoes	0.1	1.1	0.3	0.0	0.0	0.0	0.0	0.1	0.7	0.3	**2.5**
Vineyards	0.0	0.0	0.0	0.0	0.0	0.3	0.2	3.4	9.5	8.8	**22.3**
Total	**24.7**	**138.8**	**5.6**	**218.5**	**48.2**	**69.2**	**12.2**	**45.7**	**17.4**	**13.5**	**593.9**

Tables 4-11 presents the estimated agricultural water demands within the ARBS Foothills Region, by demand unit, for each of the four planning horizons (existing, 2050, 2070, 2085).

Table 4-12 presents the monthly agricultural water demand pattern, which is based on the average of agricultural demand patterns of WBAs adjacent to El Dorado County. These include WBA 22, WBA 23, WBA 24, WBA 26N, and WBA 26S (**Figure 1-3**).

Table 4-11. Agricultural Water Demand for the ARBS Foothills Region (1,000 acre-feet/year)

Demand Unit	Demand Unit Description	Existing[1]	2050	2070	2085
24_NA1[2]	Nevada ID – North Auburn	38.8	38.1	38.8	38.4
ELDID_NA1[3]	EID Eastern water supply region	8.0	10.4	13.3	15.4
ELDID_NA2[3]	EID Western water supply region	0.0	2.5	3.1	3.7
ELDID_NA3[3]	EID EDH water supply region	0.0	0.1	0.2	0.2
GDPUD_NA	Georgetown Divide PUD	7.1	8.6	9.6	10.3
EDCOCA_NA[3]	EDC OCA (N. SFA)	--[4]	2.0	3.1	3.8
EDCOCA_NA[3]	EDC OCA (S. SFA, west of Hwy 49)	--[4]	3.4	5.1	6.5
EDCOCA_NA[3]	EDC OCA (S. SFA, east of Hwy 49)	--[4]	3.7	5.7	7.2
	Total	**53.9**	**68.8**	**78.9**	**85.5**

Note:

[1] 2012 values from the 2014 WRDMP are used to represent existing conditions. Caution should be used when using a single year to represent an entire planning horizon, due to annual variability. However, the values presented for 2012 are largely consistent with multi-year averages from corroborating sources

[2] Demands for 24_NA1 are land-use based and calculated using CalSim 3.0 pre-processor CalSimHydro, reflecting future precipitation, evapotranspiration, and hydrology information under climate change scenarios, and future irrigated crops area (Table 4-4), and crop distribution pattern (Table 4-5).

[3] Aggregated demand volumes from the 2014 WRDMP were proportionally disaggregated into demand units based on the representative demand unit acreage.

[4] A 2012 estimate and 2030 projection are not made for OCA in the 2014 WRDMP. Existing OCA demands do not rely on surface water and therefore are not included in a demand unit.

Key:
EID = El Dorado Irrigation District
GDPUD = Georgetown Divide Public Utility District
PUD = Public Utility District

Table 4-12. Monthly Agricultural Water Demand Pattern[1] for the ARBS Foothills Region (Existing and Future Planning Horizons)

Demand Unit	Demand Unit Description	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
24_NA1 [2]	Nevada Irrigation District	6.1%	0.2%	0.1%	0.1%	0.0%	0.9%	9.9%	14.4%	20.0%	21.4%	17.7%	11.9%
ELDID_NA1	EID Eastern water supply region	4.6%	0%	0%	0%	0%	0.8%	12.3%	15.7%	18.9%	20.8%	17.2%	9.8%
ELDID_NA2	EID Western water supply region	4.6%	0%	0%	0%	0%	0.8%	12.3%	15.7%	18.9%	20.8%	17.2%	9.8%
ELDID_NA3	EID EDH water supply region	4.6%	0%	0%	0%	0%	0.8%	12.3%	15.7%	18.9%	20.8%	17.2%	9.8%
GDPUD_NA	Georgetown Divide PUD	4.6%	0%	0%	0%	0%	0.8%	12.3%	15.7%	18.9%	20.8%	17.2%	9.8%
EDCOCA_NA1	EDC OCA (N. SFA)	4.6%	0%	0%	0%	0%	0.8%	12.3%	15.7%	18.9%	20.8%	17.2%	9.8%
EDCOCA_NA2	EDC OCA (S. SFA, west of Hwy 49)	4.6%	0%	0%	0%	0%	0.8%	12.3%	15.7%	18.9%	20.8%	17.2%	9.8%
EDCOCA_NA3	EDC OCA (S. SFA, east of Hwy 49)	4.6%	0%	0%	0%	0%	0.8%	12.3%	15.7%	18.9%	20.8%	17.2%	9.8%

Notes:
[1] Monthly demand pattern reflect the distribution of the monthly agricultural demands with in the Water Budget Areas adjacent to El Dorado County (WBA 22, WBA 23, WBA 24, WBA 26N, WBA 26S)

[2] Monthly demand patter for 24_NA1 is developed using CALSIM Hydro and climate and hydrology information for future planning horizons.

Figure 4-4 compares existing and future urban and agricultural demands within the Study Area. **Figure 4-5** compares the decreasing trend of irrigated crop areas in the Valley Floor region to the increasing trend of agricultural water demands in the Foothill region. **Figure 4-6** compares the applied water demand across future climate change scenarios in the Valley Floor Region.

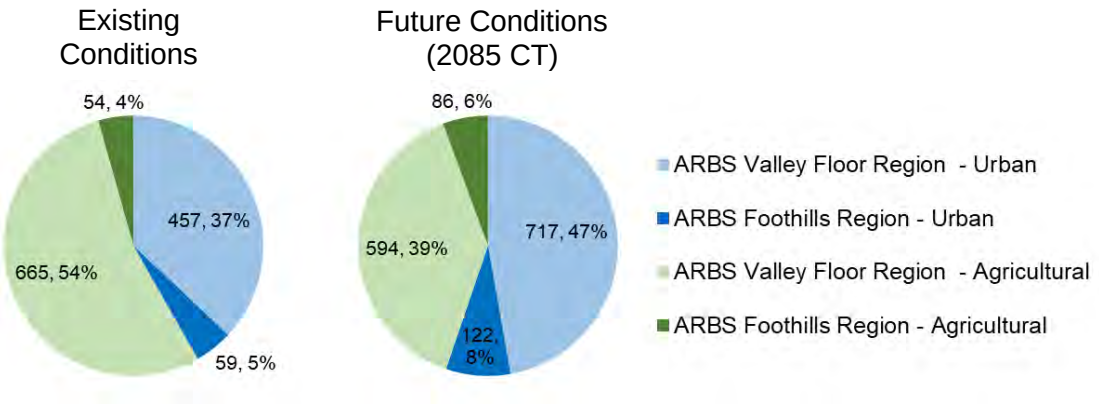

Figure 4-4. Comparison of Existing and 2085 Future Urban and Agricultural Water Demands in the Study Area (1,000 acre-feet/year).

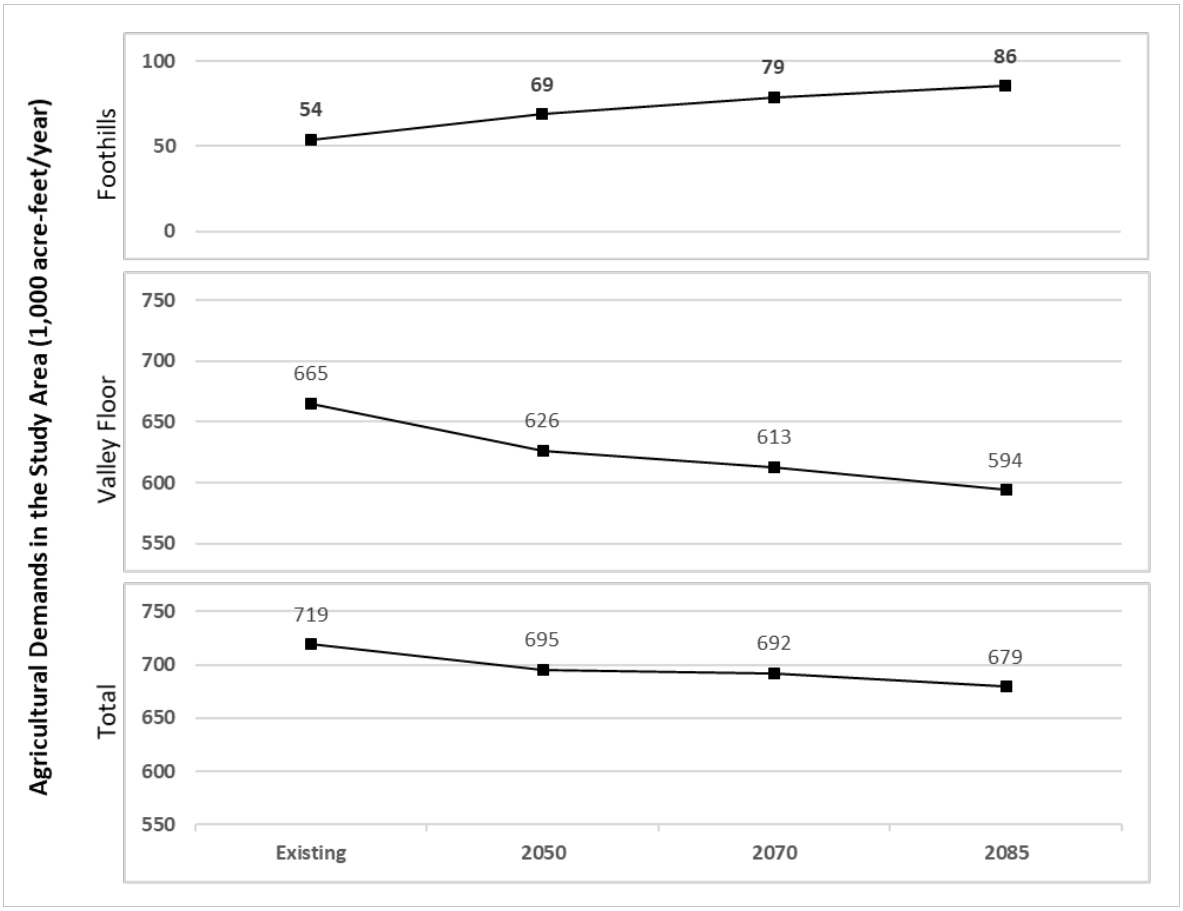

Figure 4-5. Trend of Agricultural Applied Water Demands within the ARBS Valley Floor and Foothills Regions (1,000 acre-feet/year).

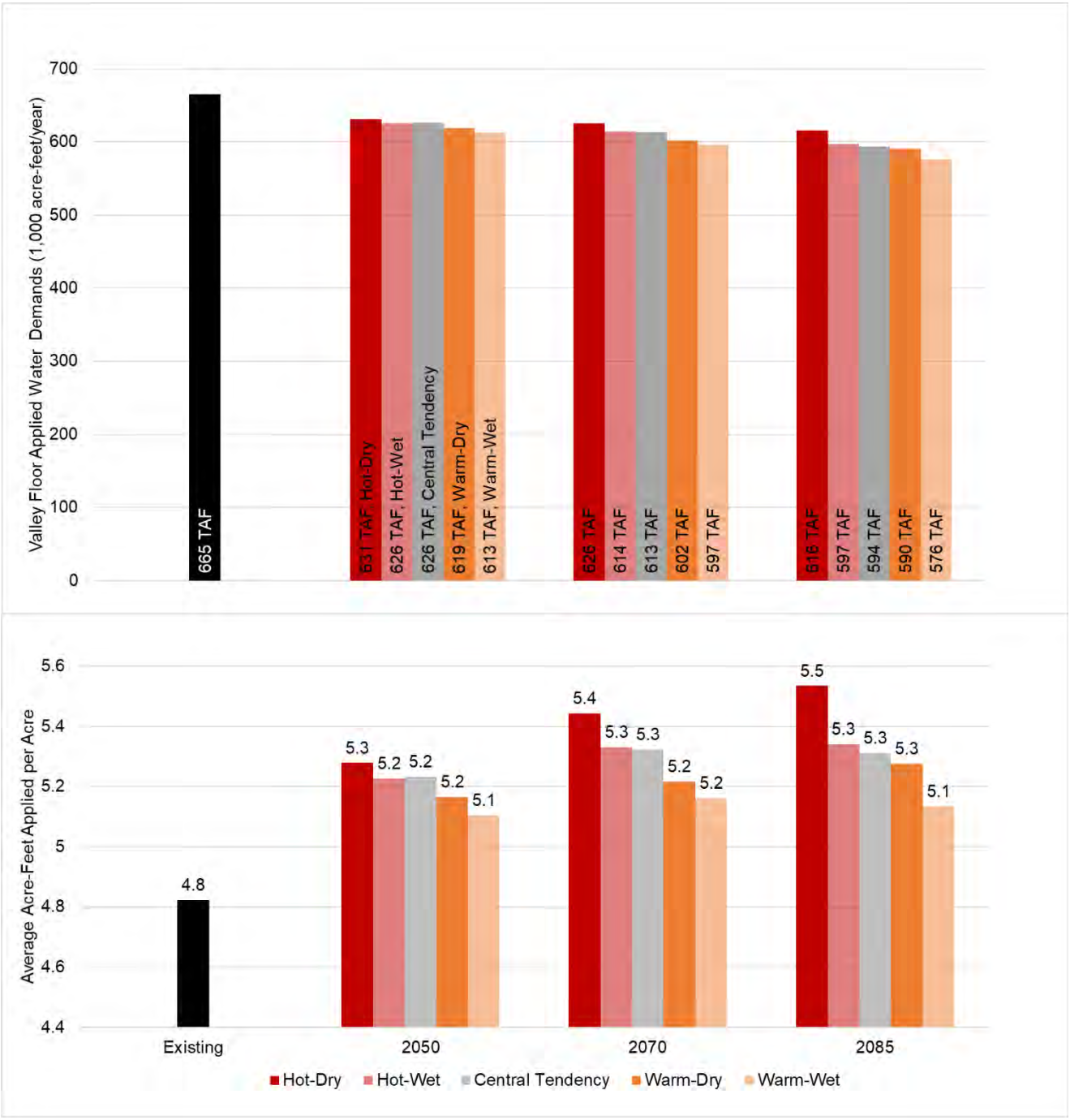

Figure 4-6. Applied water demands within the ARBS Valley Floor Region for future climate scenarios by total annual volume (top chart) and water duty per irrigated acre (bottom chart).

