McCune Creek-Putah Creek (15), Sycamore Slough (26), and Willow Spring Creek-Colusa Basin Drainage Canal (30).

In the Hamilton Creek-Cache Creek GDE Unit, this trend is the result of deeper wells being added in the more recent time period. This trend is not evident when looking only at the set of wells that are included in both periods.

Dry Creek, McCune Creek-Putah Creek, Sycamore Slough, and Willow Spring Creek-Colusa Basin Drainage Canal exhibit a greater than 10 feet increase in depth to water when comparing the two periods. The NDVI trend in these GDE falls into the 'positive' category with the exception of the Sycamore Slough GDE Unit.

2.2.7.4 Additional Ecological Data

To further understand groundwater dependent ecosystems in the Yolo Subbasin, additional ecologic data was compiled. The California Freshwater Species Database was utilized to inventory species present in each GDE Unit/HUC 12. The total number of freshwater species, the number of listed species, the number of vulnerable species, and the number of endemic species present in the California Freshwater Species Database is shown in **Table 2-21**. Groundwater dependent species identified by the California Freshwater Species Database [51]as being located in the Yolo Subbasin are included in **Appendix G – Groundwater Dependent Species in the Yolo Subbasin**.

Additionally, CDFW 's ACE Species Biodiversity dataset [ds2769][52] was used to summarize the GDE Units in the Yolo Subbasin. The biodiversity dataset combines three measures of biodiversity:

- Native species richness
- Rare species richness
- Irreplaceability, a weighted measure of endemism.

This dataset displays biodiversity relative to the whole state of California (Gogol-Prokurat 2018). **Figure 2-52** displays the State Biodiversity Rank within the Yolo Subbasin. The State Biodiversity value, "…ranks of 1-5 assigned to the statewide normalized biodiversity values, with all zero values removed and remaining values broken into 5 quantiles" (Gogol-Prokurat 2018). **Figure 2-52** and **Table 2-21**, as well as the underlying data can be used as proxies to better understand, characterize, and inventory ecological conditions within the Yolo Subbasin.

[51] https://tnc.app.box.com/s/h0qd2ilqw2908uprt7qhkhif0b2ujn35
[52] https://gis.data.ca.gov/datasets/CDFW::species-biodiversity-ace-ds2769-1/explore

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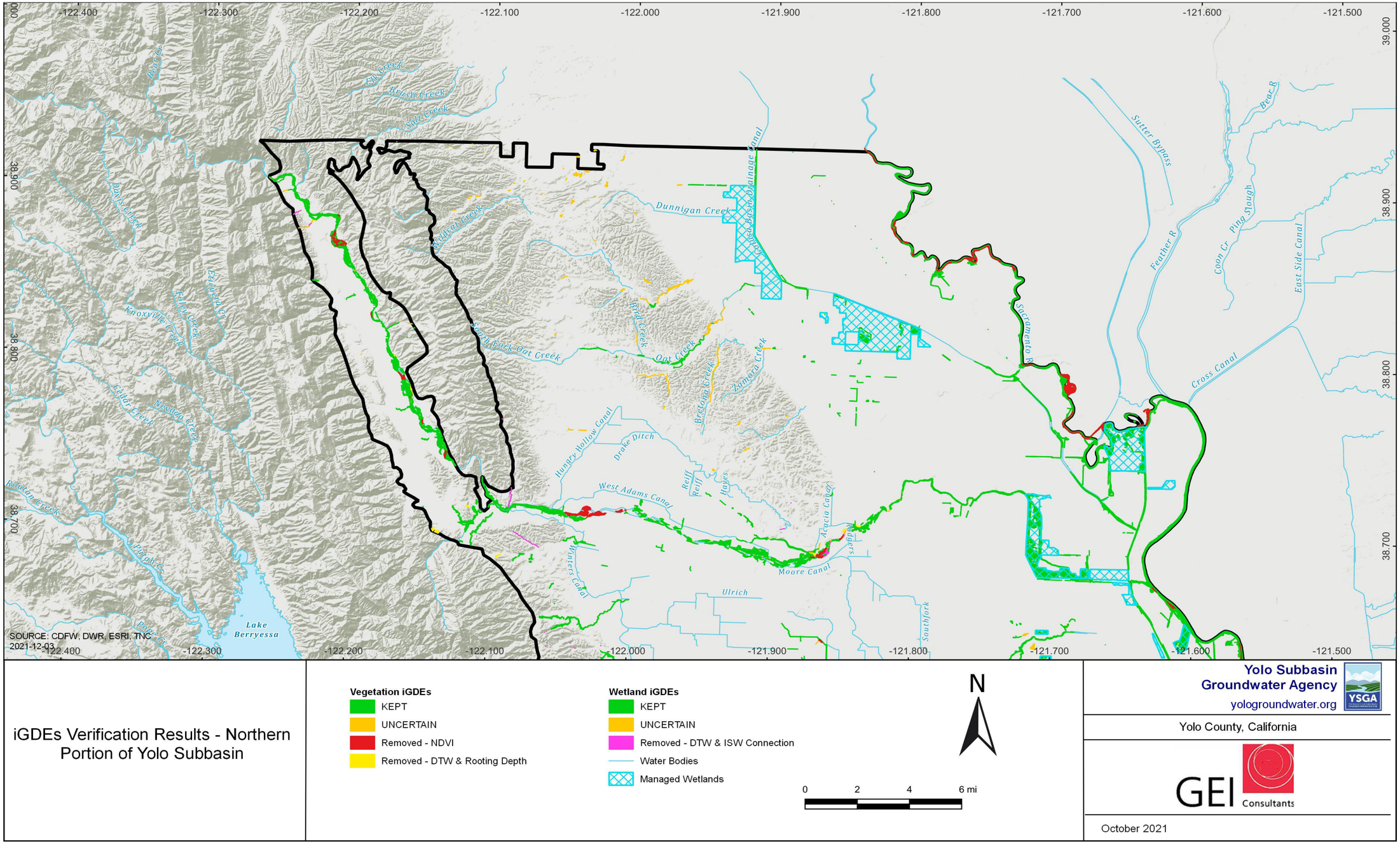

iGDEs Verification Results - Northern Portion of Yolo Subbasin

Vegetation iGDEs
- KEPT
- UNCERTAIN
- Removed - NDVI
- Removed - DTW & Rooting Depth

Wetland iGDEs
- KEPT
- UNCERTAIN
- Removed - DTW & ISW Connection
- Water Bodies
- Managed Wetlands

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Figure 2-48. iGDEs and Status in the Northern Portion of the Yolo Subbasin.

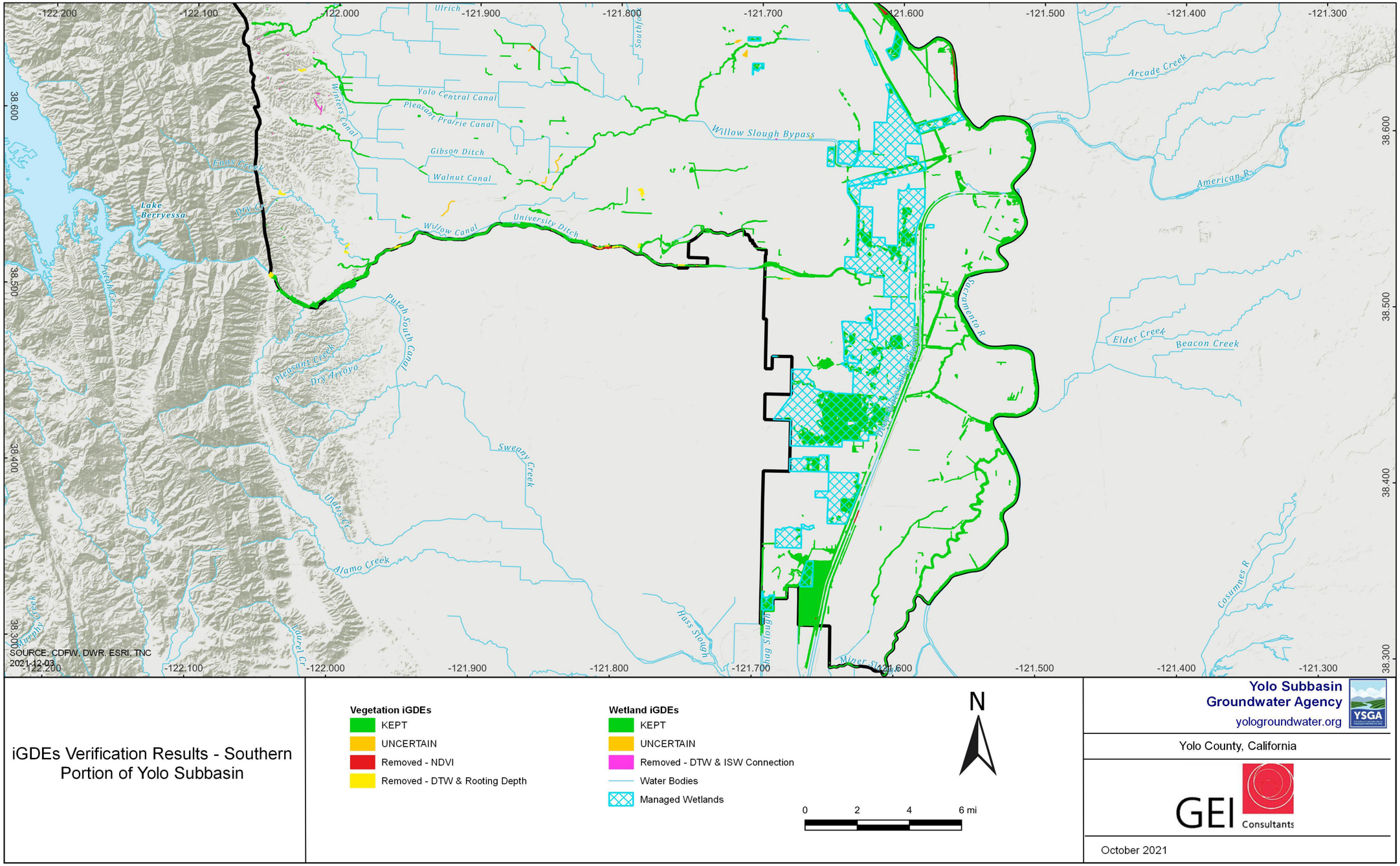

Figure 2-49. iGDEs and Their Status in the Southern Portion of the Yolo Subbasin.

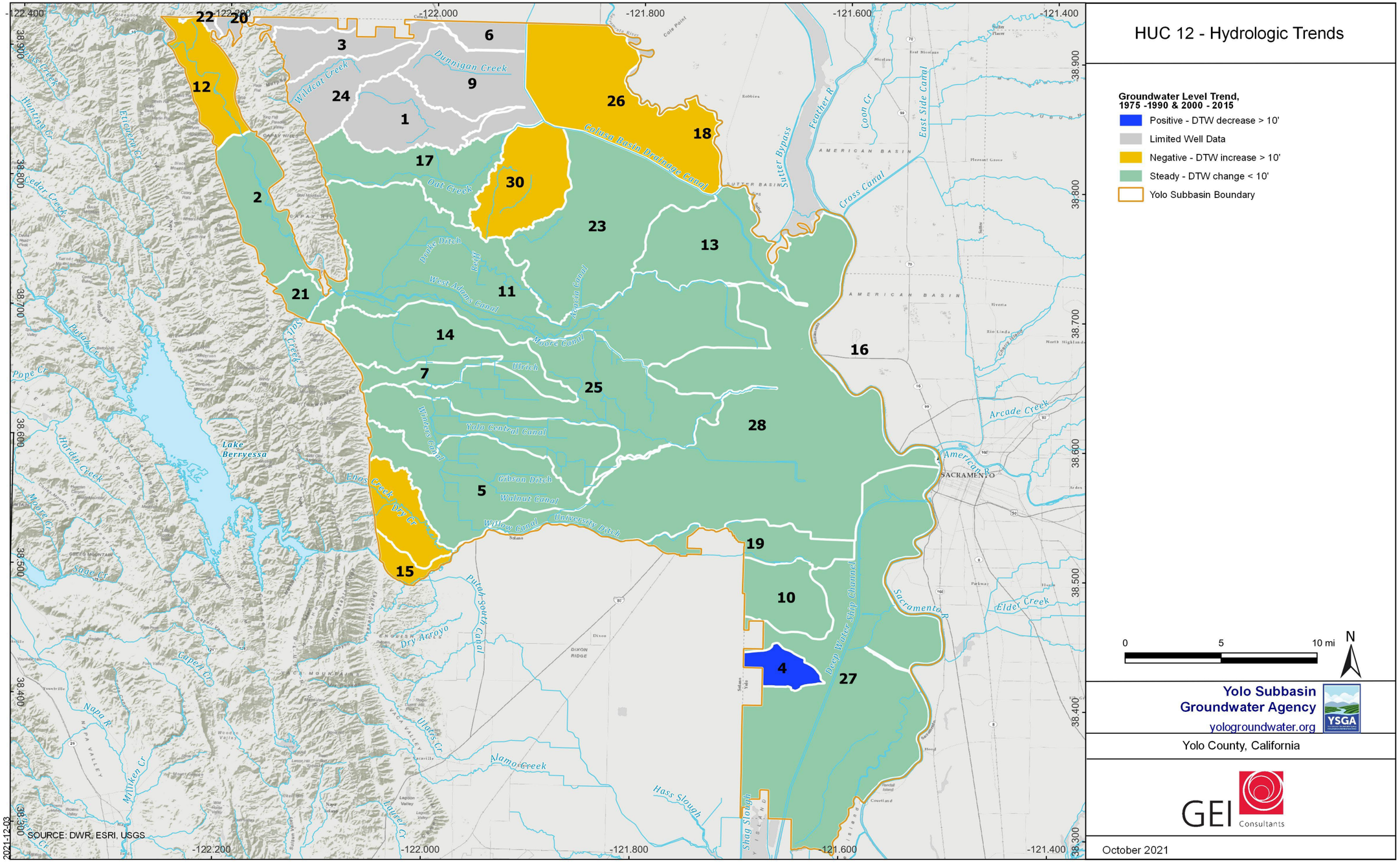

Figure 2-50. Hydrologic Trends of Groundwater Elevation in Each HUC 12 in the Yolo Subbasin.

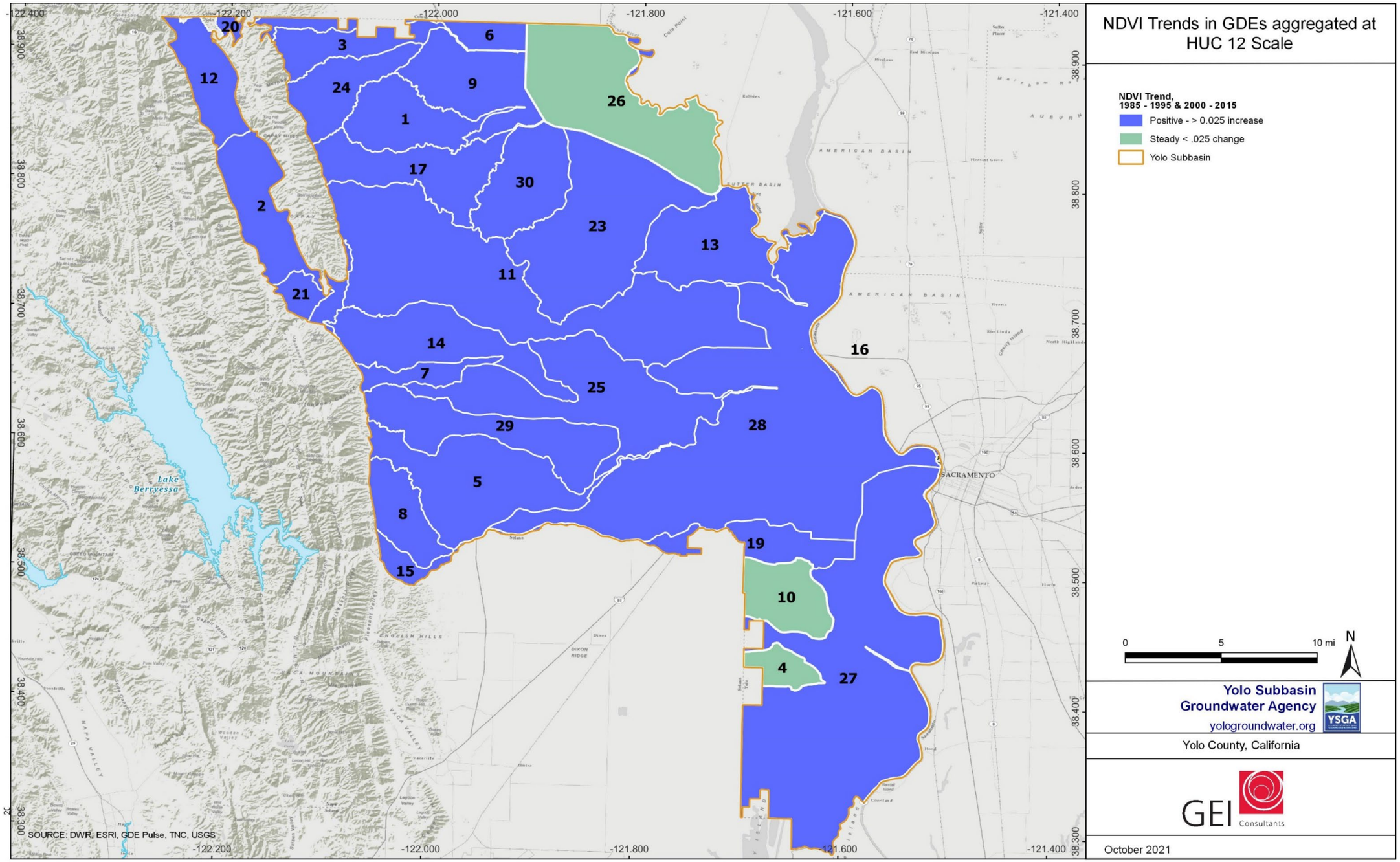

Figure 2-51. NDVI Trends in GDE polygons within each HUC 12 in the Yolo Subbasin.