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Attachment A – CalSim 3 Water Budget Areas

Figures A-1 through A-5 present urban water users located within each urban Water Budget Area (WBA). Figures A-6 through A-23 present for each agricultural WBA: demand units, land use, and source of irrigation water. Typically, the WBAs include one demand unit to represent scattered communities located throughout the WBA and that are self-supplied. These include demand units 22_NU, 23_NU, 24_NU4, and 60N_NU1.

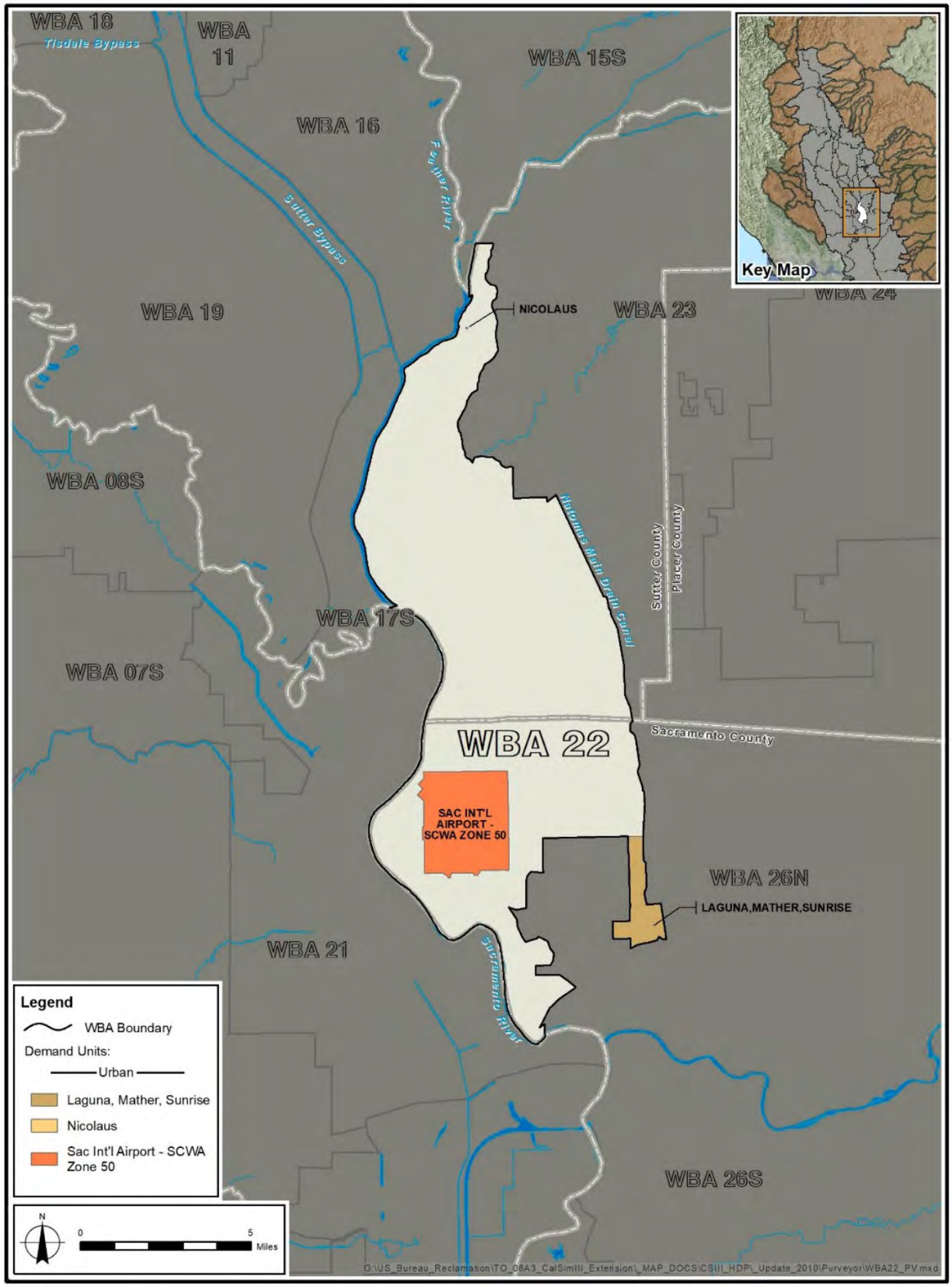

Figure A-1. Water Budget Area 22 Urban Demand Units.

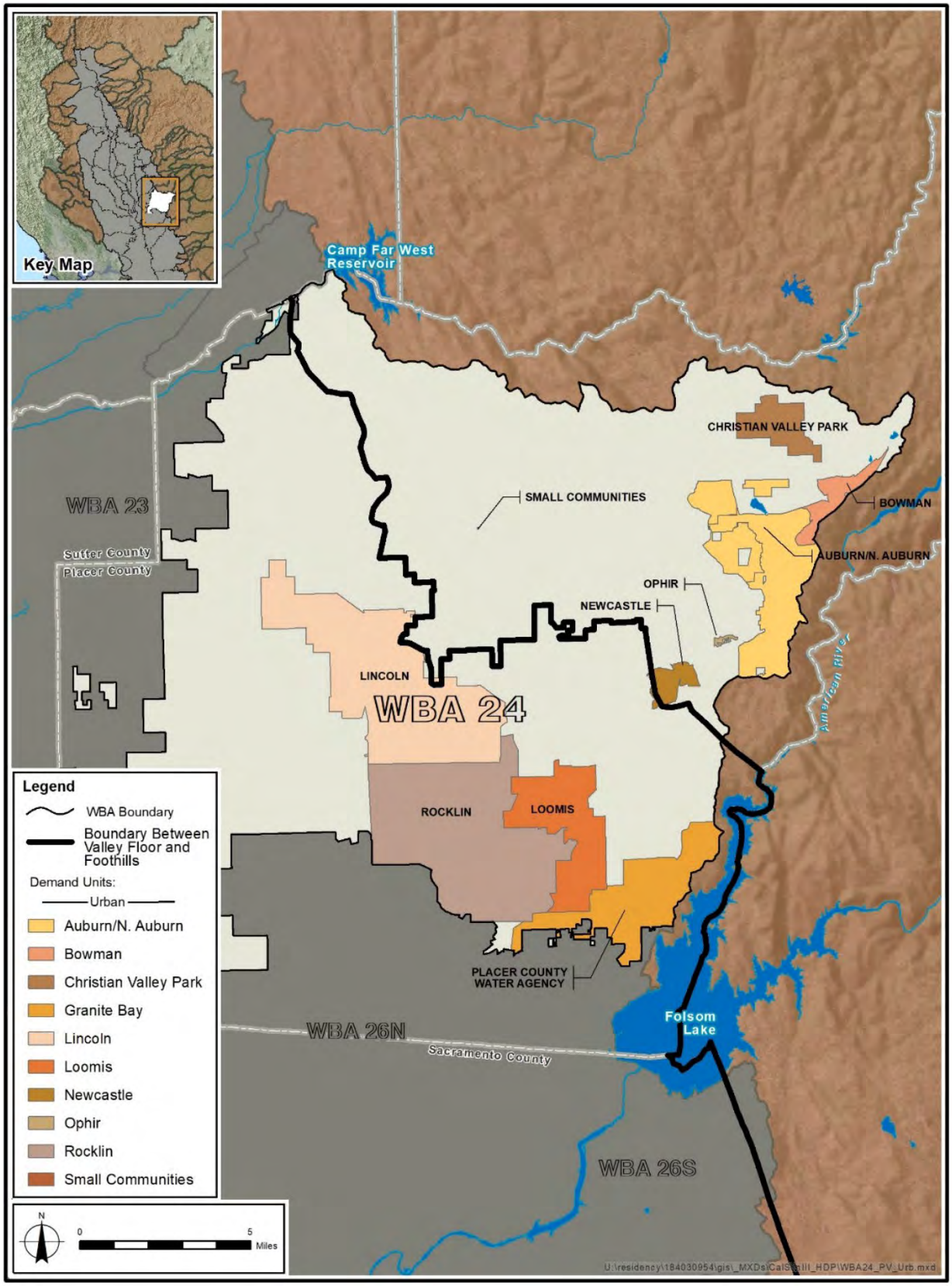

Figure A-2. Water Budget Area 24 Urban Demand Units.

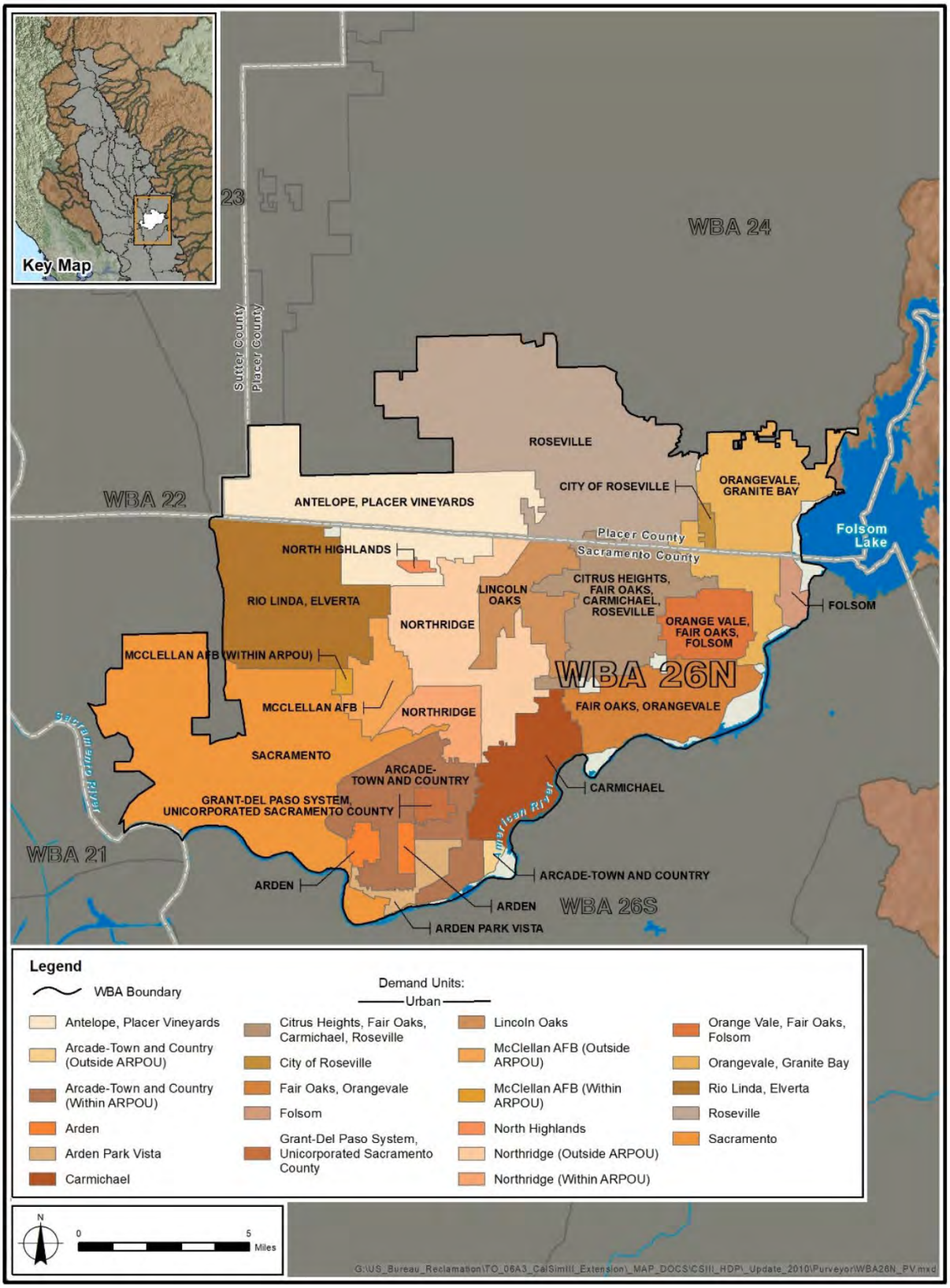

Figure A-3. Water Budget Area 26 North Urban Demand Units.