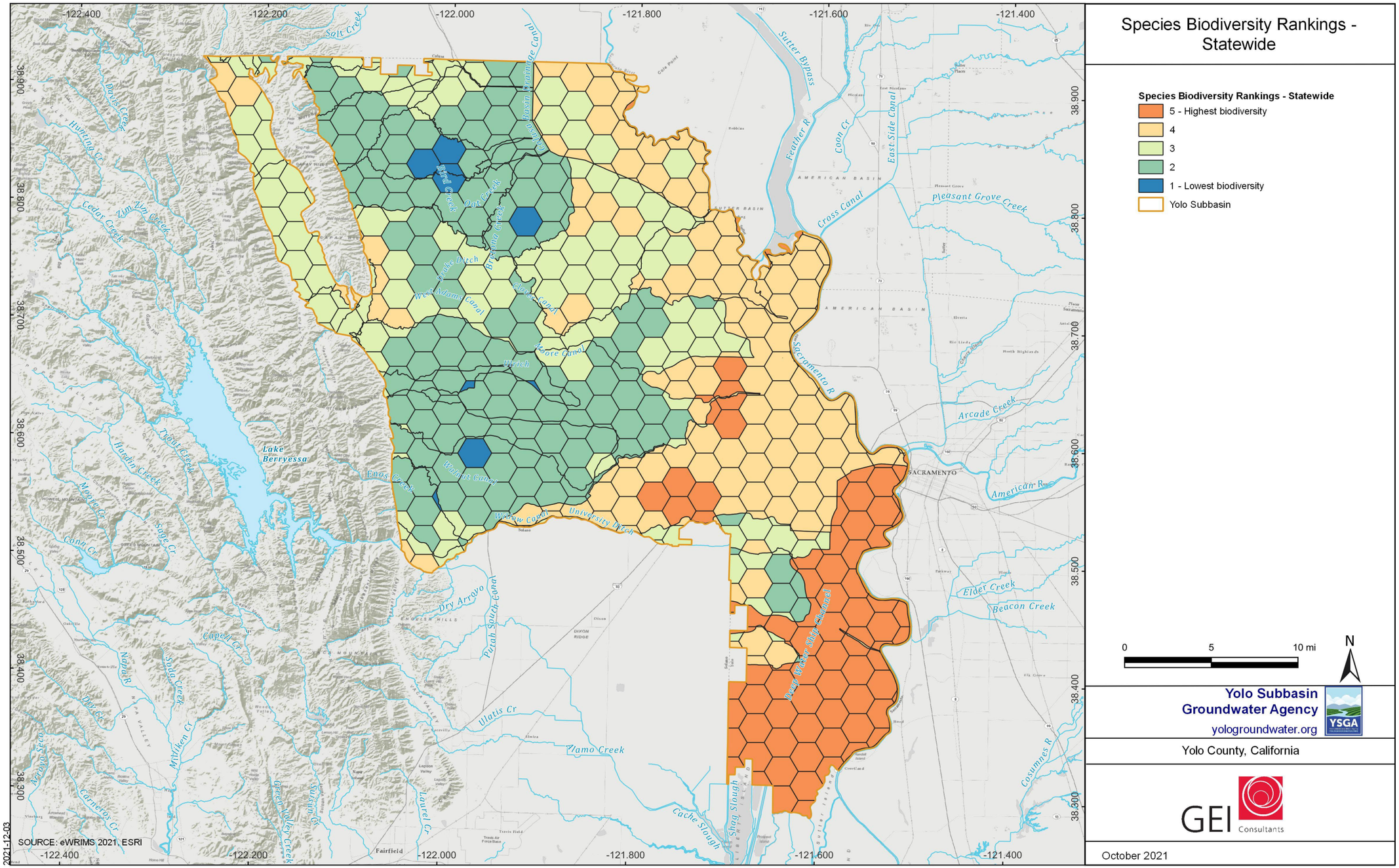

Figure 2-52. Biodiversity Rankings in the Yolo Subbasin.

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Table 2-21. Species present in California Freshwater Species Database, aggregated at the GDE Unit Scale.

GDE Unit Number	GDE Unit Number	Species Count	Listed Species	Vulnerable Species	Endemic Species
1	Bird Creek	27	4	15	15
2	Brooks Creek-Cache Creek	61	6	30	20
3	Buckeye Creek	37	5	19	16
6	Clarks Ditch-Colusa Basin Drainage Canal	263	9	62	52
7	Cottonwood Slough	41	5	21	13
9	Dunnigan Creek-Colusa Basin Drainage Canal	36	4	16	16
11	Goodnow Slough-Cache Creek	131	9	48	28
12	Hamilton Creek-Cache Creek	93	5	29	18
13	Knights Landing Ridge Cut	76	6	32	18
14	Lamb Valley Slough-South Fork Willow Slough	64	5	29	18
17	Oat Creek	37	4	22	17
18	Packer Lake-Sacramento River	132	13	47	21
20	Salt Creek	43	5	25	17
22	Sand Creek	54	4	22	16
23	Smith Creek-Colusa Basin Drainage Canal	94	8	37	17
24	South Fork Buckeye Creek	27	4	17	16
25	South Fork Ditch-Willow Slough	103	7	37	20
26	Sycamore Slough	96	9	39	19
28	Tule Canal-Toe Drain	211	13	57	33
29	Union School Slough	46	6	25	18
30	Willow Spring Creek-Colusa Basin Drainage Canal	42	4	20	15

GDE Unit susceptibility and prioritization can be categorized by evaluating the ecological significance of GDEs and trends in depth to water and spatial indices.

For example, GDE Unit 26 – Sycamore Slough, has a statewide biodiversity ranking of between three and four. GDE Unit 26 also has nine listed freshwater species, 39 vulnerable freshwater species, and 19 endemic species. NDVI has been steady in GDE Unit 26, and the average depth to water between the two sets of wells has increased between the two periods described previously.

2.2.7.5 Sustainable Management Criteria relating to GDEs

GDEs were considered in the establishment of sustainable management criteria in the Yolo subbasin. Sustainable management criteria and the rationale for selection are described in **Section 3 – Sustainable Management Criteria**.

2.2.7.6 GDE Monitoring

GDEs are considered within the Groundwater Monitoring Program. Widely available remote sensing datasets will be used to evaluate the health of GDEs through time. GDEs will experience natural fluctuations in greenness that will be captured in these remote-sensing metrics. Depth to water, and the relationship to GDEs will be monitored using the network of wells related to groundwater-level declines and interconnected surface-water depletions. These two sets of wells will provide information about vegetative and wetland GDEs throughout the Yolo Subbasin – along surface water bodies and terrestrial.

A relationship between NDVI and depth to water may be evaluated in the future to improve the understanding of the connection between groundwater levels and GDE health.

GDE data gaps – primarily in the Dunnigan Hill MA – coincide with data gaps in the monitoring network and are addressed in **Section 4 – Monitoring Networks**. Addressing data gaps in the monitoring network will help to improve the understanding of GDEs in areas where these data gaps are present.

2.3 Water Budget Information

This section describes the water budget information of the Yolo Subbasin. Water budgets quantify all inflows and outflows of the area of interest with surrounding boundaries, and within the area of interest boundary at a spatial and temporal resolution that balances data and resource (human, financial, and time) availability with the overall goals of the water budget.

Historical, present, and future land surface and groundwater budgets were estimated at catchment, MA, and Subbasin scale. This section of the GSP provides a summary of the water budgets at the Subbasin-scale; *please see* **Appendix F – Yolo Subbasin Water Budget Documentation** for additional details on water budget at the subbasin and MA scale and **Appendix E – Yolo SGA Model Documentation**, for technical information of model documentation.

Land surface water budgets quantify all the inflows and outflows to a specified area, from the bottom of the root zone (including water in the root zone), up to the land surface. Land surface inflows in the Subbasin are dominated by precipitation, surface water supply, and groundwater supply to meet multiple water demands (primarily agricultural and municipal water needs). Applied water re-use and recycled water are relatively minor inflows, quantitatively. Land surface outflows in the Subbasin are dominated by evapotranspiration (of precipitation and applied water), deep percolation (i.e., groundwater recharge), and surface runoff. Managed aquifer recharge is a

quantitatively small land surface outflow for the Subbasin as a whole. The difference between these inflows and outflows represents the net change in land surface storage.

Groundwater budgets show all the inflows and outflows to the aquifer from the bottom of the root zone, down through all aquifer layers. Water in the root zone that percolates into the groundwater system is included as an inflow into the shallow aquifer. Much of the Subbasin is underlain by an aquifer with three layers, as described in **Section 2.1.5 – Geology**. Groundwater inflows in the Subbasin are dominated by deep percolation from the overlying land surface, followed by smaller contributions as recharge from the YCFC&WCD's unlined, earthen canal system. Groundwater outflows are largely comprised of pumping (for irrigation and municipal uses). Lateral flows (exchanges with neighboring subbasins) include groundwater exchanges with surface water bodies like rivers and creeks, and other smaller groundwater outflows from the Subbasin. The difference between groundwater inflows and outflows represents the net change in groundwater storage.

In the Subbasin, groundwater storage changes are positive in wet years and negative in dry years, with no significant trend (decline or increase) over the past 50 years.

Please *see* Section 1.3.7 – Evaluating Water Budget Estimates, in **Appendix F – Yolo Subbasin Water Budget Documentation** to learn more about the uncertainty in the water budgets and YSGA model overall.

2.3.1 Model Overview

The YSGA model is a linked surface water-groundwater model developed using Water Evaluation and Planning (WEAP)[53] and USGS' modular finite-difference flow model (MODFLOW)[54]. The YSGA model includes not only the Yolo Subbasin but also portions of the Cache Creek watershed upstream of the Capay Valley (including Clear Lake and Indian Valley Reservoir. **Figure 2-53** shows the spatial domain of the YSGA model.

The YSGA Model uses inputs such as climate variables, land use, irrigation information, urban water plans, and groundwater and surface water hydrologic conditions to estimate historical and future land surface and groundwater budgets. **Table 2-22**, below, provides the details of the data sources, assumptions, and the model's use of each variable. Additional information about model inputs, model calculations, model calibration, and model performance in different subregions of the Basin is available in **Appendix E – Yolo SGA Model Documentation**. The YSGA model relies on a 48-year historical period, which covers a large spread of WY types: significant and contiguous drought and wet periods. The YSGA model runs at a monthly time step from WY 1971 to 2018. WY 2018 is treated as the current period within the model and documentation – climate and water

[53] WEAP is an integrated surface water-groundwater modeling tool, which integrates rainfall-runoff hydrology, reservoir operation, water demands from cities and crops, and allocations of water to those demands from surface water and groundwater supplies.

[54] MODFLOW is a finite-difference groundwater modeling tool developed by the USGS, which simulates the groundwater budget of the Yolo Subbasin's three-layer aquifer and was built using the inputs, aquifer parameters, boundary conditions, and aquifer representation from a Yolo County Integrated Water Flow Model (IWFM).

rights data is updated to 2018; however, land use data was only available for 2016 (land use data from 2016 was kept constant until 2018).

Table 2-22. YSGA Model Data Sources.

	Variable	Historical Scenario		Future Projections	
		Sources	Model use	Sources	Model use
Climate	Precipitation	PRISM[1]	Input data	Historical, modified by Climate Change factors provided by DWR	Input data
	ETo	CIMIS[2]	Calibration	Historical, modified by Climate Change factors provided by DWR	Input data
	Minimum Temperature	PRISM[1]	Input data	NA	
	Maximum Temperature	PRISM[1]	Input data	NA	
	Wind speed	(Livneh et al. 2013); CIMIS[2]	Input data	NA	
	Humidity	PRISM[1]	Input data	NA	
Land Use	Agricultural land use	DWR Land Use Surveys[3]; Yolo County Annual Agriculture Commissioner Reports; DWR SGMA Portal (LandIQ dataset)	Input data	Agricultural land use kept constant to Current Year	Input data
	Non-agricultural land uses	DWR Land Use Surveys[3];	Input data	Growth projections from urban master plans[6]	Input data
Irrigation	Schedule	Sacramento-San Joaquin basin Study[4] (Reclamation 2015)	Input data	Same as historical	Input data
	Crop coefficients	Sacramento-San Joaquin basin Study[4] (Reclamation 2015)	Input data; Calibration	Same as historical	Input data
	Irrigation efficiency	NA	Calibration	Same as historical	Input data
	Applied Water	DWR Applied Water Estimates[5], Groundwater management plans and personal communication[6]	Calibration	NA	Model output
	Water sources and supply	State Water Board eWRIMS water rights database[7], personal communication[6]	Input Data	Same as historical	Input Data
Urban	Water demand, including population	Urban water plans and personal communication[6]; CA Department of Finance Population data[8]	Input data	Growth projections from urban master plans[6]	Input data
	Water sources and supply	Urban water plans and personal communication[6];	Input data (water rights)	Urban water plans[6]	Input data (water rights)

	Variable	Historical Scenario		Future Projections	
		Sources	Model use	Sources	Model use
		State Water Board eWRIMS water rights database[7]			
Hydrology	Stream flows	USGS[9]; CDEC[10]	Calibration	NA	Model output
	Stream flows	USGS9; CDEC[10]	Input Data	Same as historical	Input data
	Initial groundwater conditions	WRID[11]; SGMA[12]; IWFM model (Flores Arenas 2016)	Input data	Historical model end-of simulation set as future model run initial conditions	Input data
	Groundwater boundary conditions	IWFM model (Flores Arenas 2016)	Input data, calibration	NA	Input data
	Groundwater elevations (time series)	WRID[11]; SGMA[12]; WDL [13];	Calibration, Model output	NA	Model output
	Reservoir operations (storage levels, outflows)	CDEC[10]; Conversations with and data supplied by YCFC[6]	Calibration, Model output	NA	Model output
	In-stream flow requirements	CDEC[10]; Conversations with and data supplied by YCFC[6]	Input data	Same as historical	Input data

1 http://www.prism.oregonstate.edu/explorer/ Accessed 5.19.2019
2 https://cimis.water.ca.gov/Default.aspx . Accessed 5.19.2019
3 https://gis.water.ca.gov/app/CADWRLandUseViewer/ Accessed 9.1.2020
4 https://www.usbr.gov/watersmart/bsp/docs/finalreport/sacramento-sj/Sacramento_SanJoaquin_TechnicalReport.pdf Accessed 9.1.2020
5 https://water.ca.gov/Programs/Water-Use-And-Efficiency/Land-And-Water-Use/Agricultural-Land-And-Water-Use-Estimates Accessed 2.1.20
6 A complete list of entity-specific data sources and personal communication is provided in Appendix E – Yolo SGA Model Documentation, and in spreadsheet format to the YSGA
7 https://www.waterboards.ca.gov/waterrights/water_issues/programs/ewrims/
8 http://www.dof.ca.gov/Forecasting/Demographics/Estimates/
9 https://waterdata.usgs.gov/nwis/sw
10 https://cdec.water.ca.gov/
11 Yolo County Water Resources Information Database (https://wrid.facilitiesmap.com/Login.aspx)
12 SGMA Data Viewer https://sgma.water.ca.gov/webgis/?appid=SGMADataViewer#gwlevels
13 California Water Data Library https://wdl.water.ca.gov/GroundWaterLevel.aspx

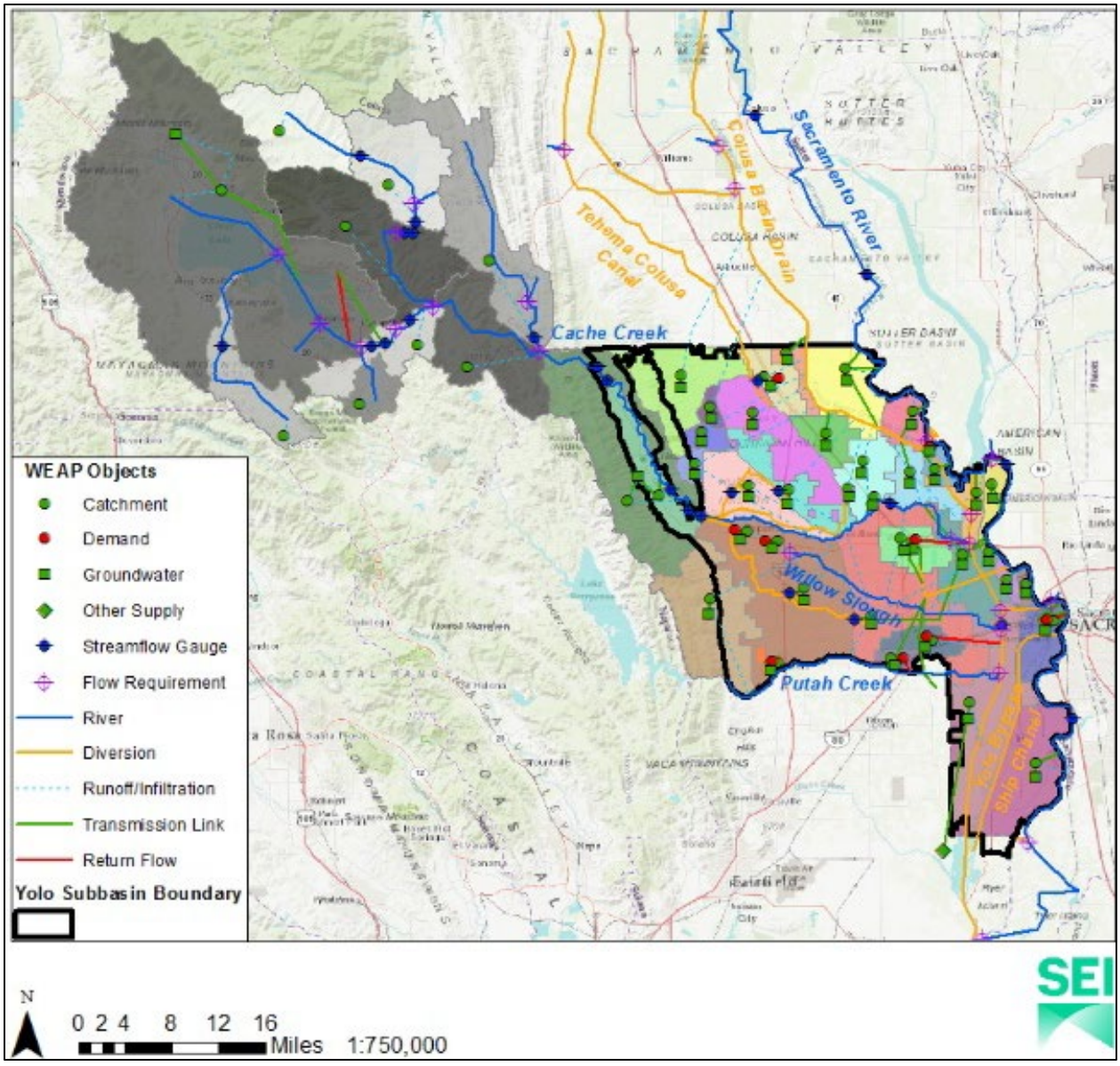


Figure 2-53. YSGA Model Spatial Domain.

Future projections in the YSGA model capture climate change projections based on climate change model simulations centered around the mid-2030's and mid-2070's. Five future scenarios exist in the model. Urban demand in these five scenarios is based on Urban Water Management Plan (UWMP) projections. The total urban demand is the same across the five modeled scenarios. Land use in the five future scenarios is held constant at the 2016/2018 land use values. The differences between five future modeling scenarios are driven by the effect of the climate changes impacting irrigation demand, precipitation, and surface water supply availability.

The five scenarios are as follows:

1. 'Future_baseline' – Urban demand increasing; irrigated crops constant; climate same as historical

2. 'Future_2030' – Climate representing the central tendency from many downscaled climate models, centered around 2030
3. 'Future_2070' – Climate representing the central tendency from many downscaled climate models, centered around 2070
4. 'Future_2070_DEW' – Climate representing the central tendency from many downscaled climate models, centered around 2070
5. 'Future_2070_WMW' – Climate representing wetter-moderate warming from many downscaled climate models, centered around 2070

The precipitation and evapotranspiration for the Yolo Subbasin are both higher in all climate projections, compared to that in the 'Historical' scenario. The model has four climate projections: Future_2030, Future_2070, 'Future_2070_DEW', and 'Future_2070_WMW'. The 'Future_baseline' scenario is not a climate change projection and models the future water budgets based on historical climate. The land surface and groundwater budgets can be compared between scenarios in **Tables 2-27, 2-28,** and **2-29.**

The four climate change scenarios use 'change factors' for precipitation and reference evapotranspiration, based on the methods presented in DWR's Climate Change Data and Guidance for Use During Groundwater Sustainability Plan Development (DWR 2018b). Additional information on Climate Change and the assumptions about climate change can be found in **Appendix F – Yolo Subbasin Water Budget Documentation** and **Appendix E – Yolo SGA Model Documentation**.

2.3.2 Land Use

Landcover in the Subbasin is dominated by agriculture and native vegetation. **Table 2-23** below shows the acreage and proportion of the main categories of Subbasin-wide land use for specific years where GIS data were available (1989, 1997, 2008, and 2016). Within each land use category, each crop is modeled with its own coefficient of water use. Native vegetation is modeled as its own category distinct from irrigated crops. More details on specific land use types and crop coefficients are available in **Appendix E – Yolo SGA Model Documentation**.

An important feature of land use changes in the Subbasin is an increasing acreage of perennial crops (deciduous, subtropical, and vines), which have partly replaced field crops, and brought previously uncultivated area into production in some regions. The Future Baseline and Historical scenarios have the same climate, but different land use inputs; Future Baseline holds 2016 land use constant, while the Historical scenario relies on the historical land use datasets in **Table 2-23**. Comparing the Future Baseline scenario to Historical demonstrates the impact of the increased perennial acreage in 2016 relative to historical land use data. Perennial acreage is generally associated with more efficient irrigation practices. Because these crops are permanent, they also decrease the flexibility of water demand ("demand hardening"). Another important change in land use is the conversion of agricultural areas to urban areas. Throughout the following sections, the comparison of the Future Baseline and Historical scenarios demonstrate the effects of this changing land use, largely in evapotranspiration and deep percolation. A model scenario incorporating future changes in land use

is outside the scope of the current modeling effort but will be developed in future improvements of the YSGA model.

Table 2-23 Modeled Land Use in Historical Scenario.

	Land Use (ac)				Land Use (Percent)			
	1989	1997	2008	2016	1989	1997	2008	2016
Entire Basin	**639,089**	**639,089**	**639,089**	**639,089**				
Deciduous	17,550	18,406	30,717	59,434	3	3	5	9
Field Crops	96,679	108,427	36,475	41,446	15	17	6	6
Grain	80,354	57,993	52,369	27,200	13	9	8	4
Managed Wetlands	0	483	459	0	0	0	0	0
Native Vegetation	288,058	284,997	319,938	330,463	45	45	50	52
Pasture	42,612	44,822	63,801	33,129	7	7	10	5
Rice	22,652	24,754	35,056	38,847	4	4	5	6
Subtropical	118	135	1,331	3,670	0	0	0	1
Truck Crops	56,953	55,160	46,968	46,930	9	9	7	7
Urban	26,347	29,153	33,220	33,270	4	5	5	5
Vine	2,543	9,536	13,384	19,329	0	1	2	3
Water	5,222	5,222	5,372	5,372	1	1	1	1

2.3.2.1 Natural Vegetation

Natural vegetation covers large areas of the Yolo sub-basin, especially in north-western Yolo County (*see* **Table 2-23** for acreages). **Table 2-24** below summarizes the subbasin wide consumptive use of natural vegetation.

Table 2-24. Modeled Evapotranspiration of Natural Vegetation.

Scenario	ET Actual Average Annual (acre-feet)
Historical	399,434
Future_Baseline	437,359
Future_2030	446,687
Future_2070	448,710
Future_2070_DEW	426,354
Future_2070_WMW	452,683

Natural vegetation ET is almost one-third of basin-wide ET in the historical period.

Natural vegetation ET increases in all future scenarios, peaking in the extreme wet scenario. Relatively drier soils in the extreme-dry scenario reduce ET slightly. Native vegetation ET differences across future scenarios are relatively small (approximately 6%).

The YSGA model outputs, as for every other land cover class, ET data for every catchment-land cover combination. The detailed consumptive water use for native vegetation is provided separately as Excel spreadsheets, allowing YSGA to investigate water requirements for multiple uses at a more refined spatial scale than listed for the basin above.

2.3.2.2 Managed Wetlands

In the YSGA model, managed wetlands appear as a landcover class in RD 2035. As described in the **Appendix E – Yolo SGA Model Documentation**, RD 2035 local data provided acreages of managed wetlands from 1996 to 2008. The acreages ranged from 93 to 790 acres, averaging 411 acres. For 2018, managed wetlands acreage was available from the Land IQ derived land cover dataset, at 55 acres.

In future model scenarios, the last available acreages were used for all land cover classes (as described earlier) – hence all model runs for future scenarios have 55 acres of managed wetlands.

In the **Table 2-25** below, 2018 acreages and ET. Actual volumes are used for the historical summary this allows a more straightforward comparison among all scenarios. As the table shows, consumptive use of managed wetlands can be expected to increase in all climate change scenarios, with the highest increase in the extreme dry climate change scenario.

Table 2-25. Modeled Evapotranspiration of Managed Wetlands.

Scenario	ET Actual (acre-feet)	Area (Acres)	ET Actual (acre-feet/Acre)
Historical	302	55	5.5
Future_Baseline	295	55	5.4
Future_2030	308	55	5.6
Future_2070	321	55	5.8
Future_2070_DEW	338	55	6.1
Future_2070_WMW	309	55	5.6

The portrayal of managed wetland acreages is a recognized weakness of this model. The challenges in constructing a robust, continuous long-term spatial landcover dataset for the Yolo Subbasin have been described earlier. None of the earlier DWR land and water use surveys, nor agricultural commissioner's reports, included managed wetlands as a category. The recent DWR commissioned Land IQ datasets may be under-estimating managed wetlands, or may be accurate enough for 2018, but no information is available about future acreages.

For future GSP and YSGA model updates, the TAC will work to harmonize historical managed wetland data and operations, as well as to guide future scenarios for their possible evolution in the future.

For now, the YSGA model indicates the high per acre water needs of managed wetlands, that should be considered when evaluating the impacts of YSGA projects and management actions.

2.3.3 Water Demand and Supply

Total water demands for each of the five scenarios are presented in **Figure 2-54**. Urban water demands (based on UWMPs) rise steadily but remain small relative to irrigation demand. Irrigation

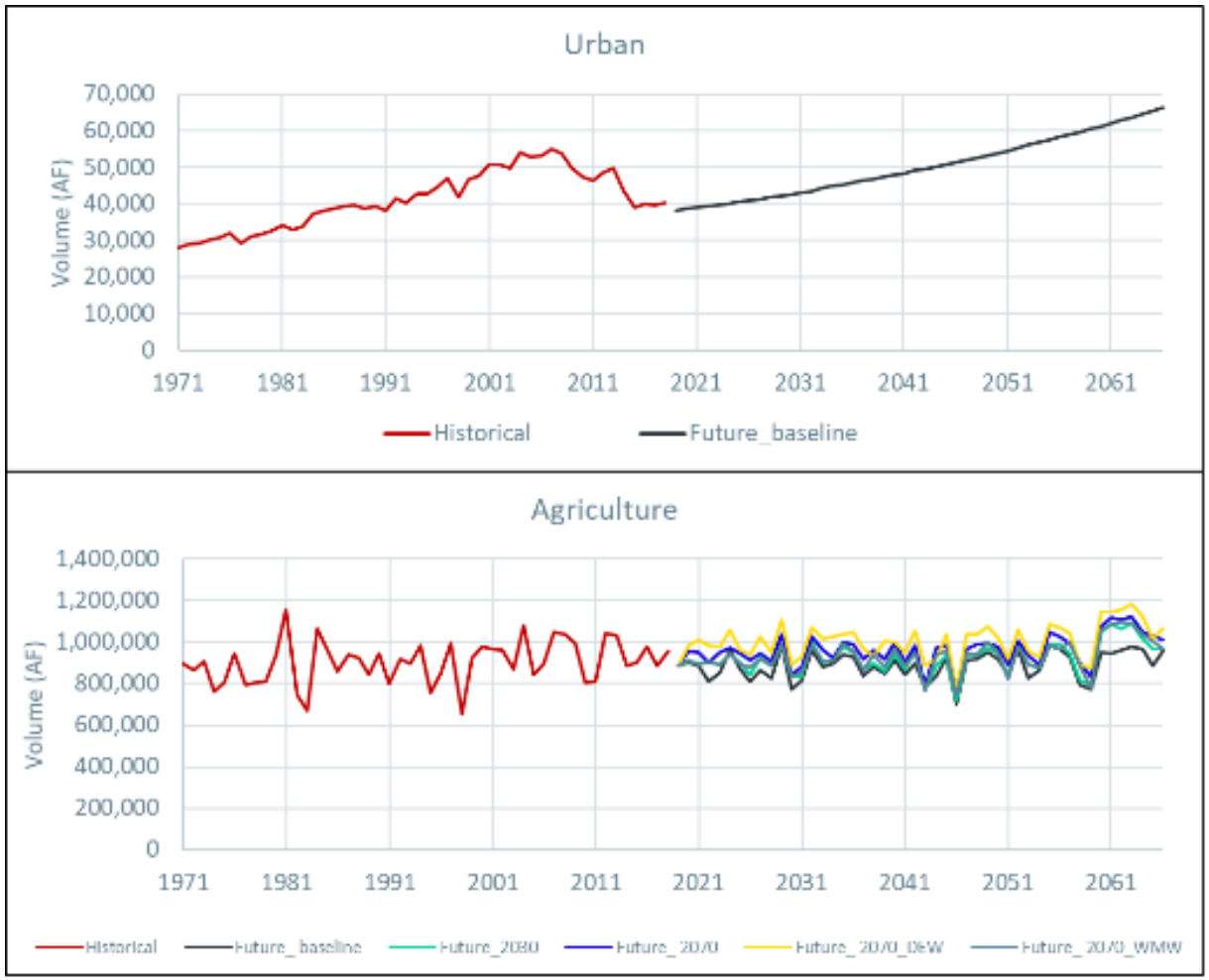
demand in the future scenarios stays within the range of historical simulations, but averages are higher than in the historical scenario.

The supply sources for the 'Historical' and 'Future_baseline' scenarios shown in the pie charts in **Figure 2-54** illustrate that supply sources are expected to be about the same: Woodland Davis Clean Water Agency's water supply accounts for the increase in urban surface water supply in the 'Future_baseline' scenario. Overall, the average annual water demand increases from 945 thousand acre-feet (TAF) to a maximum of 1,055 TAF from the 'Historical' to the 'Future_2070_DEW" (dry-extreme warming) scenario. **Figure 2-54** shows the average annual urban demand for the future scenarios as 50,270 AFY. In the future scenarios, the urban demand rises steadily, resulting in modeled urban demand that is higher at the end of the future period than at the beginning.

The modeled time period of WY 1971 to 2018 covers a large spread of WY types, significant and contiguous drought periods (WY 1976-1977, WY 1987-1992, WY 2007-2009, and WY 2012-2016), and significant and contiguous wet periods of note (WY 1971-1975, WY 1982-1984, WY 1995-2000, and WY 2005-2006). **Table 2-26** shows the WY Index (Sacramento Valley) and the WY Types for the historical to current WY type. The WY Index and WY Type are provided from DWR, and "provide a classification to assess the amount of annual precipitation in a basin" *23 CCR §351(an).* Additional information on the WY Index for the Sacramento Valley can be viewed in DWR's *Sustainable Groundwater Management Act Water Year Type Dataset Development Report* (DWR 2021)

WY 2018 – the last year of the model simulation in the historical period – is treated as the current period. This is the most recent year for which almost all datasets are available. Climate and water rights data are updated to WY 2018 in the YSGA model. Land use data, however, is only available to 2016 (the LandIQ dataset provided by DWR in the SGMA Data Viewer[55]). Hence, 2016 land use data is used and kept constant through WY 2018.

[55] See https://sgma.water.ca.gov/webgis/?appid=SGMADataViewer#waterbudget; Accessed 8.31.2018



Average Annual Demand (Acre Feet)	
Urban	
Historical	41,102
Future(all scenarios are equal)	50,270
Agriculture	
Historical	904,090
Future_baseline	888,139
Future_2030	922,000
Future_2070	961,712
Future_2070_DEW	1,005,341
Future_2070_WMW	931,403

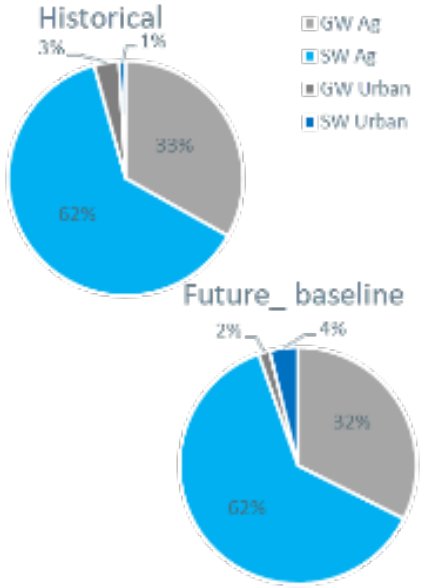


Figure 2-54. Water Demand for Historical and Future Scenarios.

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Table 2-26. Historical Sacramento Valley Water Year Index and Water Year Type.

Water Year	Water Year Index	Water Year Type	Water Year	Water Year Index	Water Year Type
1971	10.37	W	1995	12.89	W
1972	7.29	BN	1996	10.26	W
1973	8.58	AN	1997	10.82	W
1974	12.99	W	1998	13.31	W
1975	9.35	W	1999	9.80	W
1976	5.29	C	2000	8.94	AN
1977	3.11	C	2001	5.76	D
1978	8.65	AN	2002	6.35	D
1979	6.67	BN	2003	8.21	AN
1980	9.04	AN	2004	7.51	BN
1981	6.21	D	2005	8.49	AN
1982	12.76	W	2006	13.2	W
1983	15.29	W	2007	6.19	D
1984	10.00	W	2008	5.16	C
1985	6.47	D	2009	5.78	D
1986	9.96	W	2010	7.08	BN
1987	5.86	D	2011	10.54	W
1988	4.65	C	2012	6.89	BN
1989	6.13	D	2013	5.83	D
1990	4.81	C	2014	4.07	C
1991	4.21	C	2015	4.00	C
1992	4.06	C	2016	6.71	BN
1993	8.54	AN	2017	14.14	W
1994	5.02	C	2018	7.14	BN

Note: Additional information on the Water Year Index for the Sacramento Valley can be viewed in DWR's Sustainable Groundwater Management Act Water Year Type Dataset Development Report (DWR 2021).

2.3.4 Land Surface Water Budget

Figure 2-55 shows the annual historical land surface water budget, and **Table 2-27** shows the historical and projected annual average inflows and outflows in the land surface water budget. The key results for the future average land surface water budget are discussed below:

- In all scenarios, overall land surface mass balance is maintained (total inflows = outflows).

- Compared to the Historical scenario, the Future Baseline scenario results in more evapotranspiration and less deep percolation, demonstrating the effect of increased perennial acreage.
- In all 4 climate scenarios, the effect of climate change results in more evapotranspiration than the Historical and Future Baseline scenarios.
- All climate scenarios besides Future_2070_WMW have less deep percolation than the historical scenario. When comparing the future scenarios, the deep percolation is less in the 'future baseline' (historical climate with 2016/2018 land use) than it is in the climate change scenarios.

Table 2-27. Average Annual Land Surface Water Budget

Average Annual Land Surface Water Budget (TAF)														
	Outflows							Inflows						
	Evapotranspiration	Deep Percolation	Surface Runoff	Urban Consumption	YCFC Canal Recharge	Treated WW Outflow	Total Outflows	Precipitation	Pumping: Urban	Pumping: Irrigation	SW Supply: Urban	SW Supply: Irrigation	Tailwater Reuse: Irrigation	Total Inflows
Entire Basin														
Historical	-1,227	-353	-459	-18	-33	-13	-2,102	1,147	33	313	9	591	10	2,102
Future_Baseline	-1,274	-308	-437	-23	-37	-16	-2,095	1,147	16	304	34	584	10	2,095
Future_2030	-1,314	-321	-471	-23	-39	-16	-2,184	1,201	15	322	35	600	11	2,184
Future_2070	-1,345	-340	-519	-23	-40	-16	-2,282	1,259	15	343	36	619	11	2,282
Future_2070_DEW	-1,346	-323	-549	-23	-37	-16	-2,293	1,229	15	385	35	620	9	2,293
Future_2070_WMW	-1,326	-424	-692	-23	-43	-16	-2,523	1,530	14	311	37	620	11	2,524

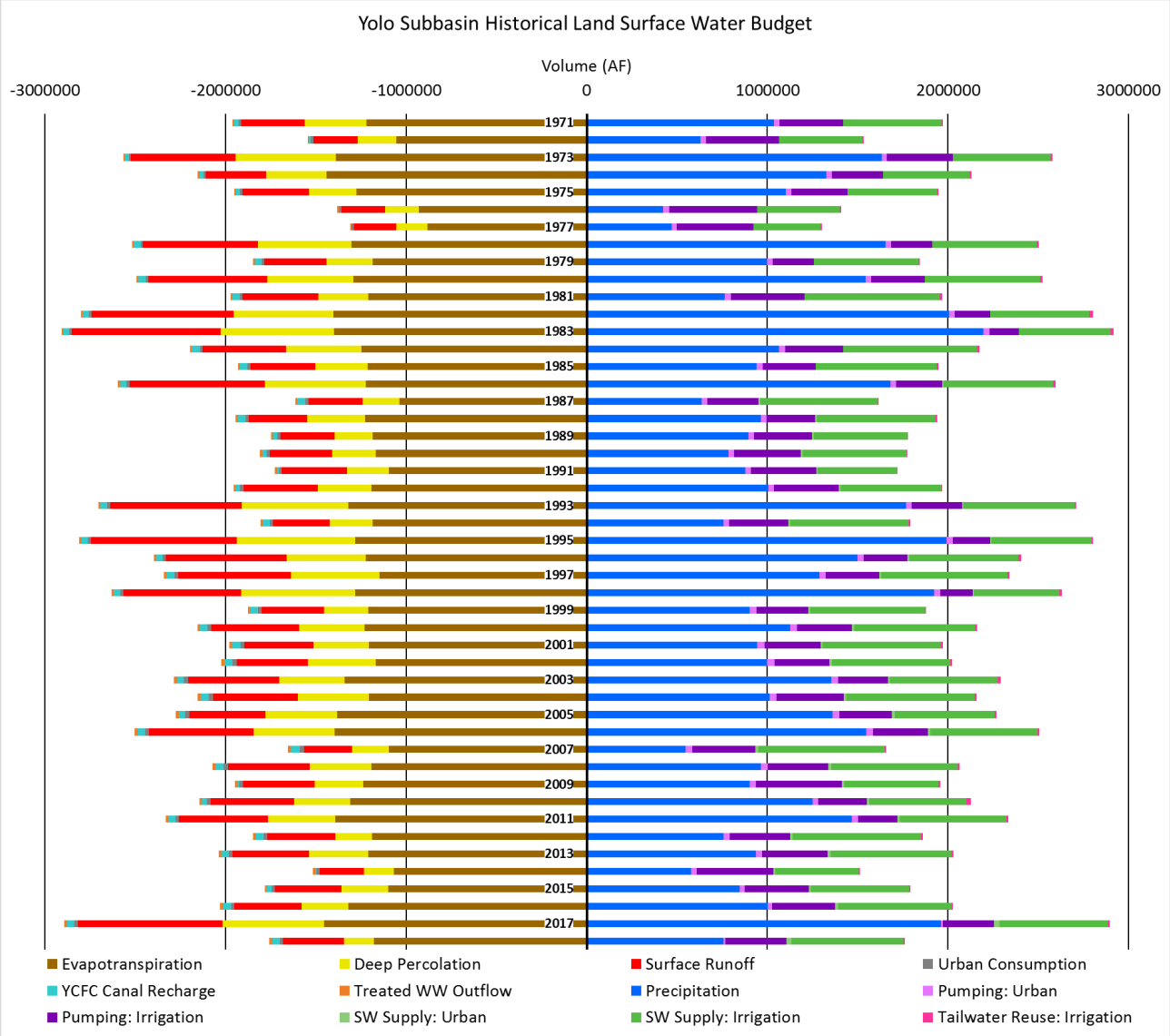

Figure 2-55. Yolo Subbasin Historical Land Surface Water Budget.