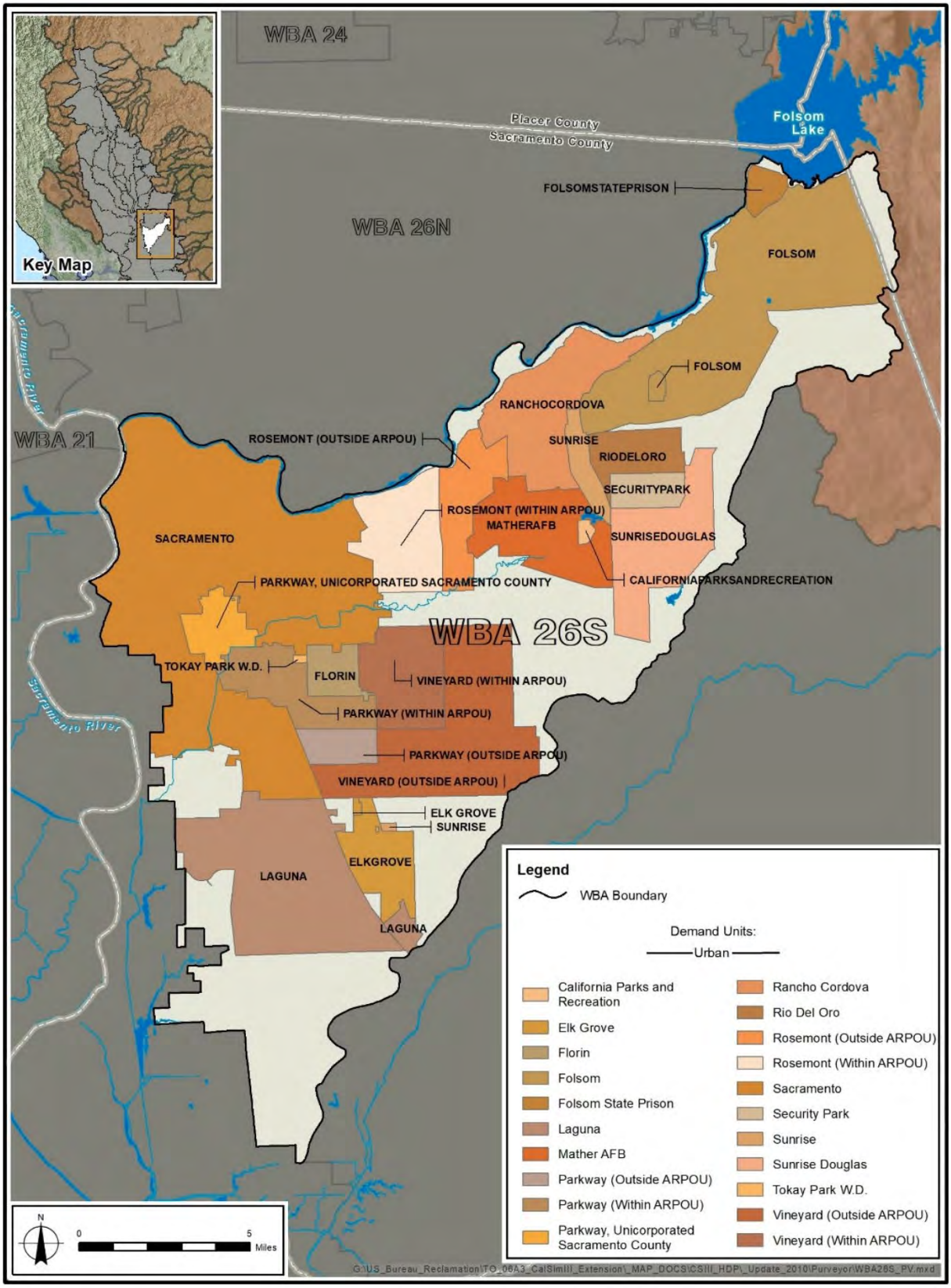

Figure A-4. Water Budget Area 26 South Urban Demand Units.

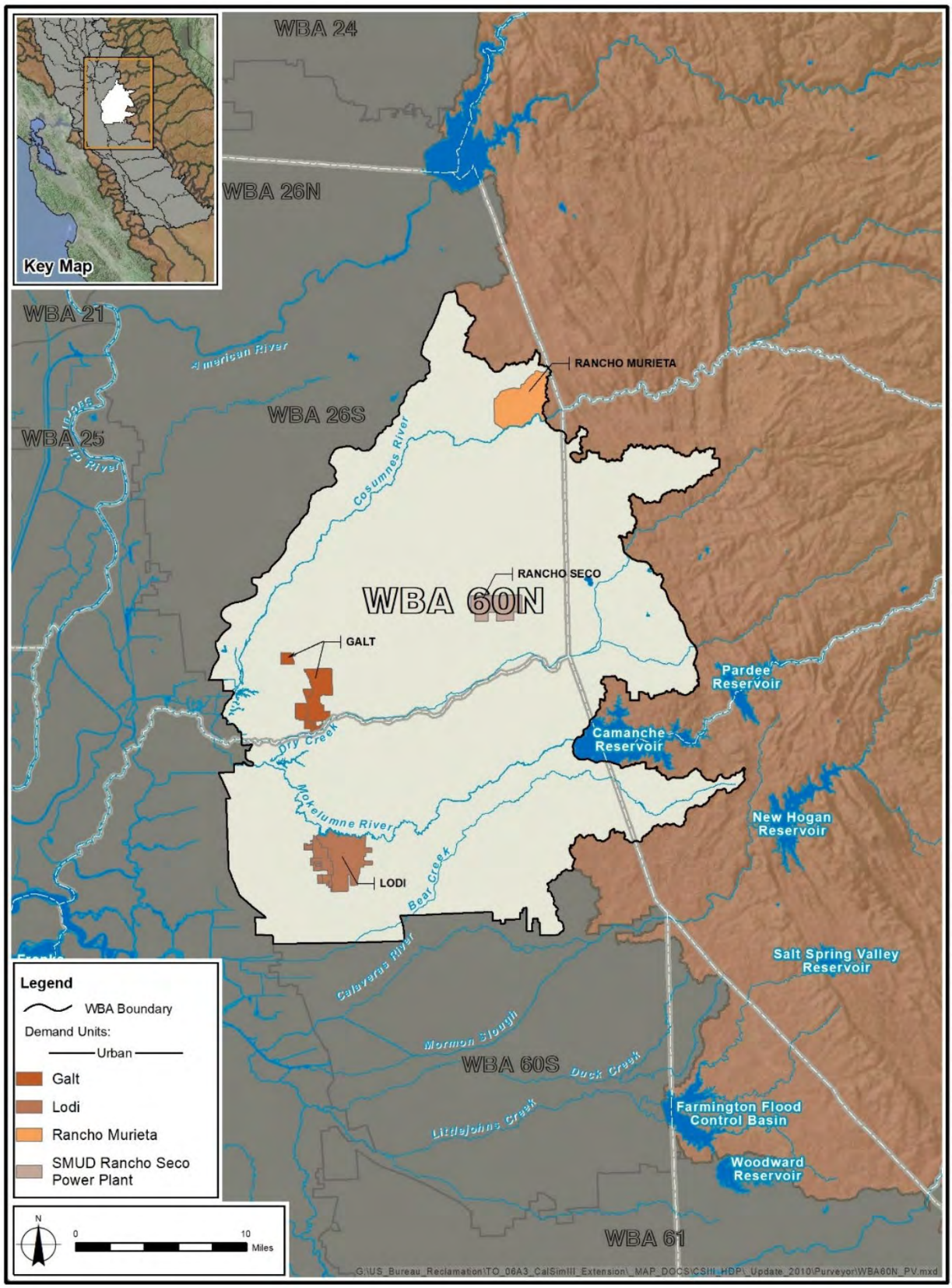

Figure A-5. Water Budget Area 60 North Urban Demand Units.

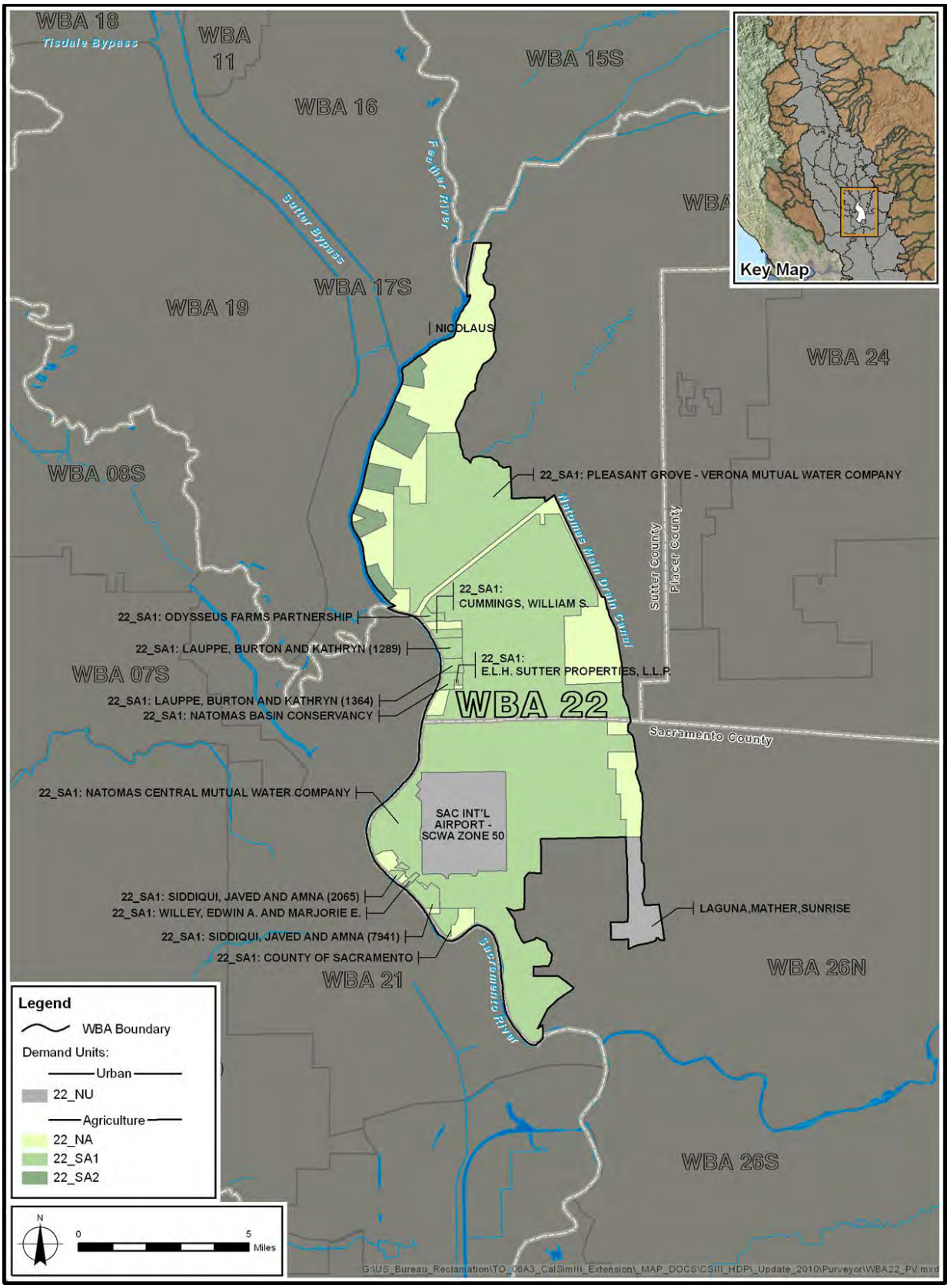

Figure A-6. Water Budget Area 22 Water Users.