2.3.5 Groundwater Budget

Figure 2-56 shows the historical groundwater budget, and the key findings are as follows:

- Inflows to the Yolo Subbasin are dominated by deep percolation.
- Pumping (urban and irrigation) is the largest groundwater outflow.
- Groundwater-surface water exchange is on average positive; more water is lost to groundwater than gained by the modeled streams.
- The net lateral exchange with neighboring basins is negative; on average, lateral flow is leaving the Subbasin.

- Some fluxes are 0 in some years. For example, the 1976-77 and 2014 droughts led to no surface water deliveries.

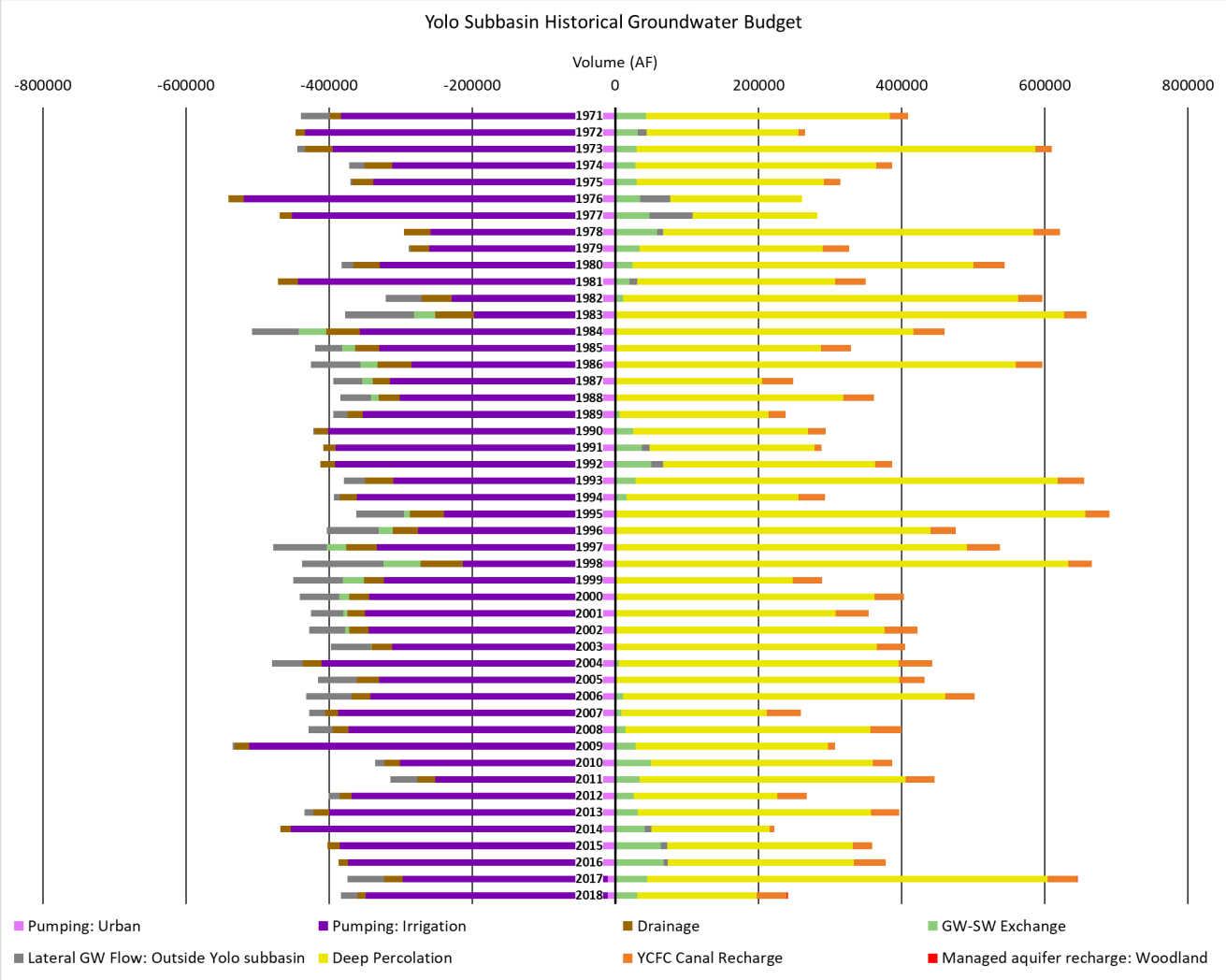

Figure 2-56. Yolo Subbasin Historical Ground Water Budget.

Table 2-28 below includes the average annual groundwater budget for the historical and five scenarios evaluated. The key findings for the future average groundwater budgets are as follows:

- The Future Baseline scenario predicts less deep percolation than historical and slightly more outflow than inflow, reflecting increased perennial acreage and changing irrigation management.
- In the Extreme Dry scenario, climate change causes an increase in deep percolation and reduced groundwater storage. In the central tendency scenarios, budgets remain balanced. In the Extreme Wet scenario, climate change causes an increase in groundwater storage.
- Every scenario except the Extreme Wet scenario shows less inflows into the groundwater system than historical (far right column of **Table 2-28**).

Table 2-28. Average Annual Groundwater Budget.

Average Annual Groundwater Budget (TAF)												
	Outflows				Varying Flows				Inflows			
	Pumping: Urban	Pumping: Irrigation	Drainage	Total Outflows	GW-SW Exchange	Lateral GW Flow: Outside Yolo	Lateral GW Flow	Total Varying Flows	Deep Percolation	YCFC Canal Recharge	Managed aquifer recharge:	Total Inflows
Entire Basin												
Historical	-33	-313	-28	-374	15	-28	0.0	-13	353	33	0.04	386
Future_Baseline	-16	-304	-16	-336	25	-40	0.0	-15	308	37	1.37	346
Future_2030	-15	-322	-15	-352	23	-37	0.0	-15	321	39	1.43	361
Future_2070	-15	-343	-15	-373	22	-35	0.0	-13	340	40	1.31	381
Future_2070_DEW	-15	-385	-13	-413	46	-6	0.0	39	323	37	1.30	360
Future_2070_WMW	-14	-311	-24	-348	-29	-79	0.0	-108	424	43	1.40	468

Notes: In the historical scenario: GW-SW exchange is positive with Cache Creek (29 TAF), Putah Creek (13.9 TAF), Sacramento River (0.9 TAF) and negative with Yolo bypass (25.7 TAF), Knights Landing Ridge Cut (1.5 TAF) and Colusa Basin Drain (2 TAF). Other GW-SW exchanges are minor.

Table 2-29 below provides another way to view the average annual groundwater fluxes by observing the delta, or difference, from the 'Historical' scenario.

Table 2-29. Average Annual Groundwater Budget Relative to Historical Scenario.

Historical Average Annual Groundwater Budget (TAF)												
	Outflows				Varying Flows				Inflows			
	Pumping: Urban	Pumping: Irrigation	Drainage	Total Outflows	GW-SW Exchange	Lateral GW Flow: Outside Yolo subbasin	Lateral GW Flow	Total Varying Flows	Deep Percolation	YCFC Canal Recharge	Managed aquifer recharge: Woodland	Total Inflows
Entire Basin												
Historical	-33	-313	-28	-374	15	-28	0	-13	353	33	0.04	386
	Delta from Historical				Delta from Historical				Delta from Historical			
Future_Baseline	17	9	12	38	10	-12	0	-2	-45	4	1.33	-40
Future_2030	18	-9	13	22	8	-9	0	-2	-32	6	1.39	-25
Future_2070	18	-30	13	1	7	-7	0	0	-13	7	1.27	-5
Future_2070_DEW	18	-72	15	-39	31	22	0	52	-30	4	1.26	-26
Future_2070_WMW	19	2	4	26	-44	-51	0	-95	71	10	1.36	82

2.3.6 Groundwater Storage

Changes in groundwater storage over time are the aggregate (net) outcome of the individual inflows and outflows from the aquifer. The MODFLOW portion of the YSGA model estimates basin-wide groundwater storage capacity at 13.7 MAF. This is consistent with Clendenen & Associates (1976), which estimated the available groundwater storage in the County (20 to 420 feet bgs), as 14 MAF.

Modeled basin groundwater storage is presented as cumulative change from initial storage in September 1970, as shown in the **Figure 2-57**. Groundwater is lost from storage in dry years and recharge occurs in wet years to allow basin-wide recovery. Deep groundwater storage declines following the deep droughts and storage recovery follows in the intervening wet periods. **Over the past 50 years, there is no evidence of basin-wide overdraft.** Additionally, as previously mentioned, the dominant shift in land use in the Yolo Subbasin over this historical period has been from annual to perennial crops. **The groundwater storage trace implies that the climate signal has dominated over this historical period at the basin-wide level.**

Groundwater extraction increases over the past decade were driven by the extended drought and acceleration of perennial acreage. Despite these factors, a wetter 2017 appears to have helped the Basin storage recover almost to initial levels (at the end of the simulation in the historical period, modeled Basin groundwater storage is lower than the initial level by 86 TAF).

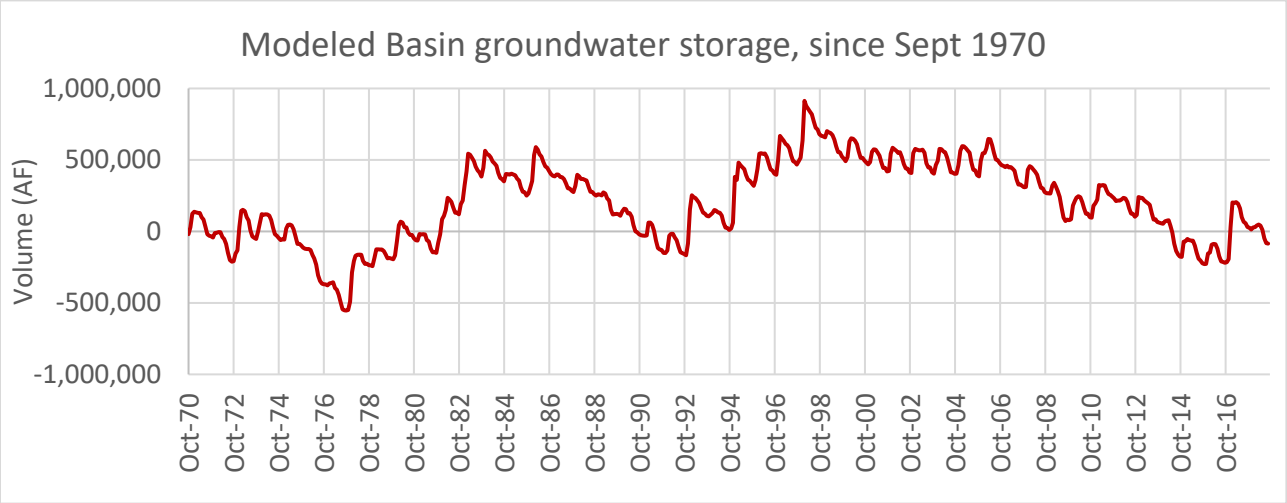

Figure 2-57. Modeled Basin Groundwater Storage.

Decadal changes in storage are summarized below in **Table 2-30** to further illustrate the fluctuation of groundwater storage in different wet and dry decades. These decadal changes represent the *historical* scenario; the groundwater storage predicted in *future* scenarios is based on future climate signals and is presented in **Figure 2-58**.

Figure 2-58 illustrates the change in groundwater storage for each of the future scenarios relative to the 'Historical' scenario (red line). Groundwater storage patterns follow the precipitation and temperature trends among scenarios, such as the following:

- The most groundwater storage declines occur in the driest, warmest scenario ('Future_70_DEW')
- Groundwater storage shows an overall increase in 'Future_70_WMW' scenari
- There is not much difference in groundwater storage between the central tendency scenarios ('Future_30' and 'Future_70') and the 'Future_baseline'
- The 'Historical' and 'Future_baseline' have the same climate input and comparing them shows the sensitivity to current cropping patterns and irrigation management

Table 2-30. Change in Groundwater Storage by Decade.

Decade	Change in Storage (AF)
WY 1971-1980	-24,806
WY 1981-1990	17,992
WY 1991-2000	521,671
WY 2001-2010	-390,769
WY 2011-2018	-208,710

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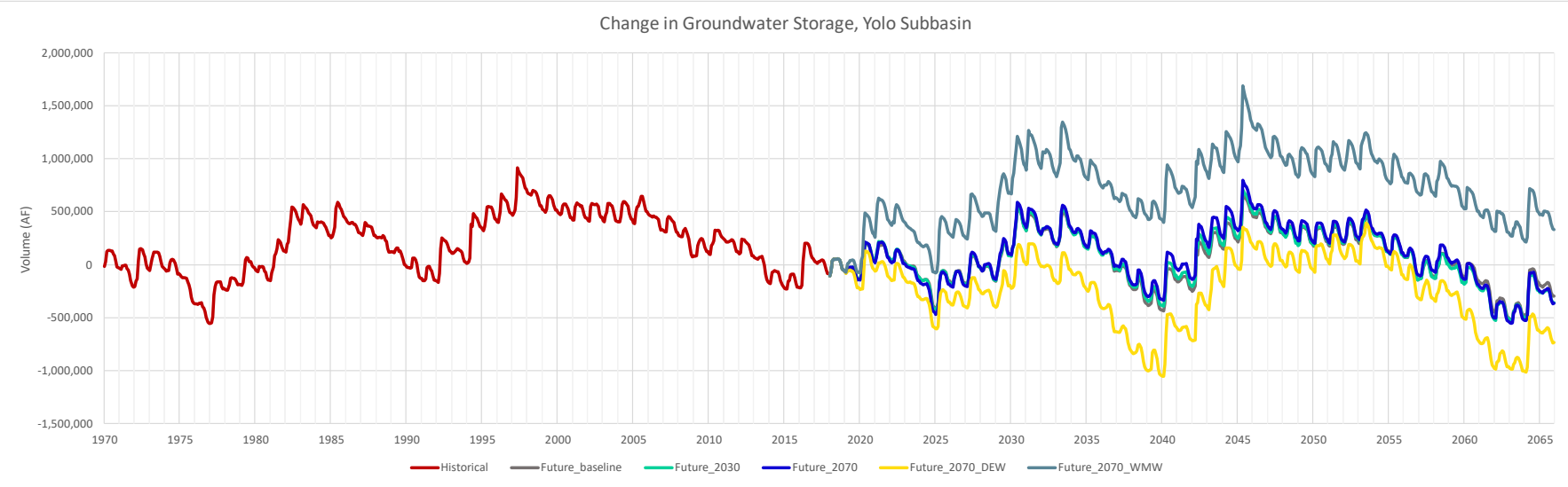

Figure 2-58. Basin-wide Change in Groundwater Storage for All Scenarios.

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2.3.7 Sustainable Yield

SGMA describes 'Sustainable Yield' as the amount of groundwater that can be withdrawn annually without causing undesirable results. Section 354.18(b)(7) of the GSP Regulations requires that an estimate of the basin's sustainable yield be provided in the GSP. This sustainable yield estimate can be helpful for estimating the projects and programs needed to achieve sustainability. Note that SGMA does not incorporate sustainable yield estimates directly into sustainable management criteria. "Basinwide pumping within the sustainable yield estimate is neither a measure of, nor proof of, sustainability. Sustainability under SGMA is only demonstrated by avoiding undesirable results for the six sustainability indicators" (DWR 2017).

The results presented above show that the Yolo Subbasin has historically been sustainable (for the 48 years between WY 1971-WY 2018). Groundwater observations and the YSGA model results during this period show that while groundwater is lost from storage in drought years, it is replenished in wet years. As a result, groundwater storage and observed elevations have almost recovered by end of WY 2018 to initial storage and elevations. These results show that the Yolo Subbasin has not been overdrafted. The conjunctive use of surface water and groundwater – especially due to surface water available from Indian Valley Reservoir and to some extent the Tehama Colusa Canal; improved irrigation practices toward low-volume irrigation methods (Orang et al. 2008); and improved urban water conservation practices in the past decade have all contributed to recovering groundwater elevations. This appears to be a marked improvement from groundwater conditions in the decades before 1971, when the Yolo Subbasin was estimated to be in a state of overdraft (Clendenen & Associates 1976).

From the literature available for the County, the closest definition to 'sustainable yield' is an estimate for perennial yield provided in the County groundwater investigation from 1976 (Clendenen & Associates 1976). These investigators defined 'perennial yield' as "the amount of water which can be pumped annually from that basin, with no net change in storage over a selected period of time". This definition is materially the same as the SGMA definition mentioned earlier. **Perennial yield for Yolo County, for the period 1963 to 1972, was calculated at 304.5 TAF.**

With the above in mind, this GSP proposes that:

1. The average annual pumping over WY 1971 – WY 2018 as the sustainable yield for the Yolo Subbasin: **346 TAF per year**. The estimated annual pumping varies widely over the historical period, from 197-519 TAF/year. The following should be noted:
    a. The proposed sustainable yield of 346 TAF is based on a longer period of time, more data, and from a period of additional surface water availability than was available back in the 1960's and early 1970's. Indeed, safe yield for Indian Valley reservoir is estimated at 50 TAF (Max Stevenson, personal communication Nov. 11, 2020), which when added to the earlier perennial yield estimate from the 1970's, independently approximates the proposed 346 TAF value.
    b. An analysis of model scenarios created for the GSP supports this estimate. In **Figure 2-59** the average annual groundwater pumping and change in groundwater

storage are plotted. A regression line fit to the data has a y-intercept corresponding to zero change in groundwater storage of 336 TAF.

2. In the spirit of adaptive planning, the sustainable yield should be re-visited – and updated if needed – for each 5-year GSP update.

Based upon the analysis above, a sustainable yield of 346 TAF seems reasonable and justified.

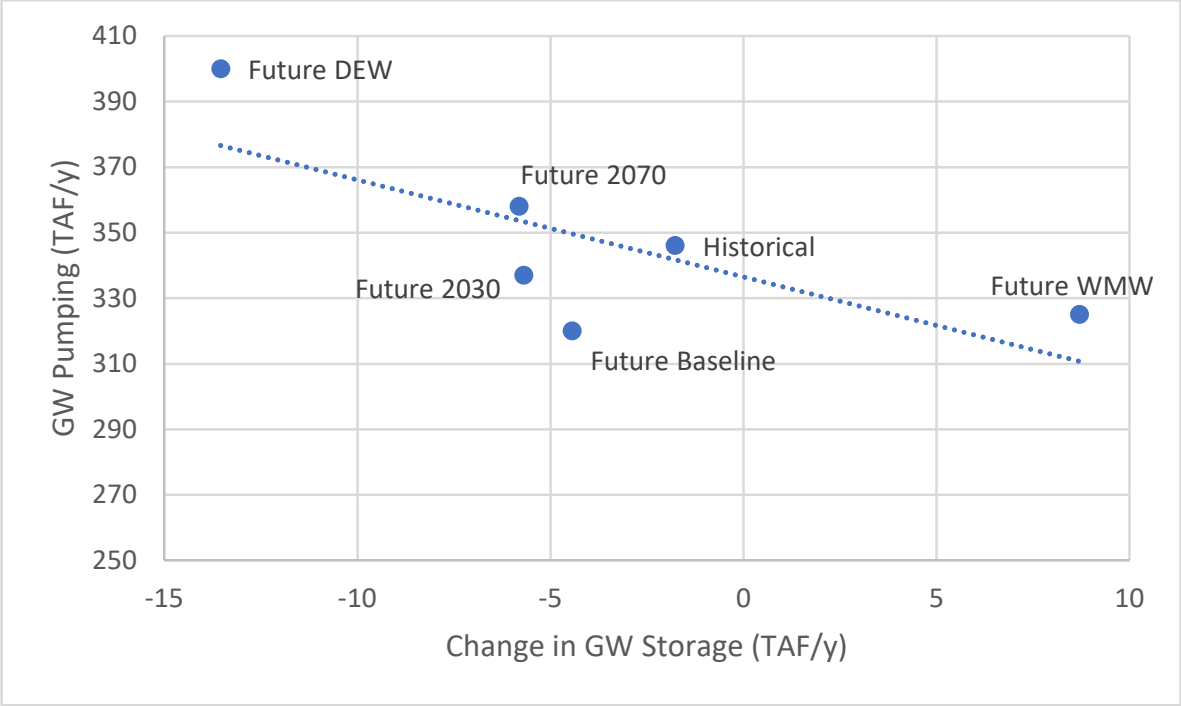

Figure 2-59. Annual Average Groundwater Pumping and Change in Storage for Each Model Scenario.

For further comparison, **Figure 2-60** shows the modeled pumping time series for the historical period, and for the future scenarios; the proposed Sustainable Yield of 346 TAF/year is shown as a horizontal reference line. **Figure 2-60** shows that Basin-wide groundwater storage, in all the investigated scenarios except for the DEW scenario, recovers to close to or above initial storage levels.

The data in **Figure 2-60** is aggregated in a different way in **Table 2-31**, showing the number and percent of years, for each scenario, when the proposed Sustainable Yield is exceeded. In all except the Dry Extreme scenario, the frequency is close to or smaller than in the Historical scenario.

Table 2-31. Modeled Pumping Versus Sustainable Yield.

Scenario	No. of Years	Precent
Historical	25	52
Future_Baseline	14	29
Future_2030	17	35
Future_2070	26	54
Future_DEW	37	77
Future WMW	14	29

2.3.8 Model Evaluation

All models are simplified abstractions of reality, and therefore water budgets will always exhibit uncertainty (Loucks and van Beek, 2017). Uncertainty in model outputs arise from uncertain or missing input data, model parameter uncertainty, differing model structures, natural variability (in climate, hydrology, geology, land use), and measurement errors (California DWR, 2020). For example, large uncertainties are likely to exist in model estimates of groundwater levels in Buckeye Creek simply because of inadequate – or complete lack - of groundwater data. These uncertainties directly affect model outputs.

As described in more detail in Section 3.3 of **Appendix E – Yolo SGA Model Documentation**, the largest uncertainties in the Yolo Basin arise from:

Land use interpretation, and related irrigation management (variations in planting and harvest dates across space and time, for example) exhibit relatively large uncertainty. The land use uncertainty affects all components of a water budget[56]. Details of crop acreage uncertainties rising from different data sources are in Section 2.1 of **Appendix E – Yolo SGA Model Documentation**.

Surface water supply in several areas of the Yolo Basin is not well known, as in some of the Reclamation Districts; and in the Willow Slough drainage, in the Clarksburg MA and Yolo Bypass and Colusa Basin Drain region. Assumptions were made, which largely allowed surface water use to take precedence over groundwater pumping.

Groundwater levels and trends are uncertain in some areas like in north-west Yolo. Additionally, reference point elevations and screening depths from well logs are uncertain, and in many cases, missing. The latter made it challenging to ascertain which aquifer layer was being pumped; and the former directly impacted calibration statistics.

Geology and stratigraphy are uncertain in the Dunnigan Hills area (WRIME 2006).

[56] This is true of all Basins

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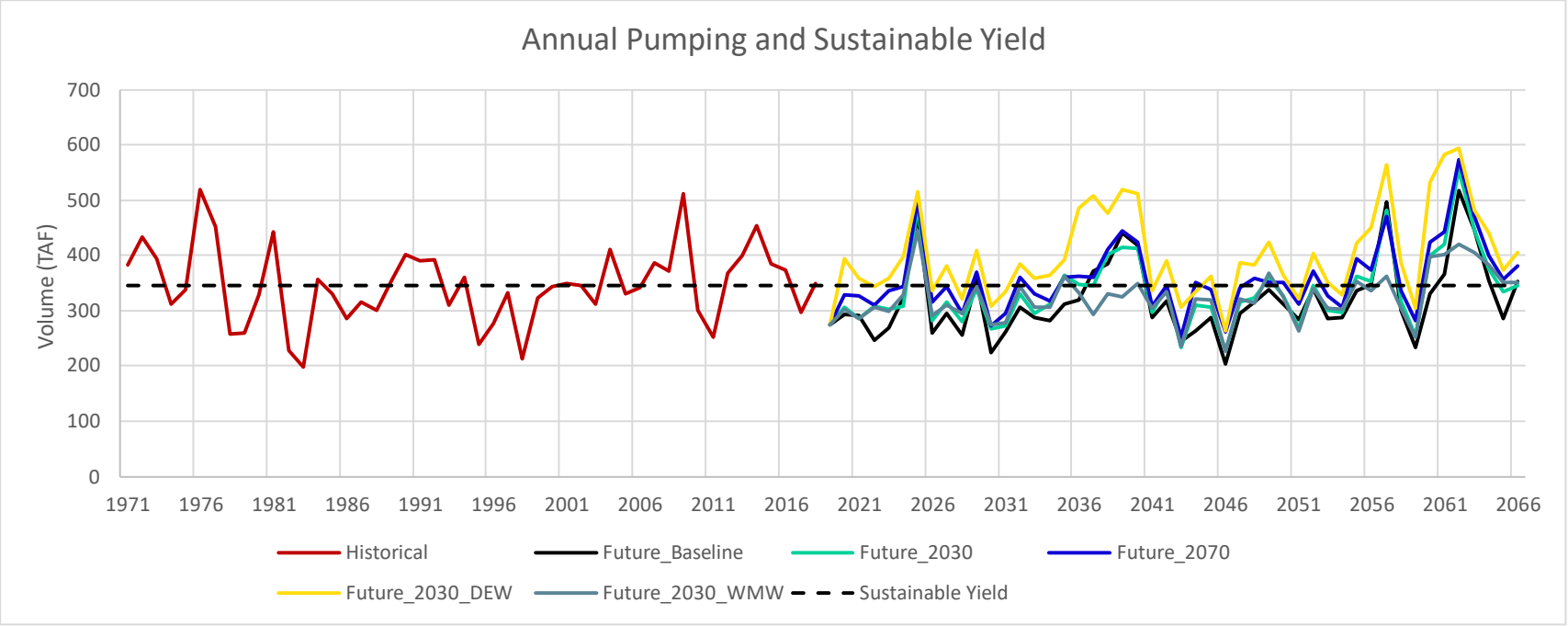

Figure 2-60. Sustainable Yield and Annual Pumping for Historical and Future Scenarios.

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An evaluation of the YSGA model in relation to previous modeling efforts is available in **Section 1.3.7** of **Appendix F – Yolo Subbasin Water Budget Documentation**. In summary, total demand from these different efforts appear to be within 10 percent of each other. The YSGA model's estimate of pumping is higher than the 1970's estimate (Clendenen & Associates 1976), and lower than the IGSM model (WRIME 2006). The YSGA model estimates of percolation are lower than that of the IGSM model (WRIME 2006).

Finally, the details and full results of the model's calibration with observed data are presented in Section 3 of **Appendix E – Yolo SGA Model Documentation**. On average, the model under predicts groundwater elevations by about 2 ft. Seventy eight percent of the simulated values are within 20 ft of observed, 47 percent are within 10 ft, and 25 percent are within 5 ft of observed. These results vary among different areas of the Subbasin. The North Yolo area displays the least amount of bias in simulated values, while the Dunnigan Hills area displays the highest amount of bias due to lack of observation wells.

2.4 Management Areas

Six MAs have been established within the Subbasin for implementation of project and management actions to achieve groundwater sustainability. In developing these MAs, YSGA considered geologic, aquifer, and topographic characteristics. The groundwater bearing deposits in the County are contained in the Sacramento Valley Basin. This report utilizes a subdivision of the County groundwater-bearing area into six informal hydrologic units, or MAs. MAs were developed based on prior investigations, which delineated somewhat different subbasin areas, and have been adapted for the purpose of this GSP. To prevent undesirable results in adjacent MAs, consistent minimum thresholds and measurable objectives have been developed as discussed in **Section 3 – Sustainable Management Criteria**. For purposes of this report, the six MAs are described below and shown on **Figure 2-61**, including:

- Capay Valley
- Dunnigan Hills
- North Yolo
- Central Yolo
- South Yolo
- Clarksburg

During the formation of the GSA, the delineations for these subunits were modified. Specifically, the Northern Sacramento River and Buckeye/Zamora subunits were combined to form the North Yolo MA. The Western Yolo and Lower Cache-Putah subunits were combined to form the Central Yolo MA, and the Southern Sacramento River subunit was divided into the South Yolo and Clarksburg MAs. Furthermore, certain YSGA entities were transferred to a neighboring MA, namely RD 1600, which moved from the North Yolo MA to the South Yolo MA. Beyond this, geologic units in the area, features such as the Capay Dam, and YSGA entities were used to adjust the MA boundaries.

In coordination with DWR several steps occurred to develop consistent MA nomenclature. The Western Yolo subunit, part of the Central Yolo MA, referenced in this report is described as including two subunits in the IRWM Plan. These subunits include the Hungry Hollow unit located north of Cache Creek and the Upper Cache-Putah unit located south of Cache Creek. Similarly, this report refers to the Buckeye/Zamora subunit located north of Cache Creek and east of the Dunnigan Hills. This subunit was originally planned to be further divided into two MAs. This plan has since been altered and the Buckeye/Zamora subunit has merged with the Northern Sacramento River subunit to form the North Yolo MA.

2.4.1 Dunnigan Hills Management Area

To the northwest, the Dunnigan Hills represent a low hilly area of uplifted Tehama Formation or nonmarine deposits with a thickness of up to 2,000 feet. These deposits appear to contain fresh groundwater, but previous reports indicate that aquifer material may be largely lacking. Historically little groundwater development has occurred in the hills. In the past 15 years, however, many thousands of acres olives, grapes, and almonds have been planted. Many new wells have been drilled to service these new plantings.

2.4.2 North Yolo Management Area

The North Yolo MA consists of the Buckeye/Zamora and Northern Sacramento River subunits. To the northeast, the Buckeye/Zamora subunit underlies the Valley floor east of the Dunnigan Hills. The area is considered to be underlain by alluvium and nonmarine deposits similar to those seen further south. Future detailed hydrogeologic study may be considered as a potential objective to better define the aquifer system in the County area. The Northern Sacramento River subunit encompasses the northernmost portion of the eastern part of the County and contains the flood plain/basin and Sacramento River area. The area is underlain by alluvium and nonmarine deposits. While at least some of the sand sequences occur in the MA, there is also a component of eastern sourced alluvial plain and/or tributary fluvial deposits in the nonmarine section. In addition, northeast of Woodland, a lower concentration of sand units occurs in the Tehama Formation.

2.4.3 Capay Valley Management Area

The Capay Valley MA is a small, structurally controlled valley of Cache Creek bound by faulted marine deposits to the east in the Capay Hills and the Coast Range to the west. Alluvium and the Tehama Formation are present in the valley floor with a thickness up to 1,000 feet. The valley appears to be connected to the larger groundwater basin through downstream alluvium and the underlying Tehama Formation along Cache Creek. The northern end of the valley is separated by a topographic divide of the Tehama Formation, although some groundwater connection may be possible north to Colusa County. According to DWR's WCR database[57], approximately one-third of wells in the MA are less than 100 feet deep, representing a significant use of the shallow aquifer zone. 5 of the 10 groundwater levels representative wells (**Section 4.4 – Chronic Lowering of**

[57] https://data.cnra.ca.gov/dataset/well-completion-reports

Groundwater Levels and Reduction of Groundwater Storage) in this MA are less than 100 feet deep, capturing the interests of the shallow groundwater users in the area.

2.4.4 Central Yolo Management Area

The Central Yolo MA consists of the Western Yolo and Lower Cache-Putah subunits. The Western Yolo subunit is defined on the north and east by the alluvial plains lying west of the roughly north-south line extending from the western edge of the Dunnigan Hills north of Cache Creek, just east of the mapped Tehama Formation exposures near the Woodland-Watts Airport area and Plainfield Ridge and south to Putah Creek. This MA is bound on the south by Putah Creek and extends to the western edge of the mapped Tehama Formation in the low hills marginal to the Coast Range. The exposures of the Tehama Formation may be an important source of recharge for the Tehama Formation further east. The gentle alluvial plain area is underlain by thin alluvium overlying the Tehama Formation. These nonmarine deposits appear to be sand poor except in the vicinity of Putah Creek. Deep test hole control is relatively poor in this MA, and additional geologic study using water well data may be warranted to examine shallow and intermediate zone stratigraphic relationships.

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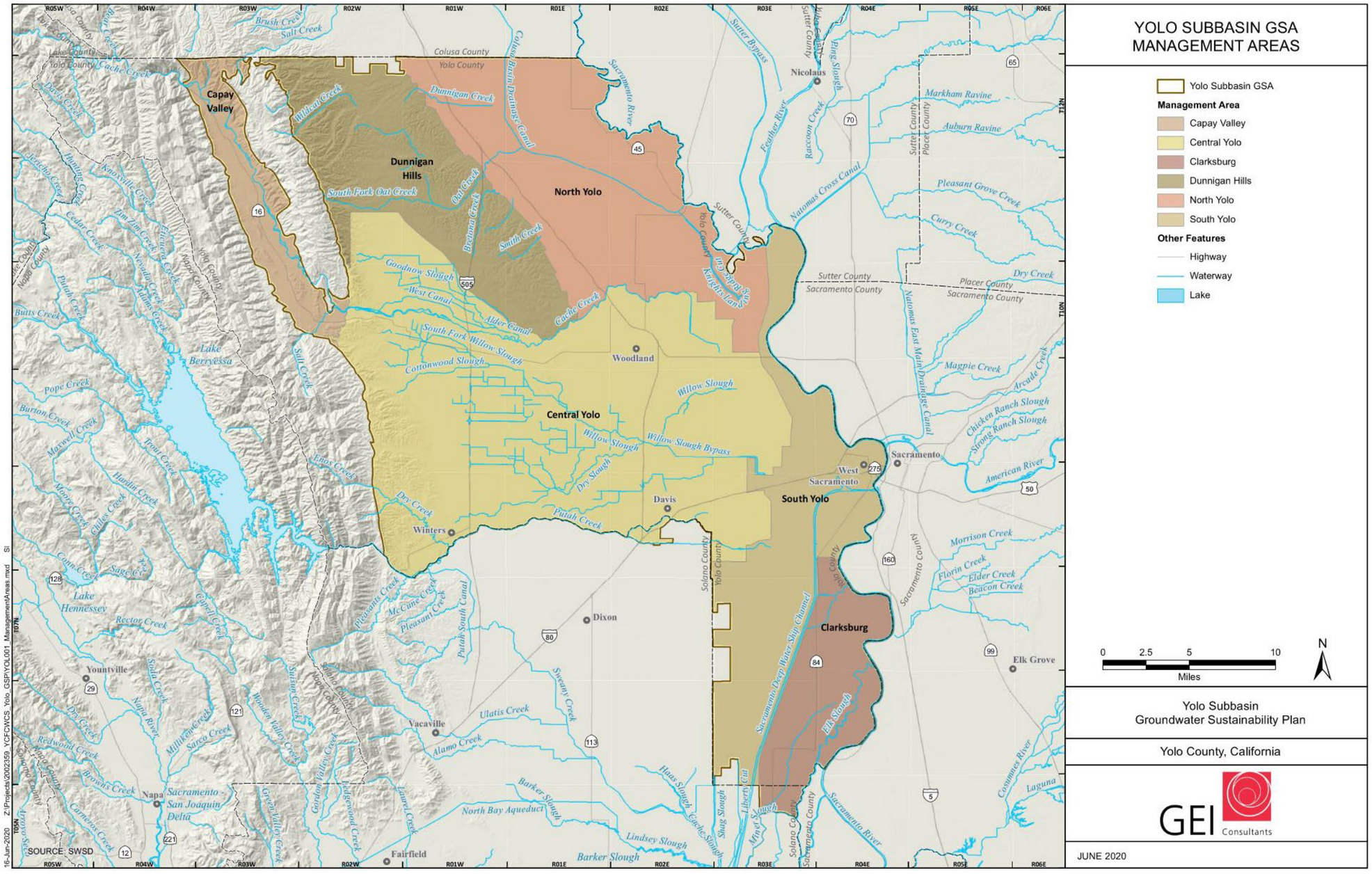

Figure 2-61. Yolo Subbasin Management Areas.

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In the Central Yolo MA, two Areas of Special Concern have been identified. These Areas of Special Concern are areas where trends in groundwater levels differ from the rest of the subbasin. The two Areas of Special Concern in the Central Yolo MA are roughly described as: (1) the general vicinity around the city of Winters and (2) the Hungry Hollow. In these two areas, there has been an emerging trend in some wells with declining levels. Further investigation is needed to determine the extent and cause of the declining water levels in the wells in these areas.

2.4.5 South Yolo Management Area

The South Yolo MA encompasses a portion of the southeastern section of the county. It contains the middle swath of the flood plain/basin, Yolo Bypass, and the Sacramento River area within the County. The area is underlain by alluvium and nonmarine deposits. While at least some of the sand sequences occur in the MA, there is also a component of eastern sourced alluvial plain and/or tributary fluvial deposits in the nonmarine section. The City of West Sacramento (City) is in the South Yolo MA. The City historically delivered groundwater to its customers as the exclusive source of water for many years before building its surface water diversion and treatment facilities. The City continues to preserve and use groundwater in its service area for various purposes and is looking to improve its groundwater system to provide necessary system redundancy to ensure safe and reliable water supplies for all of the City's residents and businesses.

The Yolo Bypass Wildlife Area, and other public and private wetland easements, make up a large part of this MA and provide important habitat for migratory birds, fishes, and other key species. The Wildlife Area is managed by the CDFW according to the Yolo Bypass Wildlife Area Land Management Plan (CDFW 2008).

2.4.6 Clarksburg Management Area

The Clarksburg MA encompasses the southernmost portion of the eastern part of the County and contains the flood plain/basin and Sacramento River area. The area is underlain by alluvium and nonmarine deposits. While at least some of the sand sequences occur in the MA, there is also a component of eastern sourced alluvial plain and/or tributary fluvial deposits in the nonmarine section.

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3.0 Sustainable Management Criteria

Under SGMA, the sustainable management criteria (SMC) define conditions for sustainable groundwater management that are used to guide sustainability in the Yolo Subbasin. SMC includes characterization of the sustainability goal for the Subbasin and the establishment of undesirable results, minimum thresholds, and measurable objectives for applicable Subbasin sustainability indicators. SMC concepts captured in this section are outlined below and provide a basis of understanding for the development of sustainable groundwater management in the Subbasin.

- **Sustainability Goal:** The sustainability goal guides sustainable groundwater management across all MAs in the Subbasin by providing qualitative descriptions of the objectives and desired conditions.
- **Undesirable Results:** Undesirable results are established for each applicable sustainability indicator and constitute as significant and unreasonable groundwater conditions in the Subbasin.
- **Minimum Thresholds:** Minimum thresholds are the quantitative values that represent groundwater conditions at a representative monitoring site that, when exceeded, in combination with exceeded minimum thresholds at other representative monitoring sites, may cause an undesirable result in the subbasin. Minimum thresholds are set for each applicable sustainability indicator at each representative monitoring site using the same metrics as the measurable objectives. This section defines the minimum thresholds at each representative monitoring site for applicable sustainability indicators considering interests of beneficial uses and users of groundwater in the Subbasin.
- **Measurable Objectives:** Measurable objectives are quantitative goals that reflect the Subbasins' desired groundwater conditions and allows the MAs within the Yolo Subbasin to be managed sustainably through the 20-year Implementation Period. In the Subbasin, the quantitative goals expressed as the measurable objectives are currently met and are intended to continue to be met. Measurable objectives are set for each applicable sustainability indicator. Measurable objectives are set such that there is a reasonable margin of operational flexibility that will anticipate recoverable fluctuations due to droughts, climate change, conjunctive use operations, or other groundwater management activities.
- **Interim Milestones:** Interim milestones are target values representing measurable groundwater conditions, in increments of 5 years, set to ensure that the Subbasin moves towards its sustainability goal over the 20-year Implementation Period. As the Subbasin is already meeting its sustainability goal, the interim milestones are set at the measurable objective for the applicable sustainability indicators.