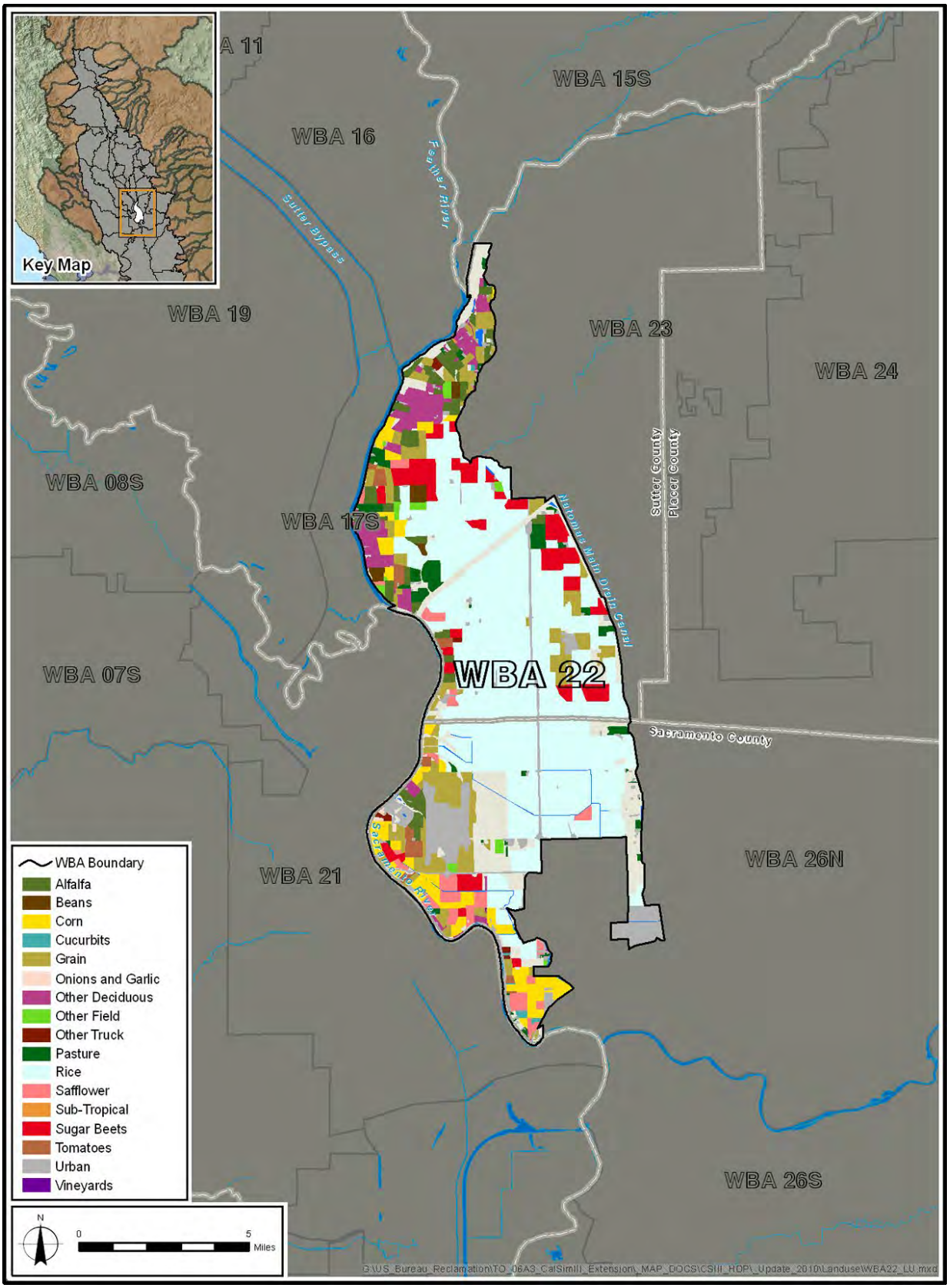

Figure A-7. Water Budget Area 22 Land Use.

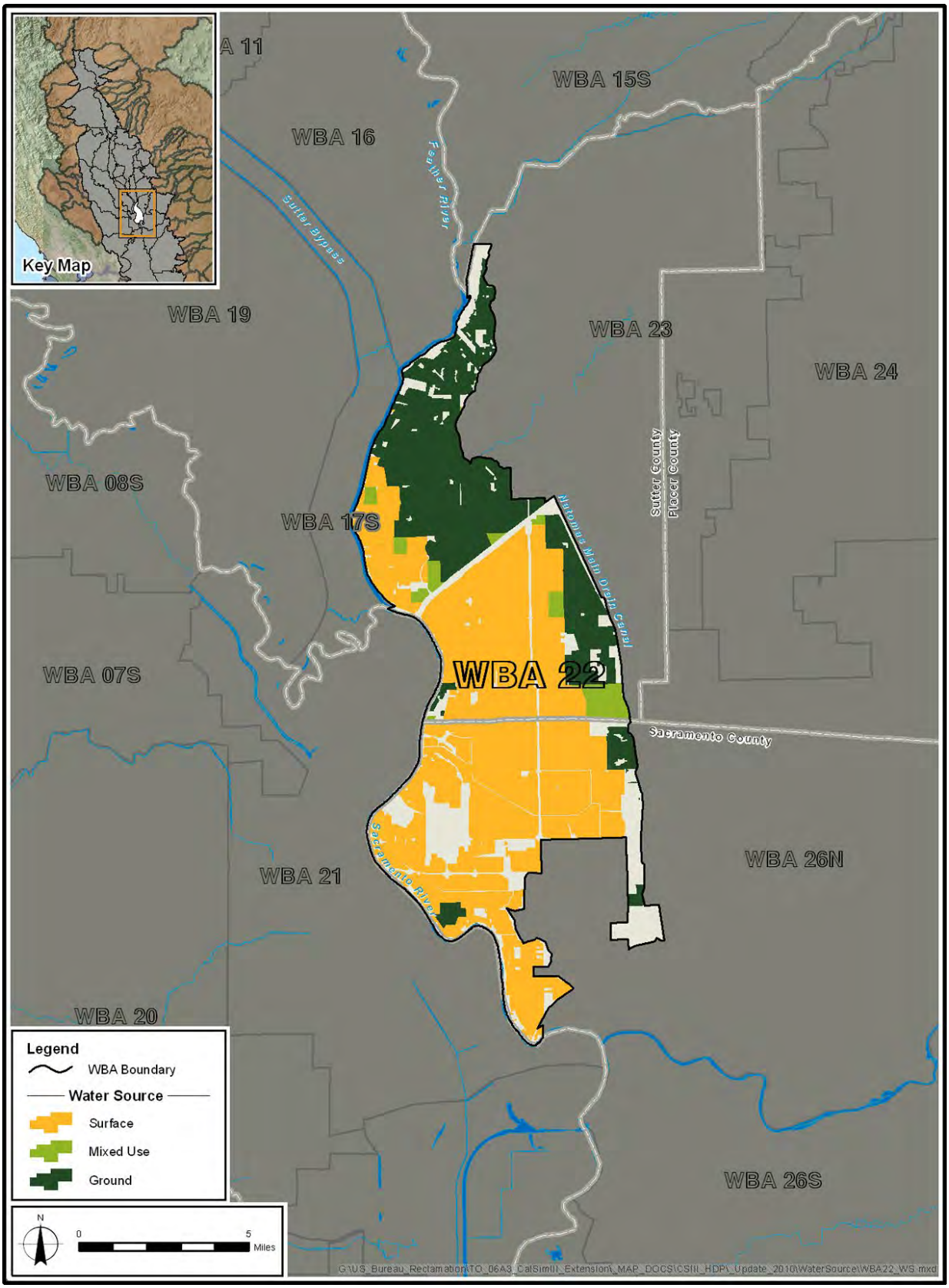

Figure A-8. Water Budget Area 22 Water Source.

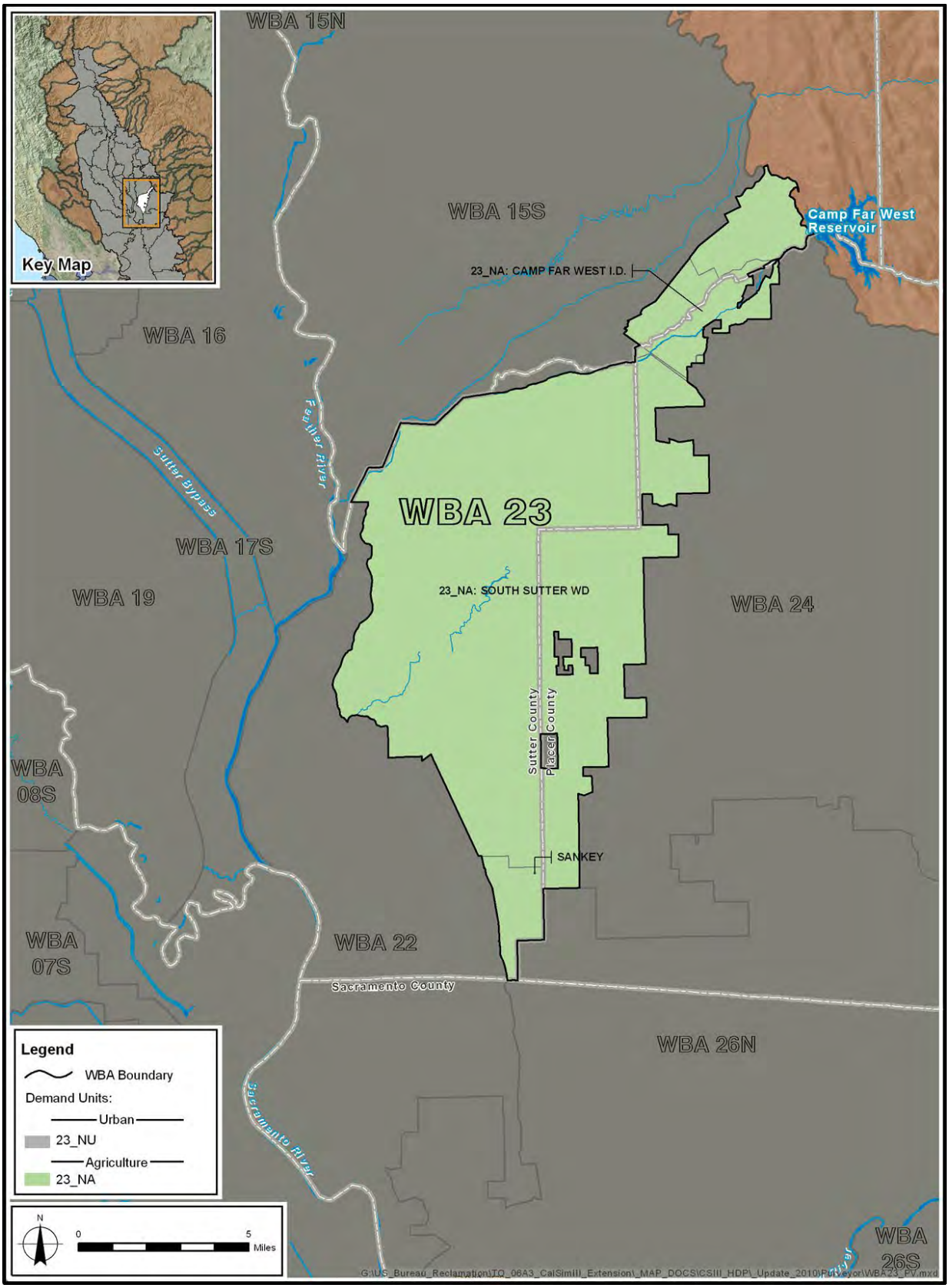

Figure A-9. Water Budget Area 23 Water Users.

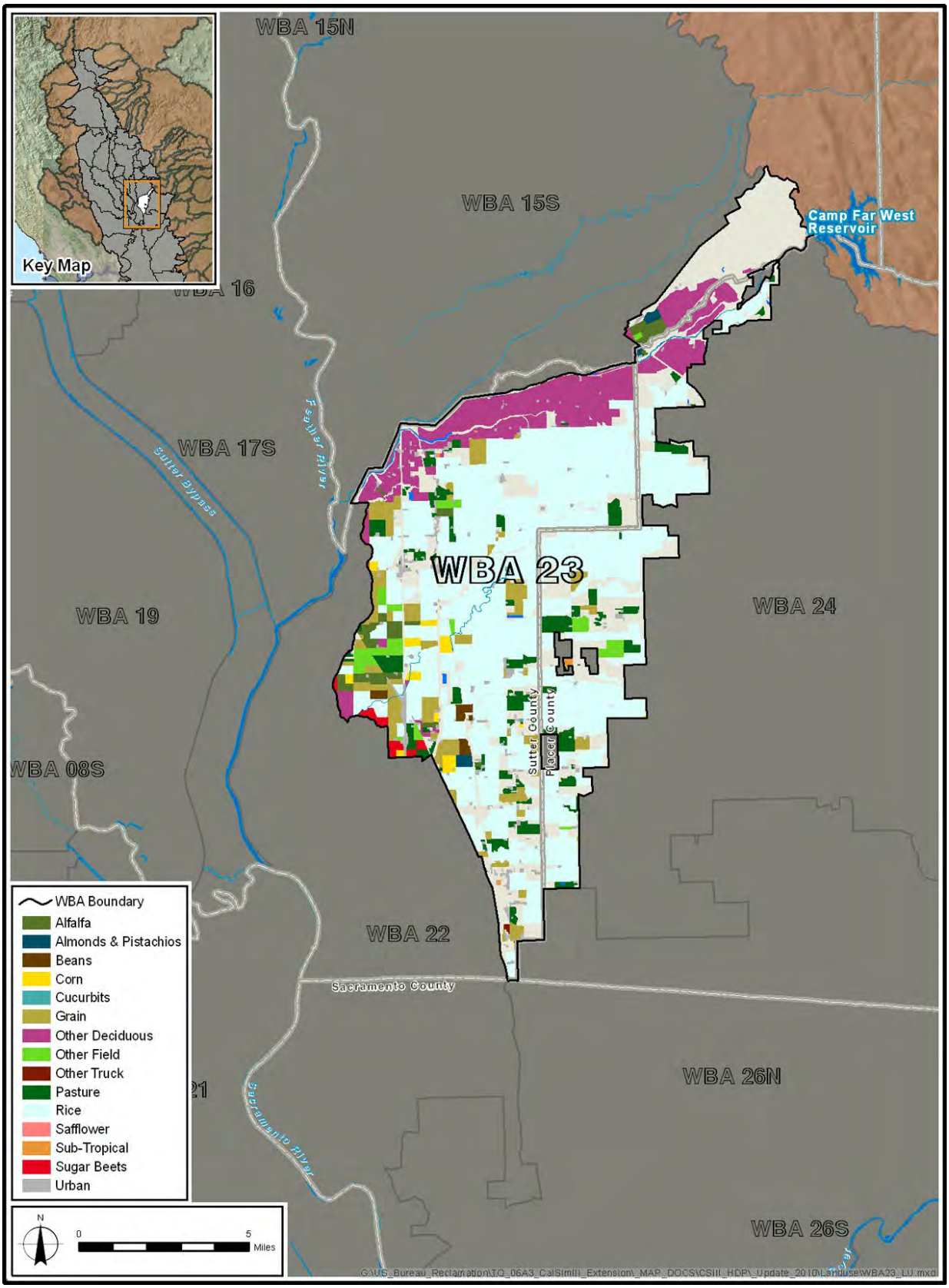

Figure A-10. Water Budget Area 23 Land Use.