  In the Yolo Subbasin, interim milestones are set equal to measurable objectives for all sustainability indicators for which minimum thresholds and measurable objectives have been

set. As described in this plan, the YSGA is establishing sustainable management criteria to be equal to recent historical conditions. Therefore, provided a normal range of hydrology, the groundwater basin is expected to maintain its historical regime and from the outset of the plan is expected to operate within a reasonable range of established measurable objectives.

- **Undesirable Results Watch Area:** An undesirable result watch area is a MA that has triggered the exceedance criteria for an undesirable result for a given sustainability indicator, but where the number of MAs exceeding the criteria has not been reached. An undesirable result watch area triggers responses from the YSGA and its member agencies to address the local conditions of exceeding minimum threshold values to avoid triggering the criteria for a basin-wide undesirable result.

3.1 Sustainability Goal

As required by SGMA, a sustainability goal is to be defined for the basin (CWC §10727(a)). This is further clarified as a basin-wide basis in DWR's GSP emergency regulations. The sustainability goals for the Yolo Subbasin are as follows:

- *Achieve sustainable groundwater management in the Yolo Subbasin by maintaining or enhancing groundwater quantity and quality through the implementation of projects and management actions to support beneficial uses and users.*
- *Maintain surface water flows and quality to support conjunctive use programs in the Subbasin that promote increased groundwater levels and quality.*
- *Operate within the established sustainable management criteria and maintain sustainable groundwater use through continued implementation of a monitoring and reporting program.*
- *Maintain sustainable operations to maintain sustainability over the implementation and planning horizon.*

3.2 Criteria for Sustainable Management Criteria

Through a collaborative process, undesirable results have been developed for each sustainability indicator. In compliance with DWR's GSP emergency regulations, these undesirable results are defined as Subbasin-wide condition representing non-sustainable management relative to the sustainability indicators (23-CCR § 354.20). The definitions of "undesirable results" provide guidance and flexibility for each MA within the Subbasin to define minimum thresholds that constitute significant and unreasonable impacts to the beneficial uses and users of groundwater within the specific MAs.

Undesirable results can occur for each sustainability indicator when minimum thresholds are exceeded at multiple representative monitoring sites within Subbasin. The exceedance of a minimum threshold at one representative monitoring site does not constitute an undesirable result for the entire Subbasin. An undesirable result occurs when the required number of monitoring sites in the

Subbasin exceed their minimum threshold, where the required number of monitoring sites is defined for each MA and for each sustainability indicator.

The following sections describe the criteria for determining undesirable results for each sustainability indicator.

3.3 Chronic Lowering of Groundwater Levels

3.3.1 Undesirable Results

The basin-wide definition of "undesirable results" for the chronic lowering of groundwater levels is as follows:

> *The point at which significant and unreasonable impacts over the planning and implementation horizon, as determined by depth or elevation of ground water, affect the reasonable beneficial use of, and access to, groundwater by overlying users.*
>
> *An undesirable result occurs when the minimum threshold criteria is exceeded in* ***51 percent or more*** *of representative monitoring wells in* ***two (2) MAs****.*

This 51 percent value was selected to allow for interim projects and management actions to take place within the subbasin. This value was selected and agreed to by the YSGA member entities and the YSGA Board. No minimum threshold has been established for the Clarksburg MA due to the lack of significant groundwater use in this MA. However, YSGA intends to monitor this MA for changes in groundwater uses and land use to identify the potential for changes in groundwater conditions. If conditions change in a manner that could influence groundwater conditions, the MA will be reevaluated and minimum thresholds for Chronic Lowering of Groundwater Levels will be considered in the future.

3.3.1.1 Potential Cause of Chronic Lowering of Groundwater Levels

Section 354.26(b)(1) of the GSP Emergency Regulations requires identification of potential causes of an undesirable result for each sustainability indicator. Potential causes of chronic lowering of groundwater levels vary throughout the Subbasin but can most likely be attributed to increased groundwater pumping during dry periods, reduction in surface water use, reduced groundwater inflows from adjacent areas, and/or climate change related impacts that result in more frequent dry years.

3.3.1.2 Potential Effects of Chronic Lowering of Groundwater Levels

Section 354.26(b)(3) of the GSP Emergency Regulations requires identification of potential effects of an undesirable result for each sustainability indicator. Potential effects of chronic lowering of groundwater levels include groundwater well dewatering and increased pumping lift. These effects would lead to increased maintenance costs and higher energy use, respectively. Lowering of groundwater levels would have an increased economic impact since reduced groundwater levels lead to increased pumping costs, additional well wear, and reduced well efficiency. In addition to the

impact on groundwater production, the chronic lowering of groundwater levels can also impact surface water-groundwater interactions along Subbasin waterways, such as Putah and Cache creeks, and groundwater availability for GDEs.

3.3.2 Minimum Thresholds

3.3.2.1 Criteria for Establishing Minimum Thresholds

Minimum thresholds for the chronic lowering of groundwater levels were established through a collaborative process with local stakeholders and interested parties. As summarized in **Section 2 – Basin Setting**, the Yolo Subbasin is a relatively stable basin, with groundwater levels maintaining a relatively consistent long-term average elevation or depth to groundwater. While groundwater levels decline during dry conditions due to reduced recharge from precipitation, local runoff and seepage, and continued reliance on groundwater for agricultural and municipal demands, groundwater levels substantially recover during wet years.

To establish the minimum thresholds and measurable objectives for the Yolo Subbasin, the YSGA reviewed available well data and selected a subset of Representative Wells that would be used to establish minimum threshold values. These Representative Wells, shown in **Figure 3-1**, were selected because the well maintained a sufficient period of record to be representative of surrounding groundwater conditions and included sufficient spring and fall elevation data for the period of 2001 to 2011. Representative Wells were reviewed with stakeholders from the MA in which they are located to ensure the selected wells represented the best available data and were representative of local groundwater conditions.

Based on historic, current, and projected groundwater conditions in the Subbasin, the YSGA developed several methodologies for establishing the minimum threshold value for each representative well, based on MA boundaries. The hydrographs for all Representative Wells used to establish minimum thresholds and measurable objectives are provided in **Appendix H – Yolo Subbasin Hydrographs of Representative Wells**. The methodology for each MA is described below.

3.3.2.1.1 Capay Valley, Dunnigan Hills, Central Yolo, and South Yolo:

> *A well violates the minimum threshold when the groundwater elevation exceeds the historic (pre-2016) minimum elevation in the period of record of each Representative Well in two consecutive fall measurements.*

The minimum threshold established with this methodology protect groundwater levels from chronically lowering to levels below the historical experience and recognize that groundwater conditions in these MAs is expected to behave similarly to historic conditions. No significant decreases in groundwater conditions are expected under future projected conditions. Minimum thresholds for groundwater levels and groundwater storage will be evaluated using static water levels.

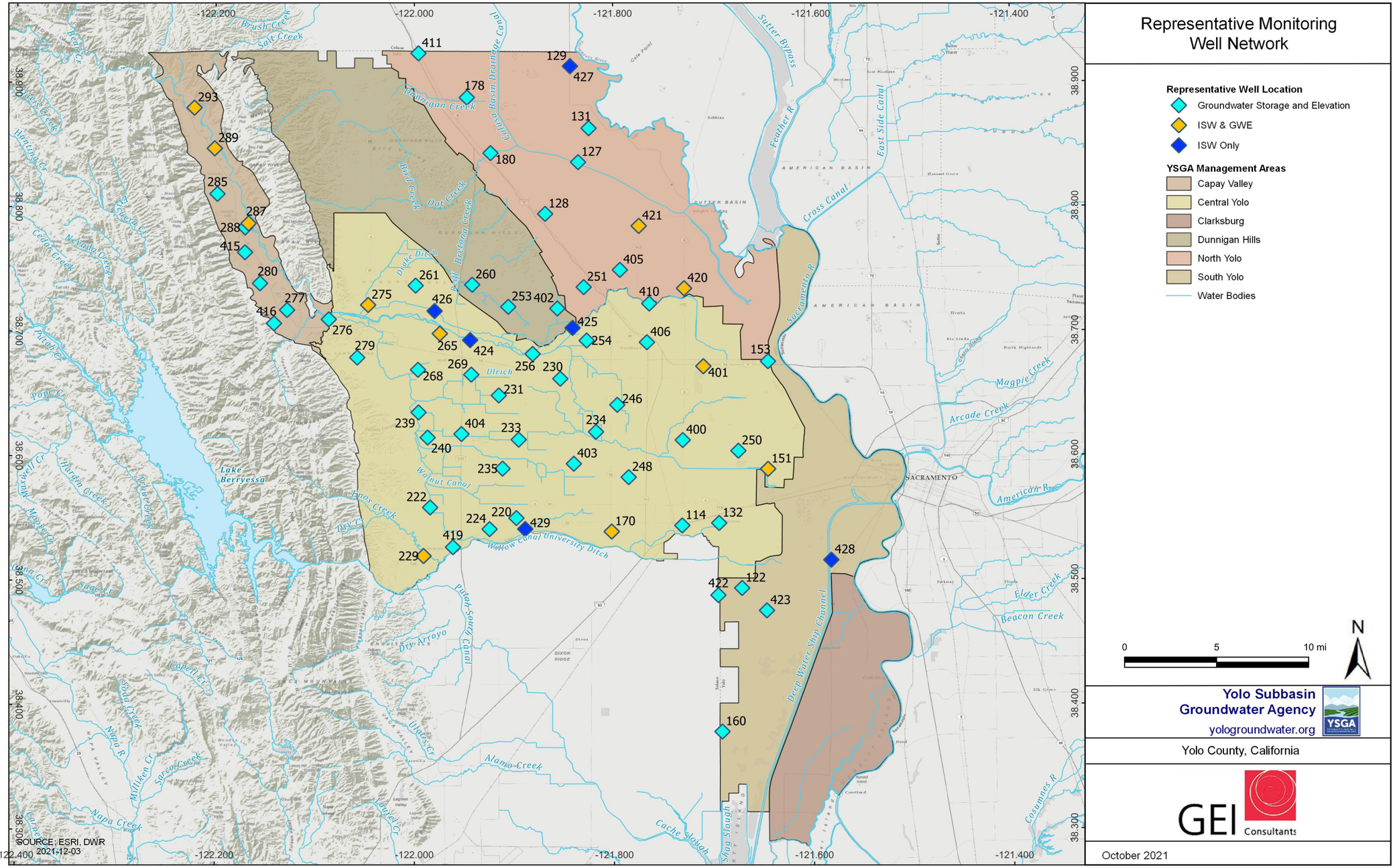

Figure 3-1. Yolo Subbasin Representative Wells.

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3.3.2.1.2 North Yolo:

A well violates the minimum threshold when the groundwater elevation exceeds the historic minimum elevation in the period of record (pre-2016) of each Representative Well ***plus*** *20 percent of the depth between the historic maximum and historic minimum elevation for the period of record (pre-2016) of the Representative Well in two consecutive fall measurements.*

The minimum thresholds for the North Yolo MA are set lower than historical conditions recognizing that water districts, such as RD 108, in this area may experience reductions in surface water deliveries from the Sacramento River as the Voluntary Agreements with the State Water Board are implemented. The Voluntary Agreements are expected to reduce surface water deliveries to Sacramento Water Rights Contractors during certain year types, requiring that water users increase their reliance on local groundwater during the same year types. Historical performance of the North Yolo MA shows that groundwater levels typically recover to a long-term average during wet periods. Therefore, setting the minimum threshold lower than the historical low is not expected to create long-term undesirable effects on groundwater elevations. Minimum thresholds for groundwater levels and groundwater storage will be evaluated using static water levels.

3.3.2.1.3 Clarksburg:

No minimum threshold has been established for the Clarksburg MA due to the lack of groundwater usage in the MA. The YSGA will annually monitor groundwater conditions in the Clarksburg MA to determine if groundwater conditions or usage changes to the degree that minimum thresholds are required to ensure sustainable management of this portion of the Subbasin.

3.3.2.2 Minimum Threshold Values

The minimum threshold values for chronic lowering of groundwater levels have been established for each MA as described above. **Table 3-1** shows the minimum threshold values and measurable objective values for each of the Representative Wells in the Subbasin. **Figure 3-2** shows a contour map of minimum threshold elevations for all representative wells used to establish minimum thresholds and measurable objectives. The groundwater elevation contour of minimum thresholds allows for the evaluation of minimum threshold values across the region. Where a discontinuity of minimum groundwater elevations is seen (e.g., large vertical differences between minimum groundwater elevations of adjacent representative wells) corrective action can be made to adjust minimum elevations to compatible values among adjacent wells. Variations of **Figure 3-2** have been developed throughout the development of this GSP and have been reviewed with stakeholders for input leading to refinement of minimum threshold values.

3.3.3 Measurable Objectives

3.3.3.1 Criteria for Establishing Measurable Objectives

To establish the measurable objectives for the Yolo Subbasin, the YSGA utilized the representative wells identified for minimum thresholds, shown in **Table 3-1** and **Figure 3-1**, to determine the measurable objectives for chronic lowering of groundwater levels. Based on historic, current, and

projected groundwater conditions in the Subbasin, the used the following criteria for establishing measurable objectives at all MAs, with the exception of the Clarksburg MA:

> *Measurable objective is equal to the average fall (Sep.-Dec.) groundwater elevation for the water year period of 2000 to 2011 at each Representative Well. Performance of the measurable objective will be measured as the five (5) year running average of the minimum fall (Sep.-Dec.) groundwater elevation.*

Due to the lack of significant groundwater use in the Clarksburg MA no measurable objective has been established in the MA.

The hydrographs for all Representative Wells used to establish minimum thresholds and measurable objectives are provided in **Appendix H – Yolo Subbasin Hydrographs of Representative Wells**.

3.3.4 Interim Milestones

Interim milestones for the Chronic Lowering of Groundwater Levels are set equal to measurable objectives.

3.4 Reduction of Groundwater Storage

Historically, DWR has utilized changes in groundwater elevations to estimate changes in groundwater storage. Similarly, the YSGA intends to use groundwater levels as a proxy for the change in groundwater storage that will be calculated by evaluating the volumetric difference between changes in groundwater surfaces created based on groundwater level data collected at representative monitoring wells and reported to DWR, per SGMA reporting requirements.

As a result, the sustainable management criteria for reduction of groundwater storage are tied to the criteria for chronic lowering of groundwater levels. The minimum threshold and measurable objectives for chronic lowering of groundwater levels are identical to those of chronic lowering of groundwater levels, as groundwater elevation serves as the proxy for groundwater storage.

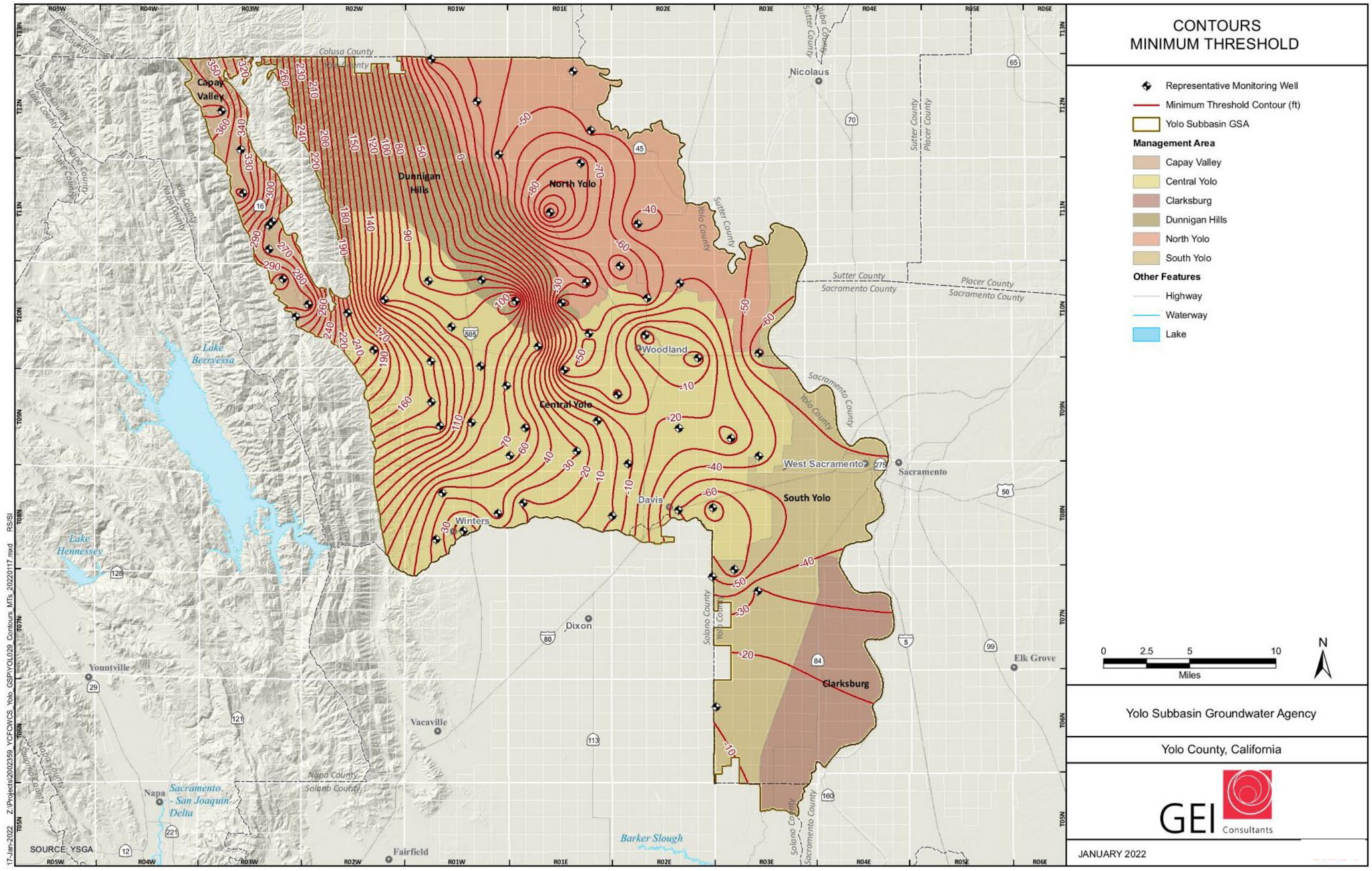

Figure 3-2. Yolo Subbasin Minimum Threshold Elevation Contour.

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Table 3-1. Yolo Subbasin Representative Wells and Minimum Threshold and Measurable Objective Values.

Management Area	YSGA Representative Well Number	State Well Number	Measurable Objective (ft)		Minimum Threshold (ft)	
			Depth to Water	*Groundwater elevation*	*Depth to Water*	*Groundwater elevation*
Capay Valley	276	10N02W16R001M	14.4	215.0	21.9	207.7
	277	10N02W18F001M	20.4	315.6	31.8	304.2
	280	10N03W02R002M	18.7	319.5	29.9	308.2
	285	11N03W09Q001M	20.4	383.7	48.3	355.8
	287	11N03W23L001M	15.2	296.0	23.6	287.6
	288	11N03W23N001M	32.9	287.3	49.1	271.0
	289	11N03W33F001M	19.8	351.2	29.6	341.2
	293	12N03W20D001M	19.8	382.8	26.2	376.4
	415	11N03W35D003M	28.6	280.7	36.3	273.0
	416	10N03W24B002M	65.4	324.8	109.1	281.1
Central Yolo	114	08N02E15A002M	71.5	-25.1	107.7	-61.3
	132	08N03E07N500M	58.3	-22.0	114.3	-78.0
	151	09N03E33B002M	16.2	4.7	56.1	-35.3
	170	08N02E18M002M	48.1	20.4	67.0	1.5
	220	08N01E07R001M	25.3	82.3	91.0	16.5
	222	08N01W09C001M	57.3	110.9	127.9	40.3
	224	08N01W13G003M	37.7	80.0	69.9	47.8
	229	08N01W20R005M	79.8	72.8	116.2	36.4
	230	09N01E03C003M	81.7	19.3	157.4	-56.4
	231	09N01E07D001M	13.4	111.1	56.2	68.3
	233	09N01E20E001M	10.0	104.8	47.7	67.1
	234	09N01E24D001M	17.2	52.2	61.7	7.6
	235	09N01E31D001M	13.4	104.6	49.8	68.3
	239	09N01W08Q001M	13.8	185.1	46.7	152.2
	240	09N01W21E001M	11.9	163.4	30.5	144.7
	246	09N02E07L001M	46.1	24.7	116.2	-45.4
	248	09N02E32M001M	31.9	29.1	68.0	-7.0
	250	09N03E19R002M	17.6	6.7	38.3	-14.1
	254	10N01E23Q002M	65.0	26.8	134.8	-43.0
	256	10N01E29K001M	34.9	77.8	54.4	58.4
	261	10N01W08B001M	41.3	139.5	107.6	73.3
	265	10N01W21J001M	33.8	127.5	70.4	90.9
	268	10N01W32E001M	18.9	169.9	44.3	144.5
	269	10N01W35Q001M	20.8	120.5	48.4	93.0
	275	10N02W14A001M	69.9	137.8	116.5	91.1
	279	10N02W26P001M	112.6	241.7	141.7	212.7

Management Area	YSGA Representative Well Number	State Well Number	Measurable Objective (ft)		Minimum Threshold (ft)	
			Depth to Water	*Groundwater elevation*	*Depth to Water*	*Groundwater elevation*
	406	10N02E29A001M	21.5	35.7	47.4	9.9
	400	09N02E22H002M	16.1	22.9	63.8	-24.8
	401	10N02E36E001M	8.1	22.1	21.2	9.0
	403	09N01E26N001M	8.4	71.7	48.0	32.2
	404	09N01W23D001M	10.5	135.8	63.4	82.9
	419	08N01W22G500M	59.6	71.9	125	6.5
North Yolo	127	11N01E02D001M	41.5	-13.3	116.5	-88.3
	128	11N01E16P001M	88.6	-33.1	185.3	-129.8
	129	12N01E03R002M	23.2	9.1	76.6	-44.3
	131	12N01E26A002M	30.1	-4.2	72.0	-46.1
	153	10N03E33B011M	21.0	3.8	98.0	-73.3
	178	12N01W14M001M	37.0	10.5	78.4	-30.9
	180	12N01W36K002M	48.2	-7.7	90.2	-49.7
	251	10N01E02Q002M	45.2	32.1	109.8	-32.6
	405	10N02E06B001M	34.7	26.0	146.4	-85.7
	411	12N01W05B001M	94.4	49.5	169.2	-25.3
	410	10N02E09N001M	48.5	12.9	125.0	-63.7
	420	10N02E03R002M	30.6	12.2	81.9	-39.2
	421	11N02E20K004M	24.7	28.8	85.1	-31.6
South Yolo	122	08N03E32L001M	30.5	-1.9	100.3	-71.8
	160	06N03E07M001M	9.0	9.9	29.7	-10.8
	422	08N03E31N001M	40.6	-7.0	82.8	-49.3
	423	07N03E04Q001M	24.0	0.5	51.6	-27.1
Dunnigan Hills	253	10N01E18C001M	51.4	143.1	61.6	132.8
	260	10N01W02Q001M	66.5	128.3	121.2	73.6
	402	10N01E15D001M	76.9	17.5	164.0	-69.6

3.4.1 Undesirable Result

The basin-wide definition of "undesirable results" for the reduction of groundwater storage is as follows:

> *The point at which significant and unreasonable impacts over the planning and implementation horizon, as determined by the amount of groundwater storage in the Yolo Subbasin, affect the reasonable and beneficial use of, and access to, groundwater by overlying users. In the Subbasin groundwater elevations serve as a proxy for groundwater storage.*

A groundwater storage undesirable result occurs under the same definition as the chronic lowering of groundwater levels. As with the chronic lowering of groundwater levels, no sustainable management criteria are established for the Clarksburg MA, due to the lack of significant groundwater use in the MA.

3.4.1.1 Potential Cause of Reduction of Groundwater Storage

Section 354.26(b)(1) of the GSP Emergency Regulations requires identification of potential causes of an undesirable result for each sustainability indicator. Potential causes for reduction of groundwater storage are generally the same for that of lowering of groundwater levels. Therefore, the causes listed above for the lowering of groundwater levels are applicable to causes of undesirable results due to the reduction of groundwater storage.

3.4.1.2 Potential Effects of Reduction of Groundwater Storage

Section 354.26(b)(3) of the GSP Emergency Regulations requires identification of potential effects of an undesirable result for each sustainability indicator. Potential effects of reduction of groundwater storage includes the potential for limited groundwater availability during a prolonged drought for the various Subbasin uses and users of groundwater, including environmental users.

3.4.2 Minimum Threshold

The minimum threshold values for reduction of groundwater storage have been established for each MA and are based on and identical to the minimum threshold values established for chronic lowering of groundwater elevations.

3.4.3 Measurable Objective

The measurable objective values for reduction of groundwater storage have been established for each MA and are based on and identical to the measurable objective values established for chronic lowering of groundwater elevations.

3.4.4 Interim Milestones

Interim milestones for the Chronic Lowering of Groundwater Levels are set equal to measurable objectives.

3.5 Degraded Water Quality

The YSGA is only establishing sustainable management criteria for total dissolved solids and has elected to not establish specific sustainable management criteria for other constituents of concern identified within the Subbasin at this time. For all constituents of concern except total dissolved solids, the Subbasin will rely on current and future water quality standards established for drinking water and agricultural water uses by state and County regulatory agencies. The YSGA will annually review water quality monitoring data, in collaboration with regulating agencies, to determine if water quality is being negatively affected by groundwater management activities. In the future, where

significant negative impacts to water quality associated with groundwater management activities are identified, the YSGA will coordinate with stakeholders and regulatory agencies to establish appropriate sustainable management criteria that can be used to define the occurrence of basin-wide undesirable results for specific water quality constituents.

The YSGA has identified a list of water quality constituents of concern, including those constituents whose presence, distribution, or concentration can be influenced by groundwater management activities. The list of water quality constituents of concern for the Subbasin includes:

- Total Dissolved Solids
- Nitrate
- Arsenic
- Boron
- Hexavalent Chromium (VI)

3.5.1 Undesirable Result

The basin-wide definition of "undesirable results" for degraded water quality is as follows:

> *The point at which water quality is degraded to the extent of causing significant and unreasonable impacts from groundwater management actions in the Yolo Subbasin, that affect the reasonable and beneficial use of, and access to, groundwater by overlying users.*
>
> *An undesirable result occurs when the minimum threshold criteria is exceeded in* ***50 percent or more*** *of representative monitoring wells monitored for total dissolved solids.*

The YSGA will also perform an annual qualitative analysis of water quality conditions for all identified constituents of concern to determine whether water quality conditions are being impacted by groundwater management activities. In the event that clear linkages between degraded water quality conditions (i.e., unacceptable concentrations of constituents of concern) and groundwater management activities are identified, the YSGA will create a process for establishing minimum thresholds and measurable objectives for those constituents consistent with concentration limits established by responsible regulating agencies.

3.5.1.1 Potential Causes of Degraded Water Quality

Section 354.26(b)(1) of the GSP Emergency Regulations requires identification of potential causes of an undesirable result for each sustainability indicator. Potential causes of undesirable results due to Degraded Water Quality within the Subbasin include the addition or movement of constituents of concern (COCs) *via* groundwater processes that are related to water management or land use activities. These potential processes include:

- Deep percolation of precipitation, seepage from various natural and man-made channels, and recharge from spreading basins.

- Irrigation system backflow into wells and flow through well gravelpack and screens from one formation to another.
- Deep percolation of excess applied irrigation water and other water applied for cultural practices (e.g., for soil leaching). Potential COCs include salinity (i.e., TDS), nitrate, and agricultural chemicals.
- Lateral migration from adjacent areas with poorer quality groundwater. Potential COCs include salinity and other natural constituents (e.g., chloride and sulfate).
- Leaching from internal sources such as fine-grained, clay-rich interbeds. Potential COCs include arsenic and other constituents associated with fine-grained depositional environments.

In the case of deep percolation of excess applied irrigation and leaching water, such activities are regulated separately under the CVRWQCB's ILRP and CV-SALTS. For the last two items listed above, the underlying cause can be related to hydraulic gradients and heads (groundwater levels), and thus linked to changes in groundwater levels. Currently, the leaching or movement of COCs related to groundwater gradients is not a documented issue in the Subbasin.

3.5.1.2 Potential Effects of Degraded Water Quality

Section 354.26(b)(3) of the GSP Emergency Regulations requires identification of potential effects of an undesirable result for each sustainability indicator. The potential effects of undesirable results caused by degraded water quality on beneficial uses and users of groundwater may include: increased costs to treat groundwater to drinking water standards if it is to be used as a potable supply source; increased costs to blend relatively poor-quality groundwater with higher-quality sources for agricultural and non-agricultural uses; limitations on viable crop types or crop yield depending on crop sensitivity and tolerance to COCs in groundwater used for irrigation; and potential reduction in "usable storage" volume of groundwater in the basin if large areas of an aquifer are impacted to the point that they cannot be used to support beneficial uses and users.

3.5.1.3 Annual Water Quality Review

The YSGA will rely on current and future water quality standards established for drinking water and agricultural water uses by state and County regulatory agencies. *See* **Table 4-2** for current agricultural and drinking water standards for California in 2021.

To determine whether groundwater management activities are impacting the quality of groundwater, the YSGA will monitor levels of total dissolved solids in select RMWs and will review water quality data collected by other responsible regulating agencies.

Annually the YSGA will:

- Review water quality monitoring data, in collaboration with responsible regulating agencies, to determine if water quality is being negatively affected by groundwater management activities.

- Where future significant negative impacts to water quality associated with groundwater management activities are identified, the YSGA will coordinate with stakeholders and regulatory agencies to establish appropriate sustainable management criteria to avoid the occurrence of basin-wide undesirable results.
- YSGA's annual review of water quality conditions and determination of impacts associated with groundwater management activities will be provide to DWR in the YSGA's required annual report. This report will also be available for review by local stakeholders.

3.5.2 Minimum Threshold

The YSGA has established a minimum threshold for total dissolved solids as follows:

A representative monitoring well violates the minimum threshold when the total dissolved solids concentration exceeds 1,000 ppm over a three (3) year rolling average.

3.5.3 Measurable Objective

The YSGA has established a measurable objective for total dissolved solids as follows:

A representative monitoring well violates the measurable objective when the total dissolved solids concentration exceeds 750 ppm over a three (3) year rolling average.

3.5.4 Interim Milestones

Interim milestones for the Degraded Water Quality are set equal to measurable objectives.

3.6 Land Subsidence

3.6.1 Undesirable Result

The basin-wide definition of "undesirable results" for land subsidence is as follows:

The point at which the rate and extent of subsidence in the Subbasin causes significant and unreasonable impacts to surface land uses or critical infrastructure.

An undesirable result occurs when the minimum threshold value is exceeded over 25 percent of the management or sub-MA in three (3) or more management or sub-MAs in the same reporting year.

Within the Yolo Subbasin, a management or sub-MA will be considered an undesirable result watch area when that MA exceeds its minimum threshold value, identified below. Sub-MAs have been established for the purposes of assessing undesirable results of land subsidence and are shown in **Figure 3-3**. If three or more undesirable result watch areas exist, as defined above, the Subbasin would be considered to be experiencing an undesirable result relative to land subsidence.

3.6.1.1 Potential Causes of Land Subsidence

Section 354.26(b)(1) of the GSP Emergency Regulations requires identification of potential causes of an undesirable result for each sustainability indicator. Land subsidence can be caused by several mechanisms, but the mechanism most relevant to sustainable groundwater management is the long or short-term depressurization of aquifers and aquitards due to lowering of groundwater levels, which can lead to compaction of compressible strata and lowering of the ground surface. Therefore, the potential causes of Undesirable Results due to land subsidence are generally the same as the potential causes listed above for undesirable results due to chronic lowering of groundwater levels.

3.6.1.2 Potential Effects of Land Subsidence

Section 354.26(b)(3) of the GSP emergency regulations requires identification of potential effects of an undesirable result for each sustainability indicator. Potential effects of land subsidence on beneficial uses and users of groundwater and overlying land uses within the Subbasin would include damage to gravity-driven water conveyance infrastructure, and groundwater well casings, and other public infrastructure, such as roadways and utility infrastructure.

3.6.1.3 Criteria for Establishing Minimum Thresholds and Measurable Objectives

The YSGA reviewed the level of subsidence in the Subbasin based on a number of studies as reviewed in **Section 2.2.5 – Land Subsidence**. Land deformation occurs as both surface subsidence and surface uplifting and the Subbasin experiences both processes. In the east portion of the Central Yolo MA and nearly the entire North Yolo MA steady levels of subsidence have been documented. In the western portion of the Central Yolo MA a slight amount of uplift has been observed. For additional details, *refer to* **Section 2.2.5**.

Subsidence in the Subbasin has occurred at a steady rate according to available studies and occurs even in years when groundwater levels are stable or increasing. The rate of subsidence does not substantially increase during years when groundwater levels are declining. The cause of subsidence can be attributed to other tectonic activities, and not solely groundwater extractions. To fully understand the exact causes of subsidence additional data is needed to identify where in the substrata subsidence occurs.

The YSGA recognizes that, while the exact causes of subsidence in the Subbasin are not fully understood, subsidence can cause significant impacts to surface infrastructure and is often caused by increasing groundwater extractions. The YSGA and its member agencies have also established groundwater level minimum threshold and measurable objective values at levels consistent with historic conditions. Therefore, future subsidence rates could be expected to continue at rates similar to current rates. Through a collaborative process with YSGA member agencies and stakeholders the minimum threshold and measurable objectives for subsidence have been set at approximately the current rate of subsidence in the various parts of the Subbasin.

The YSGA is committed to continued evaluation of subsidence and identification of impacts associated with subsidence. The YSGA will work with local and state agencies to evaluate subsidence in the Subbasin and will:

- Require continued monitoring and reporting of the level of land subsidence occurring in the Subbasin
- Require annual monitoring and reporting of potential impacts to land uses, critical infrastructure, and wells (domestic, production and municipal)
- Continue to refine the understanding of the causes of subsidence based on observed data (water management vs tectonic)
- Quantify the amount of subsidence which causes impacts to infrastructure
- Using observed data consider establishing future subsidence thresholds as maximum amount of subsidence in critical areas of the Subbasin based on observed data

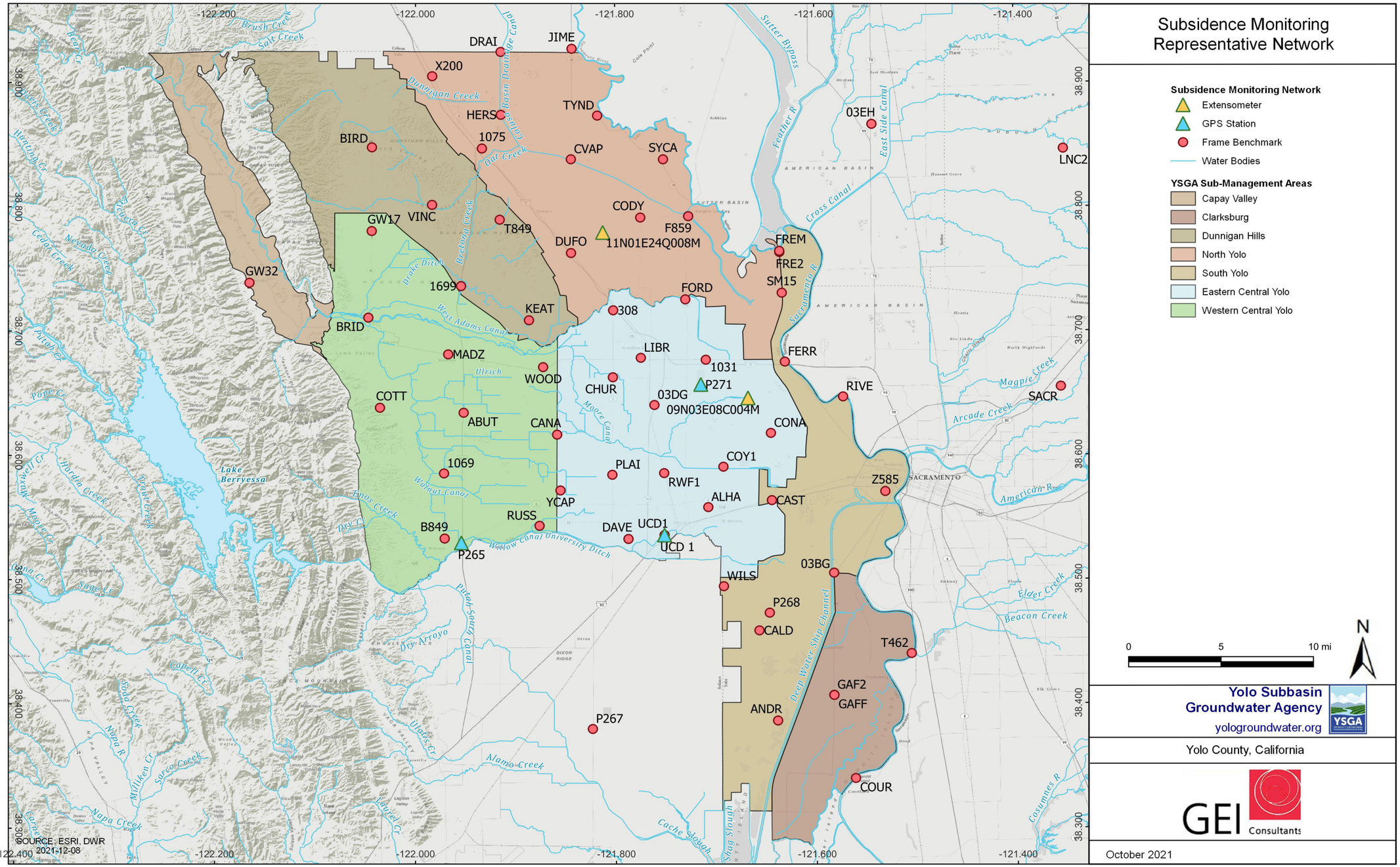

Figure 3-3. Yolo Subbasin Sub-Management Area for Subsidence Sustainability Indicator.

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3.6.2 Minimum Threshold Values

The minimum threshold values for land subsidence have been established for each management or sub-MA as shown in **Table 3-2**.

Table 3-2. Minimum Thresholds for Land Subsidence.