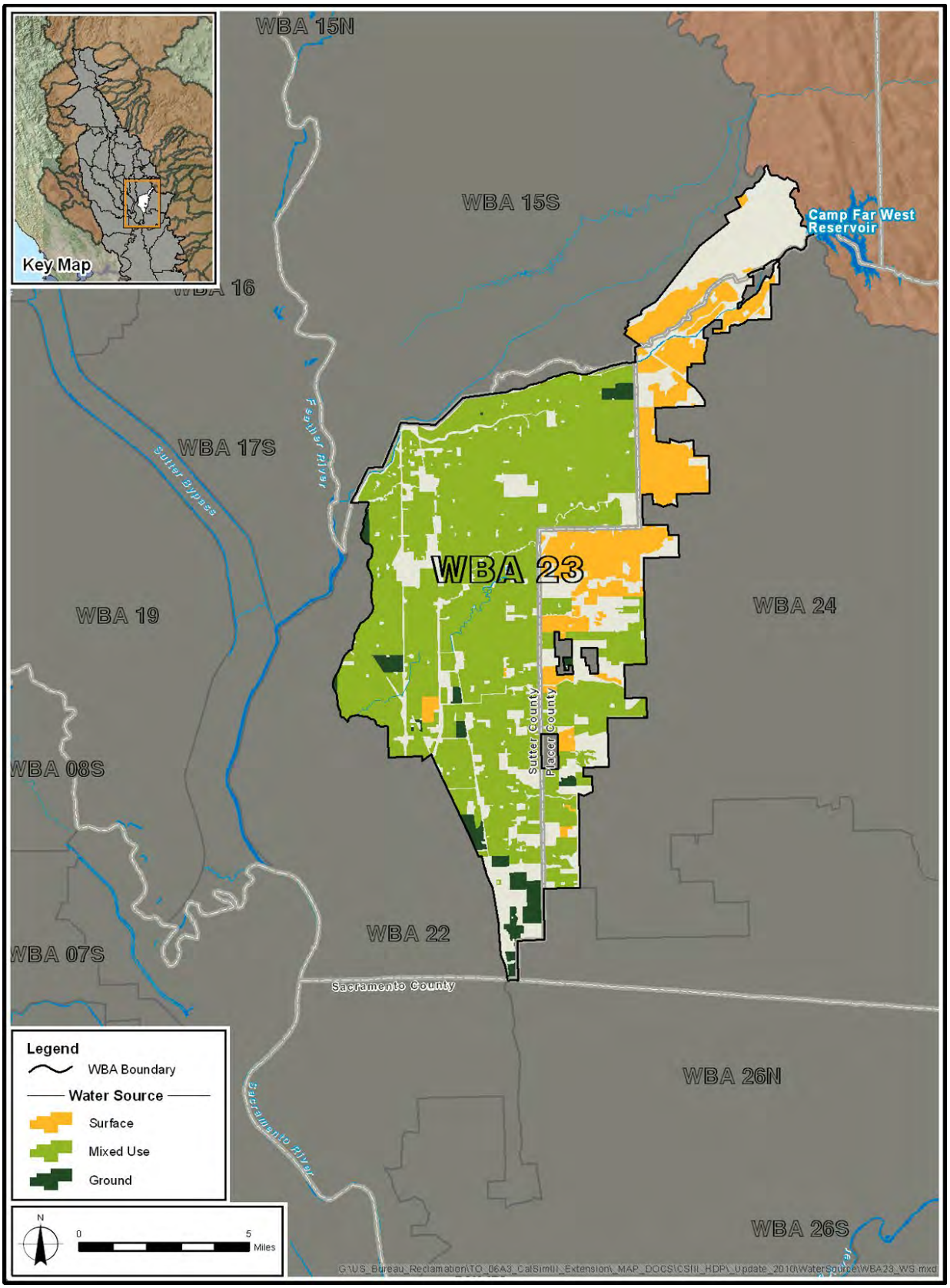

Figure A-11. Water Budget Area 23 Water Source.

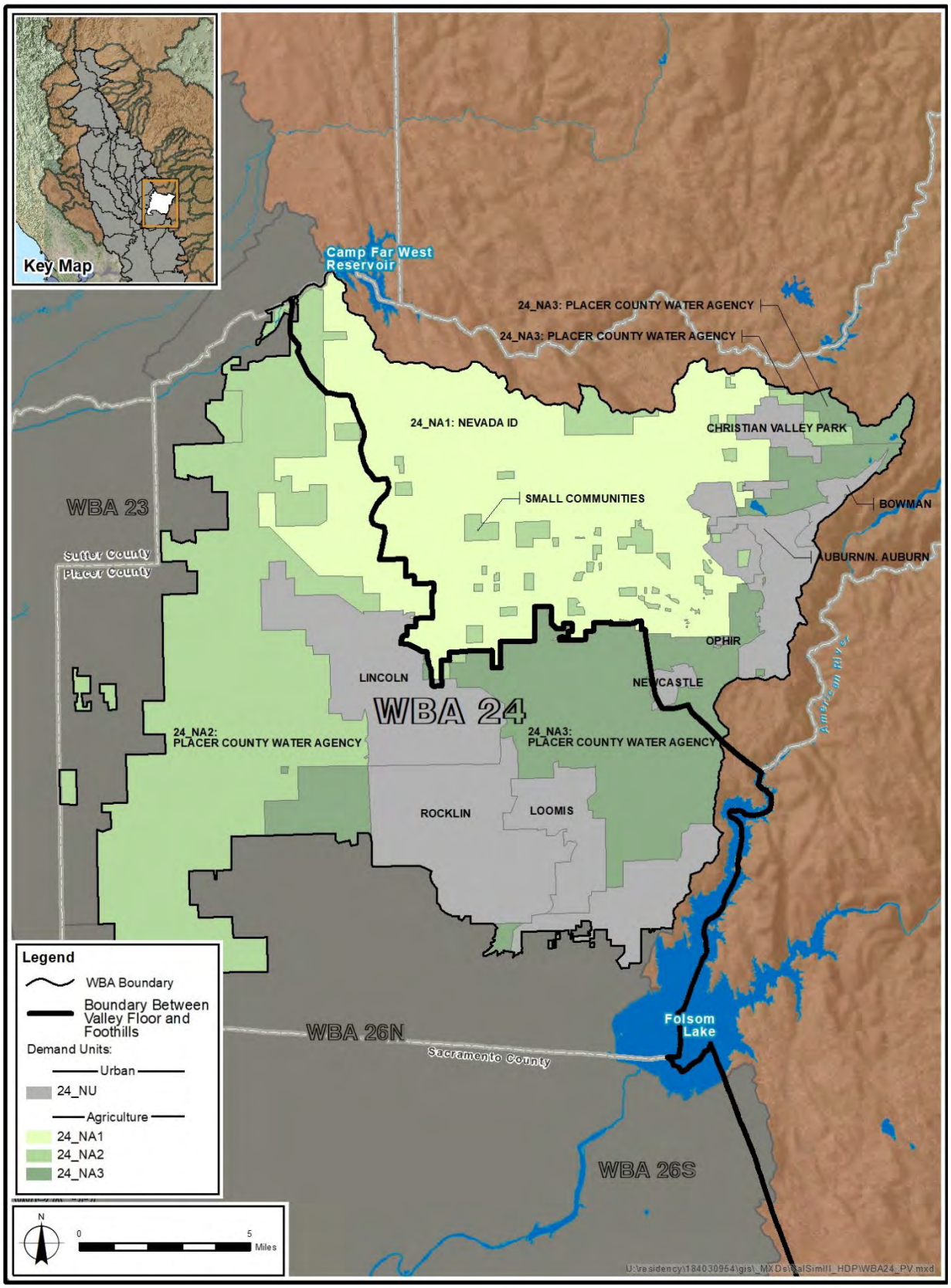

Figure A-12. Water Budget Area 24 Water Users.

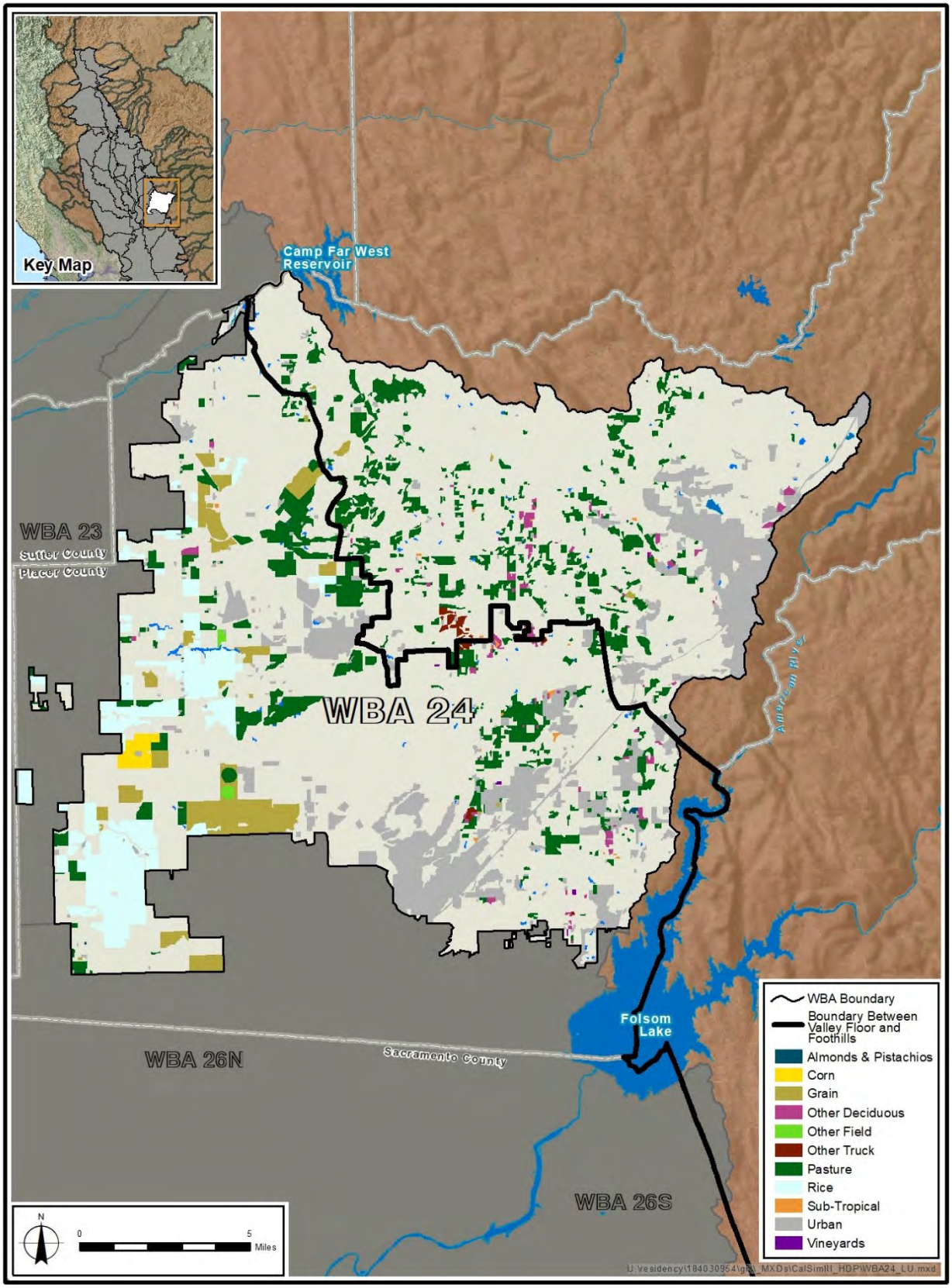

Figure A-13. Water Budget Area 24 Land Use.

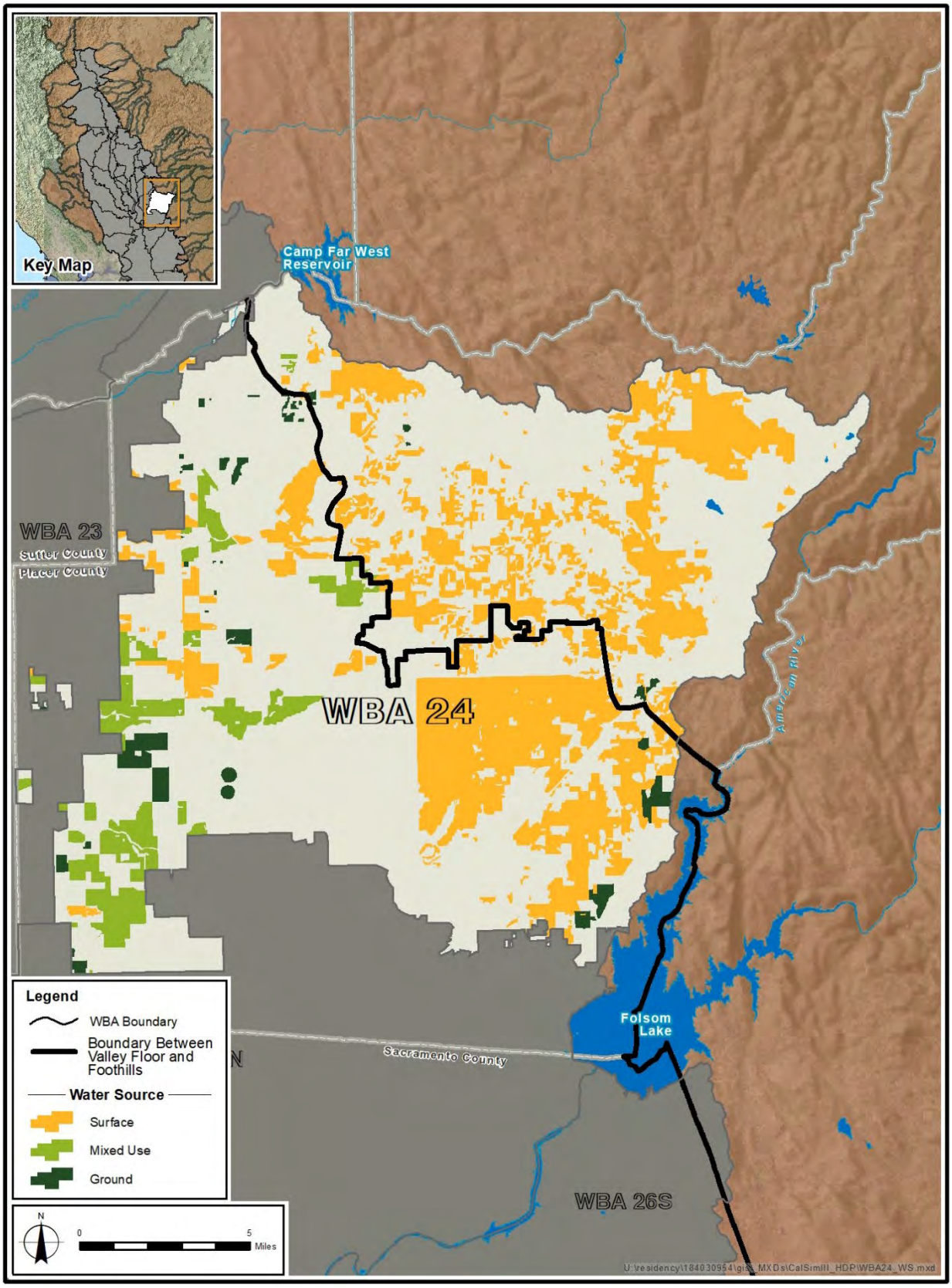

Figure A-14. Water Budget Area 24 Water Source.

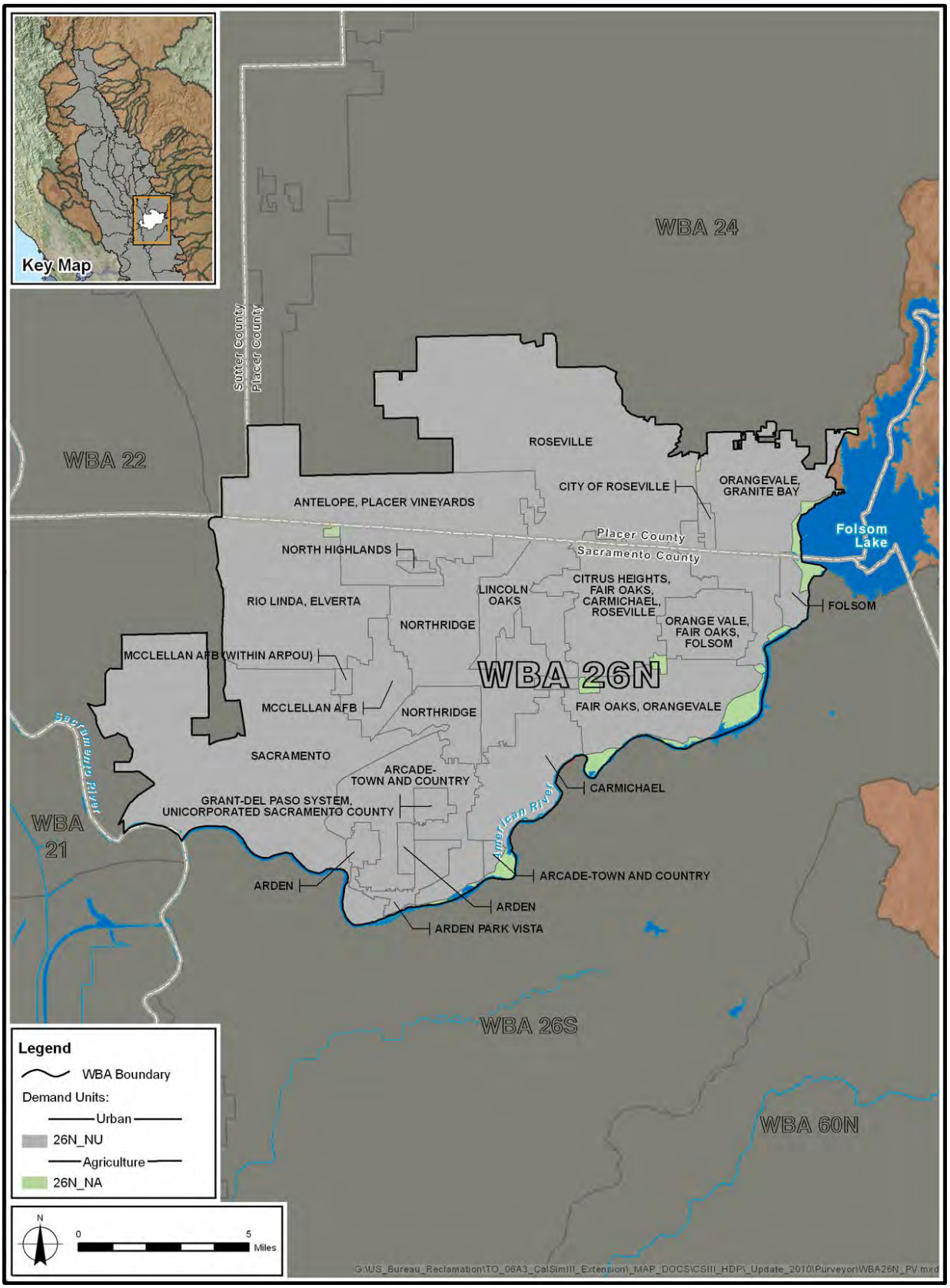

Figure A-15. Water Budget Area 26N Water Users.

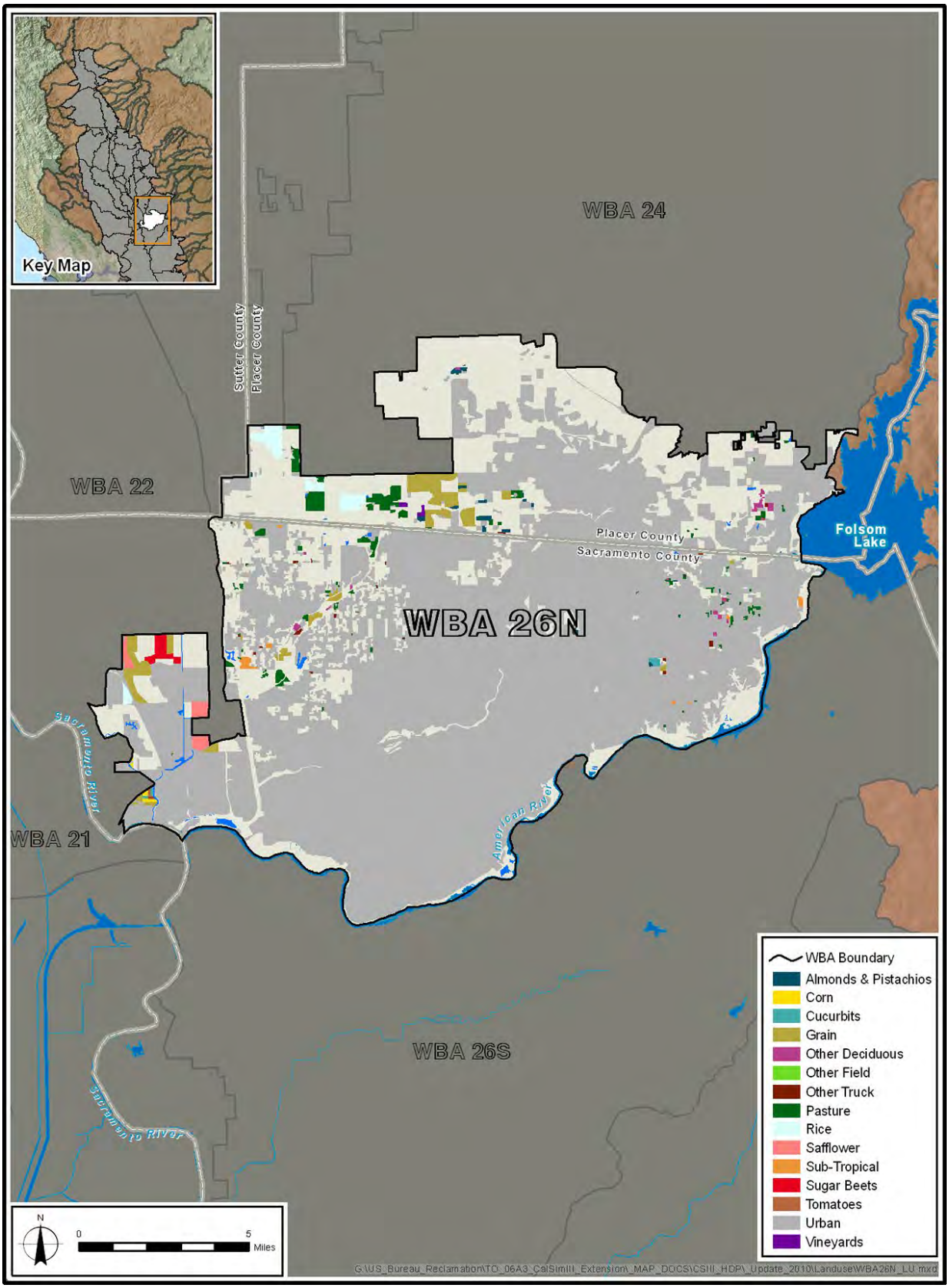

Figure A-16. Water Budget Area 26N Land Use.

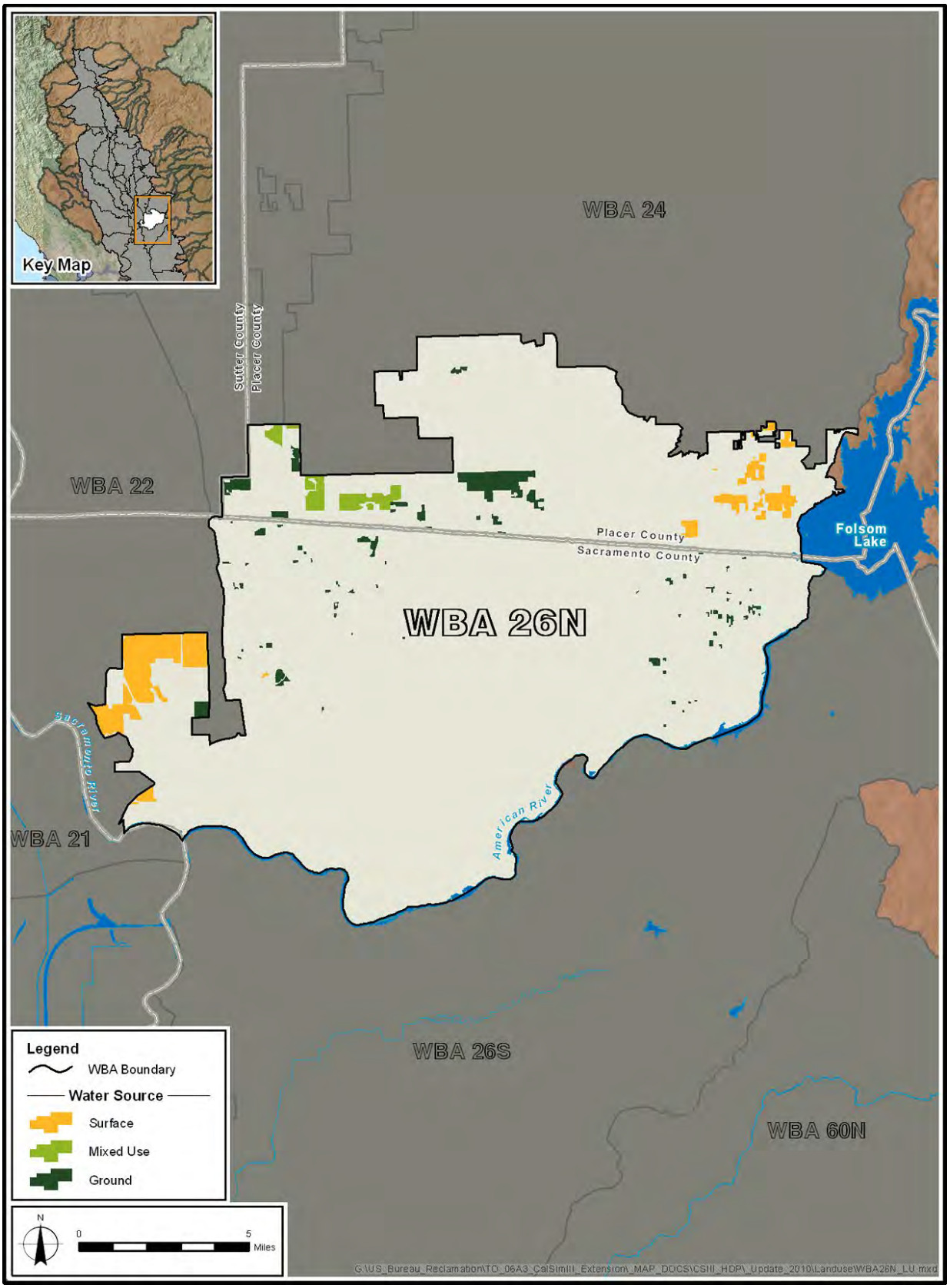

Figure A-17. Water Budget Area 26N Water Source.

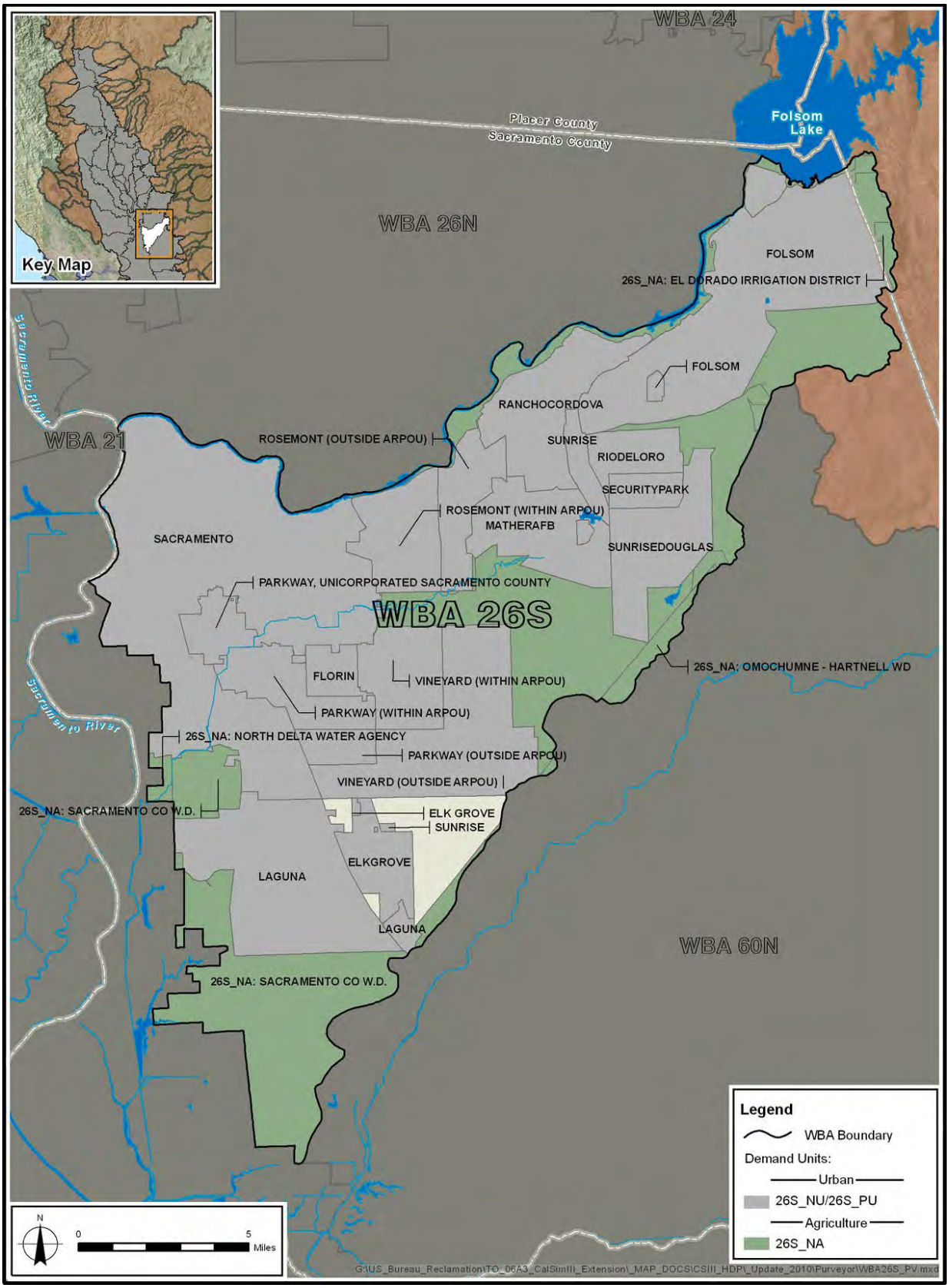

Figure A-18 Water Budget Area 26S Water Users.

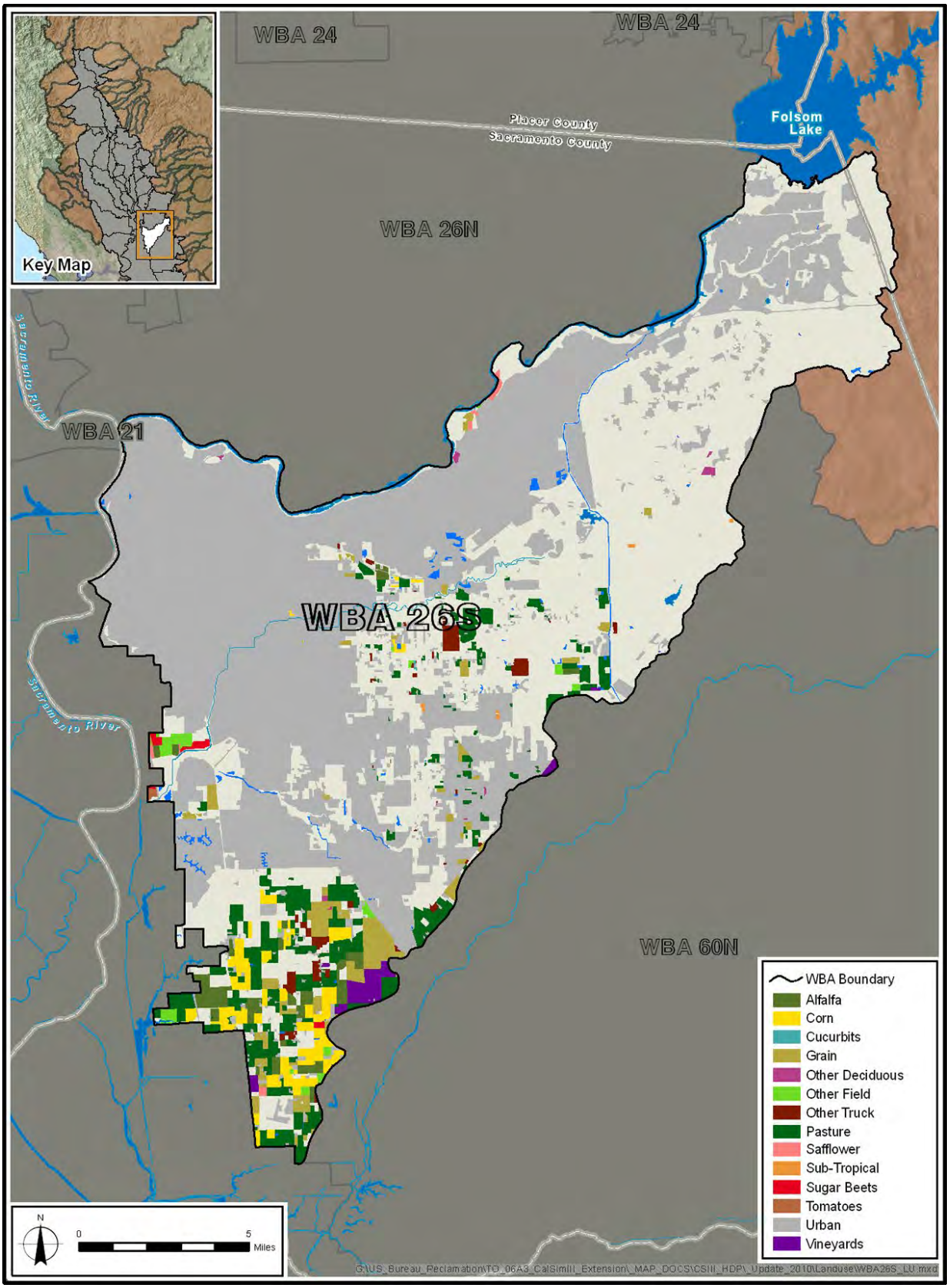

Figure A-19. Water Budget Area 26S Land Use.

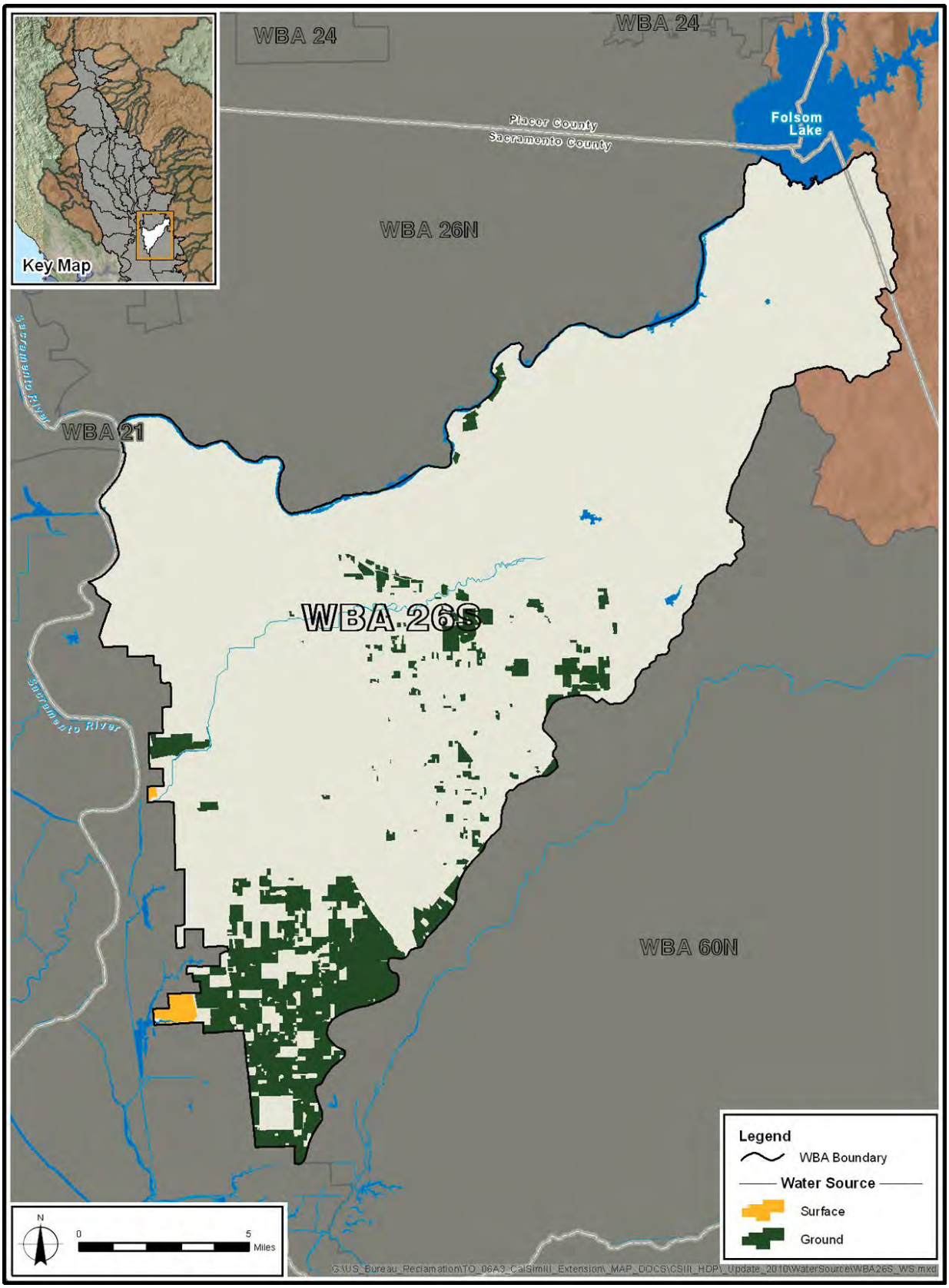

Figure A-20. Water Budget Area 26S Water Source.

Attachment A
CalSim 3.0 Water Budget Areas

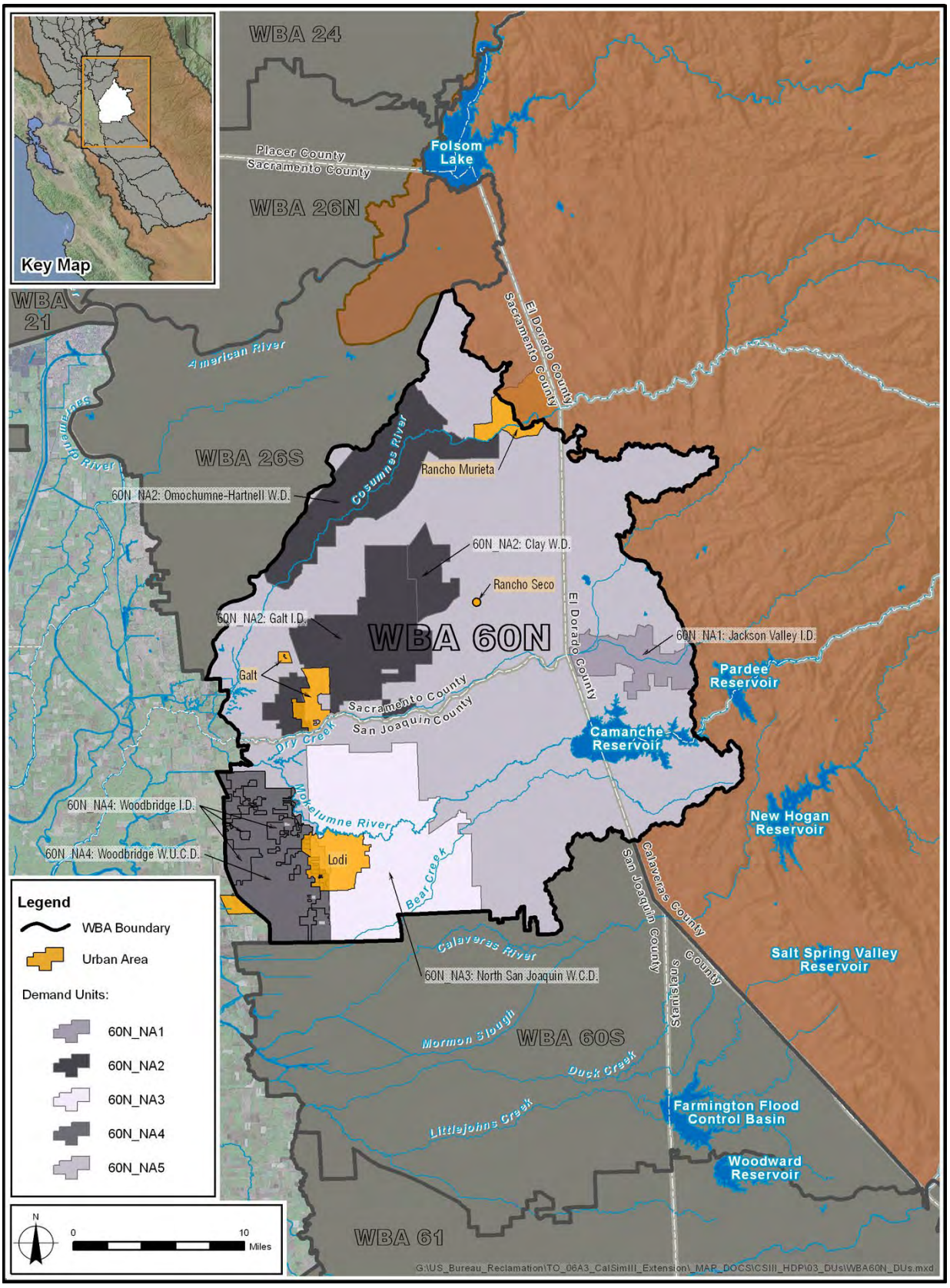

Figure A-21. Water Budget Area 60-North Water Users.

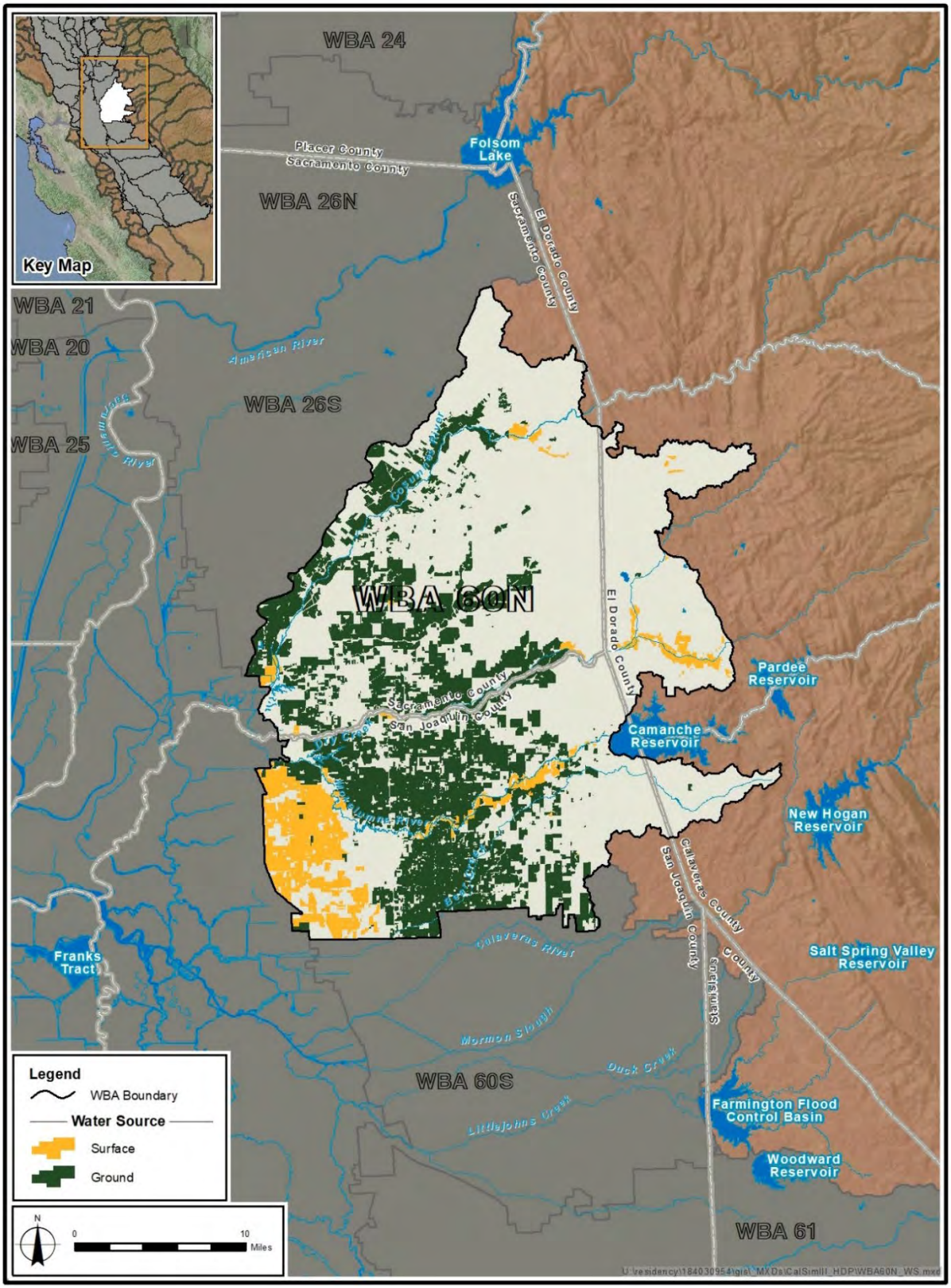

Figure A-22. Water Budget Area 60 North Land Use.

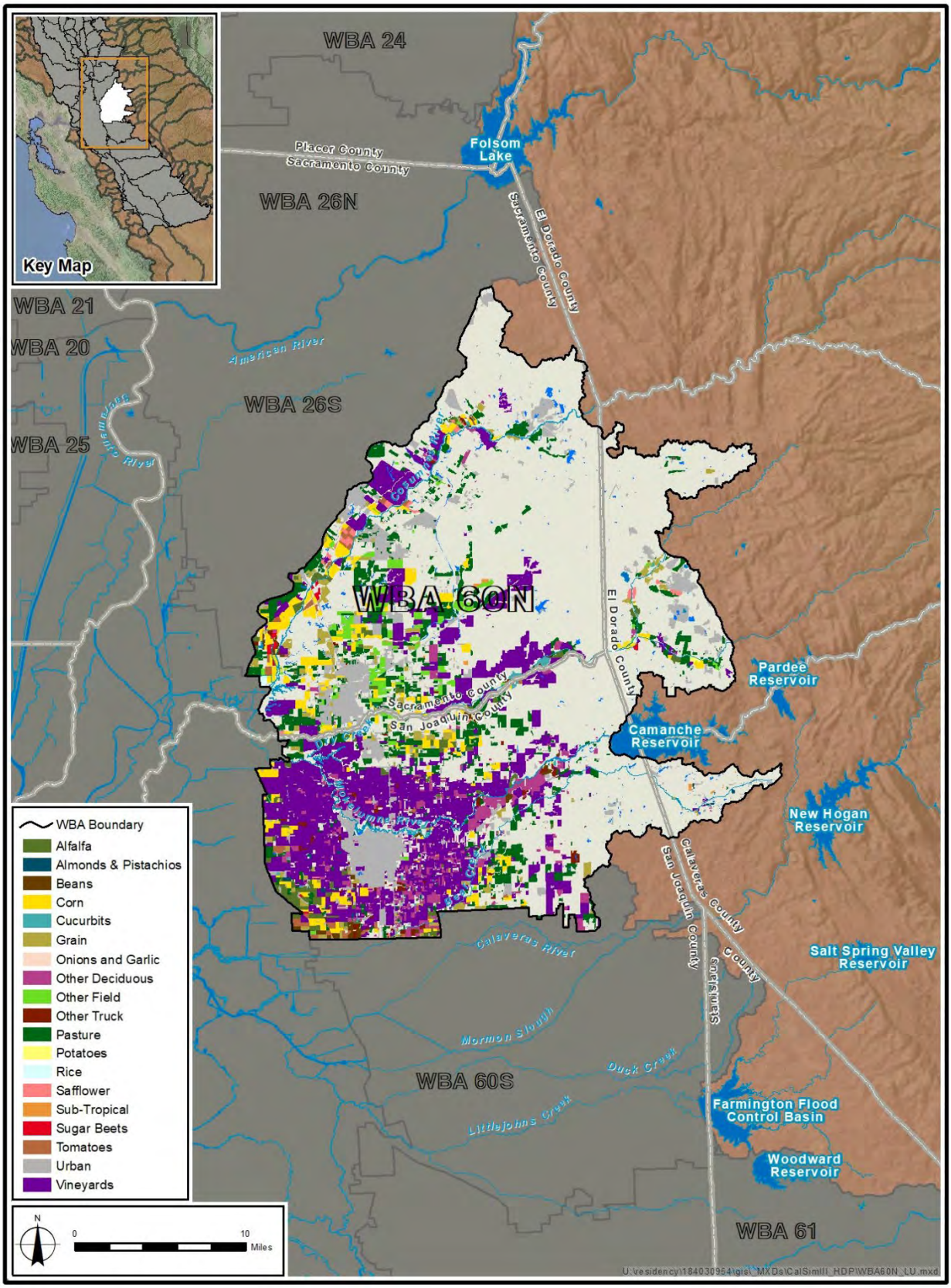

Figure A-23. Water Budget Area 60 North Water Source.