Management / Sub-Management Area	Running Average	Max Subsidence Rate	Max Percent of Area
Capay Valley	TBD	TBD	TBD
Dunnigan Hills	5-year	1.8 cm/year	25%
North Yolo	5-year	3.0 cm/year	25%
East Central Yolo	5-year	2.5 cm/year	25%
West Central Yolo	5-year	1.8 cm/year	25%
South Yolo	5-year	0.0 cm/year	25%
Clarksburg	5-year	0.0 cm/year	25%

3.6.3 Measurable Objectives Values

The measurable objectives values for land subsidence have been established for each management and sub-MA as shown in **Table 3-3**.

Table 3-3. Measurable Objective Thresholds for Land Subsidence.

Management / Sub-Management Area	Running Average	Max Subsidence Rate	Max Percent of Area
Capay Valley	TBD	TBD	TBD
Dunnigan Hills	3-year	1.8 cm/year	25%
North Yolo	3-year	3.0 cm/year	25%
East Central Yolo	3-year	2.5 cm/year	25%
West Central Yolo	3-year	1.8 cm/year	25%
South Yolo	3-year	0.0 cm/year	25%
Clarksburg	3-year	0.0 cm/year	25%

3.6.4 Interim Milestones

Interim milestones for the Land Subsidence are set equal to measurable objectives that are generally equal to current levels of subsidence. The YSGA's objective for land subsidence, as for most sustainability indicators, is to maintain groundwater levels and conditions at those experienced during recent historical conditions, generally since 2000. Therefore, SMCs for land subsidence are set at conditions similar those recently experienced.

3.7 Seawater Intrusion

Seawater intrusion has been determined to not be a concern in the Yolo Subbasin with no potential for seawater intrusion to occur under water quality management objectives in the Sacramento-San

Joaquin Delta or changes in water management activities in the Subbasin. Accordingly, no definitions of undesirable results, minimum thresholds, or measurable objectives have been developed.

3.8 Depletion of Interconnected Surface Water

The YSGA intends to use groundwater levels at shallow near-stream representative monitoring wells as a proxy for the rate and volume of depletion of interconnected surface waters caused by groundwater use.

There are many uncertainties associated with directly quantifying and measuring the rate and volume of surface water depletions caused by groundwater use. With the current state of knowledge, the YSGA lacks the ability to directly measure such depletions. There are streamflow gages throughout the basin; however, the gages are influenced by many other factors, and surface water management makes it difficult or impossible to see the effects of depletion. Second, separating depletion caused by reduced natural seepage to the groundwater basin from changing climate signals or other factors is a difficult task. The YSGA's integrated WEAP/MODFLOW model (YSGA Model) provides estimates of the quantity and timing of groundwater-surface water exchange; however, the model contains uncertainties such that setting thresholds based around model outputs is not appropriate. More information about model uncertainties is provided in the **Appendix E – Yolo GSA Model Documentation**. Improvements in the model's calibration parameters and portrayal of interconnected surface water systems are planned as a future Management Actions to update the YSGA Model.

Therefore, groundwater levels at the representative monitoring wells (RMW)s are being used as a proxy for the rate and volume of depletion of interconnected surface waters caused by groundwater use. The correlation between shallow groundwater levels and the depletion of interconnected surface waters is described by the YSGA Model. While the near-stream groundwater levels are higher than the elevation of the stream bottom, a lowering of groundwater levels either (1) reduces the rate of exchange from groundwater to the stream in a gaining reach, (2) increases the rate of exchange from the stream to groundwater in a losing reach, or (3) changes the reach from gaining to losing. This relationship holds in the reverse direction with an increase in groundwater elevations. While the near-stream groundwater levels are below the stream bottom elevation, the stream is considered disconnected, and a change in groundwater levels has no effect on depletion. For more details about groundwater-surface water interaction in the model, *please refer to* Modeling Surface Water-Groundwater Interaction with MODFLOW: Some Considerations (Brunner et.al. 2010).

Development of sustainable management criteria for the depletion of interconnected surface waters was constrained by limited groundwater data and available previous studies of stream-aquifer interaction. Additional investigations of stream-aquifer interactions and additional groundwater monitoring data in the Yolo Subbasin may necessitate a future change in the sustainable management criteria for this sustainability indicator.

3.8.1 Undesirable Results

The basin-wide definition of "undesirable results" for interconnected surface water is as follows:

> *The point at which significant and unreasonable impacts to the surface waters affect the reasonable and beneficial use of those surface waters by overlying users, including associated ecosystems.*
>
> *An undesirable result occurs when the Minimum Threshold is exceeded in over 50 percent of the interconnected surface water representative monitoring wells in two (2) or more interconnected surface water MAs in the same reporting year.*

Within the Yolo Subbasin, an interconnected surface water management zone will be considered an *"undesirable result watch area"* when 50 percent or more of the RMW's in that management zone exceed their minimum threshold value, identified below. If multiple undesirable result watch areas meet the criteria for depletion of interconnected surface waters undesirable result, as defined above, the Subbasin will be experiencing an undesirable result relative to depletion of interconnected surface waters. Interconnected Surface Water Management Zones are defined as follows:

- Upper Cache Creek – Cache Creek upstream of Capay Dam (coincident with the Capay Valley MA)
- Lower Cache Creek – Cache Creek downstream of Capay Dam to the Cache Creek Settling Basin, including RMW's up to 1 mile away from the creek
- Upper Sacramento River Reach – Sacramento River from the northern Subbasin boundary to the southern boundary of the North Yolo MA, including RMW's up to 5 miles away from the river. Also includes the Colusa Basin Drain
- Lower Sacramento River Reach – Sacramento River from the southern boundary of the North Yolo MA to the southern Subbasin boundary, including RMW's up to 5 miles away from the river
- Putah Creek –Putah Creek from the western Subbasin boundary to its drainage in the Yolo Bypass Wildlife Area, including wells up to 2 miles away from the creek

3.8.1.1 Potential Causes of Depletion of Interconnected Surface Water

Section 354.26(b)(1) of the GSP Emergency Regulations requires identification of potential causes of an undesirable result for each sustainability indicator. Potential causes of depletion of interconnected surface water include increased excessive groundwater pumping, which can draw on surface water; depleted streamflow; and increased surface water diversions.

3.1.1.1 Potential Effects of Depletion of Interconnected Surface Water

Section 354.26(b)(3) of the GSP Emergency Regulations requires identification of potential effects of an undesirable result for each sustainability indicator. Potential effects of depletion of interconnected surface water may include reduced stream or surface water flows, subsidence, and degraded groundwater quality. The reduction of surface water flows can reduce suitable aquatic

habitat through increased temperature and reduced stream depth, flow velocity, cover, and dissolved oxygen.

3.8.2 Minimum Thresholds

3.8.2.1 Criteria for Establishing Minimum Thresholds

Minimum thresholds for the chronic lowering of groundwater levels were established through a collaborative process with local stakeholders and interested parties. To establish the minimum thresholds and measurable objectives for the Yolo Subbasin, the YSGA reviewed available well data and selected Representative Wells that could be used to establish minimum threshold values for interconnected surface waters. These Representative Wells, shown in **Figure 3-1**, were selected based on proximity to interconnected surface waters and well depth. More details about representative well selection can be found in **Section 4.8 – Depletion of Interconnected Surface Water.**

Based on historic, current, and projected conditions in the Subbasin, the YSGA developed several methodologies for establishing the minimum threshold value for each representative well, based on Interconnected Surface Water Management Zones. The primary sustainability criteria for establishing minimum thresholds for interconnected surface waters is to maintain interconnection of the local groundwater system to the critical surface water body at levels consistent with recent conditions (1971-2018). In this manner the YSGA is establishing sustainable management criteria that protects the existing level and frequency of interconnection, which in turn supports existing habitat and ecosystem conditions associated with critical surface water bodies, while preventing further degradation. The habitat associated with interconnected surface water bodies is supported by both surface flows (much of which is managed) and periodic connection to groundwater. The goal of the YSGA is to maintain conditions experienced in the past and to cause no degradation of habitat from the Subbasin's current baseline. Historically this condition included periods when groundwater elevations were below the level needed to support connection to surface water bodies. However, groundwater elevations recover during wet periods to reestablish connections between groundwater and surface water bodies. This regime of fluctuating and periodically recovering groundwater levels supports the current level of habitat in interconnected surface water bodies and for GDEs. The hydrographs for all Representative Wells used to establish minimum thresholds and measurable objectives are provided in **Appendix H – Yolo Subbasin Hydrographs of Representative Wells**. The methodology for each Interconnected Surface Water Management Zone is described below.

3.8.2.1.1 Lower Cache Creek:

The Minimum Threshold for depletion of interconnected surface water is the recurrence of the spring (March-May) average measurement for 1975 to present in at least one spring in every seven (7) years.

Lower Cache Creek is an intermittent water body with a known connection to groundwater, that supports sensitive ecosystems, recreation, and surface water uses. The creek experiences connection to, and disconnection from, groundwater that varies in space and time. The intention of the

established minimum threshold is to ensure that no depletion occurs in excess of what has been experienced since 1975, and to ensure that groundwater levels rise at regular intervals to maintain the stream's connection to groundwater.

Historically, near-stream groundwater levels have fluctuated on both an annual and inter-annual basis. Within the range of historical inter-annual variation in near-stream groundwater levels, undesirable results have not been documented.

Because of the construction of Indian Valley Reservoir in 1975, many of the near-stream hydrographs showed steep declines prior to 1975 and significantly higher levels afterwards. Because the pre-1975 hydrographs showed significant declines contrary to the management goal of the basin, the period-of-record for calculation of minimum thresholds and measurable objectives for lower Cache Creek was shortened to 1975-2018. This ensures that the pre-1975 declines observed in these hydrographs are not repeated.

At each RMW, the average 1975 to present spring (March-May) groundwater elevation was calculated. The hydrograph was then evaluated for the longest period of time that groundwater elevations had remained below that value. The 7-year threshold represents the average of this period of time in all designated RMW's for Lower Cache Creek. In different areas of the creek, this value ranged from 4 to 11 years. The 7-year designation thus provides conservative preservation of the hydrologic regime throughout the entire lower creek area.

3.8.2.1.2 Upper Cache Creek, Putah Creek, and Lower Sacramento River:

Minimum Threshold value is equal to the minimum elevation for the period of record at the RMW, exceeded in 2 consecutive years.

Upper Cache Creek, Putah Creek, and the Sacramento River are perennial waterways that support a variety of beneficial uses. The effect of groundwater extraction on streamflow is difficult to determine due to flow management practices. However, hydrographs of monitoring wells adjacent to perennial water bodies display much less inter-annual variation than those of Lower Cache Creek. Generally, water levels are more stable, reflecting both the availability of surface water in the area and the replenishment of groundwater levels by the water body. Because groundwater levels at these wells generally rebound every spring, it is not appropriate to set a multi-year threshold. The minimum threshold is a single value aimed at limiting the rate of depletion from the water body. No undesirable results have been documented within the historical period of evaluation. Therefore, the minimum threshold is set to the historic minimum elevation for the period of evaluation at the representative monitoring well. The exceedance of this value in 2 consecutive years represents a departure from the historical near-stream hydrology, and if it occurs at a subbasin wide scale may lead to an undesirable result. The established minimum thresholds have been established to maintain interconnection of local groundwater systems to the adjacent water body at levels consistent with recent conditions, thereby, supporting existing habitat and ecosystem conditions associated with the water bodies, while preventing further degradation.

3.8.2.1.3 Upper Sacramento River:

Exceedance of the historic minimum elevation in the period of record of each RMW plus 20 percent of the depth between the historic maximum and historic minimum elevation for the period of record of the RMW in 2 consecutive years.

The minimum thresholds for the North Yolo MA are set lower than historical conditions recognizing that water districts, such as RD 108, in this area may experience reductions in surface water deliveries from the Sacramento River as potential Voluntary Agreements with the State Water Board are implemented. The Voluntary Agreements are expected to reduce surface water deliveries to Sacramento River Settlement Contractors during certain year types, requiring that water users increase their reliance on local groundwater during the same year types.

The minimum threshold is lower in this reach to provide operational flexibility to the beneficial users of groundwater in the region. However, the YSGA intends to manage towards the measurable objective, which seeks to maintain historical groundwater levels. In the long-term, groundwater levels will stay at their historically sustainable levels, and no undesirable results are predicted to occur.

3.8.2.2 Minimum Threshold Values

The *Minimum Threshold* values for depletion of interconnected surface water have been established for each RMW in the interconnected surface water management zone, as described above, and are provided in **Table 3-4**. The *Minimum Threshold*s will be measured at specific RMWs representative of the surrounding area and capture groundwater conditions in the area that influence surface waters.

3.8.3 Measurable Objectives

3.8.3.1 Criteria for Establishing Measurable Objectives

To establish the measurable objectives for the Yolo Subbasin, the YSGA utilized the representative wells identified for minimum thresholds, shown in **Table 3-5**, to determine the measurable objectives for chronic lowering of groundwater levels. Based on historic, current, and projected groundwater conditions in the Subbasin, the used the following criteria for establishing measurable objectives at representative monitoring wells:

Measurable Objective is equal to the average spring (March-May) groundwater elevation for water years 2000-2011 at the RMW. Performance of the Measurable Objective will be measured as the five (5) year running average of the maximum spring (March-May) groundwater elevation.

This measurable objective ensures that groundwater levels continue to rebound in spring, maintaining connection to and preventing undesirable depletion of interconnected surface waters.

Table 3-4. Interconnected Surface Water Minimum Thresholds.

YSGA Representative Well Number	State Well Number	Interconnected Surface Water Management Zone	Minimum Thresholds Value Depth to Water (Ft)	Minimum Thresholds Value Groundwater Elevation (Ft msl)	Minimum Thresholds Evaluation
265	10N01W21J001M	Lower Cache	29.7	131.6	1 in 7 years
275	10N02W14A001M	Lower Cache	64.4	143.2	1 in 7 years
424	10N01W23P001M	Lower Cache	28.6	116.7	1 in 7 years
425	10N01E22H500M	Lower Cache	29.4	55.1	1 in 7 years
426	10N01W16G500M	Lower Cache	36.1	132.6	1 in 7 years
151	09N03E33B002M	Lower Sacramento	56.1	-35.3	Single exceedance
401	10N02E36E001M	Lower Sacramento	21.2	9.0	Single exceedance
428	08N04E19N001M	Lower Sacramento	19.3	-1.3	Single exceedance
170	08N02E18M002M	Putah Creek	67.0	1.5	Single exceedance
229	08N01W20R005M	Putah Creek	116.2	36.4	Single exceedance
429	08N01E17F001M	Putah Creek	47.7	56.1	Single exceedance
287	11N03W23L001M	Upper Cache	23.6	287.6	Single exceedance
289	11N03W33F001M	Upper Cache	29.6	341.2	Single exceedance
293	12N03W20D001M	Upper Cache	26.2	376.4	Single exceedance
420	10N02E03R002M	Upper Sacramento	81.9	-39.2	Single exceedance
427	12N01E03R003M	Upper Sacramento	73.7	-35.4	Single exceedance
421	11N02E20K004M	Upper Sacramento	85.1	-31.6	Single exceedance

3.8.3.2 Measurable Objective Values

The measurable objective for depletion of interconnected surface waters has been established for each RMW in the interconnected surface water management zone, as described above. The Measurable Objectives will be measured at specific RMWs representative of the surrounding area and capture groundwater conditions in the area that influence surface waters

3.8.4 Interim Milestones

Interim milestones for the depletion of interconnected surface waters are set equal to measurable objectives that are generally equal to current conditions. The YSGA's objective is to maintain groundwater levels and conditions at those experienced during recent historical conditions, as detailed above.

Table 3-5. Interconnected Surface Water Measurable Objectives

YSGA Representative Well Number	State Well Number	Interconnected Surface Water Management Zone	Measurable Objectives Value Depth to Water (Ft)	Measurable Objectives Value Groundwater Elevation (Ft msl)
265	10N01W21J001M	Lower Cache	28.6	132.7
275	10N02W14A001M	Lower Cache	62.2	145.4
424	10N01W23P001M	Lower Cache	29.5	115.8
425	10N01E22H500M	Lower Cache	23.3	61.2
426	10N01W16G500M	Lower Cache	30.6	138.0
151	09N03E33B002M	Lower Sacramento	5.1	15.7
401	10N02E36E001M	Lower Sacramento	3.3	26.8
428	08N04E19N001M	Lower Sacramento	9.3	8.7
170	08N02E18M002M	Putah Creek	38.8	29.7
229	08N01W20R005M	Putah Creek	61.0	91.6
429	08N01E17F001M	Putah Creek	27.8	76.0
287	11N03W23L001M	Upper Cache	12.5	298.7
289	11N03W33F001M	Upper Cache	16.5	354.3
293	12N03W20D001M	Upper Cache	17.4	385.2
420	10N02E03R002M	Upper Sacramento	18.9	23.9
427	12N01E03R003M	Upper Sacramento	9.0	29.3
421	11N02E20K004M	Upper Sacramento	20.0	33.5

4.0 Monitoring Networks

The monitoring network and protocols described in this section are designed to collect data of sufficient quality, frequency, and distribution to characterize groundwater conditions and water budget components in the Yolo Subbasin, and to evaluate changing conditions due to local hydrology, water management actions, and water supply projects. This section describes the objectives, design, rationale, monitoring protocols, and data reporting requirements of the monitoring network, along with a plan for future improvement to the monitoring network to fill identified data gaps. The YSGA has established this SGMA representative monitoring network with those wells or sites that will be used to report the Subbasin's performance for each of the sustainability indicators. Within the Subbasin many hundreds of additional wells are also monitored for purposes other than SGMA reporting.

Since 2004, the Yolo Subbasin has maintained an established groundwater-level and water quality monitoring database known as the County WRID[58] that includes more than 190,000 records from thousands of agricultural, domestic, municipal and dedicated monitoring wells that have been monitored for groundwater levels, water quality and subsidence. In addition, members of the YSGA and more than 40 other agencies also maintain and monitor wells throughout the Subbasin. The subset of wells that are included in the Subbasin's SGMA monitoring network for specific sustainability indicators are detailed in the following sections. Not all monitoring wells are included in the SGMA monitoring network. They are, nevertheless, important for monitoring conditions in the Subbasin and will continue to be monitored. All current and historic monitoring data on the WRID is available online for scientists and engineers. For more accessible public access, all currently active monitoring wells (418 as of August 2021) are available to the public at sgma.yologroundwater.org.

SGMA representative monitoring wells or sites are discussed for each of the sustainability indicators in the following sections along with evidence that the wells are reflective of conditions in the principal aquifers.

4.1 Objectives

The representative monitoring network in the Subbasin is designed to meet the following objectives of this GSP:

- Monitor impacts of groundwater pumping on beneficial uses and users of groundwater
- Monitor progress toward measurable objectives and minimum thresholds
- Collect data to quantify annual changes in water budget components of the Subbasin

[58] https://wrid.facilitiesmap.com/

- Monitor changes in groundwater conditions relative implementation of projects and management actions

The representative monitoring network design relative to these four objectives are discussed in this section. These objectives will monitor the following pertinent sustainability indicators:

- Chronic lowering of groundwater levels
- Reduction of groundwater storage
- Degraded groundwater quality
- Land subsidence
- Depletion of interconnected surface waters

The following sections provide a description of the 1) entire monitoring network, 2) selected representative monitoring network along with its justification, and 3) frequency of measurement for each of the sustainability indicators.

4.2 Monitoring Progress Toward Measurable Objectives

The monitoring network will inform progress of the Subbasin to operate to interim milestones and measurable objectives and ensure avoidance of minimum thresholds. As described in **Section 3.3 – Chronic Lowering of Groundwater Levels**, groundwater levels are the primary indicator for which minimum thresholds have been set for the evaluation of the Subbasin's sustainable management. Groundwater levels serve as the measure for chronic lowering of groundwater levels, reduction of groundwater storage, and depletion of interconnected surface waters. However, as groundwater levels change, effects on other indicators will also be evaluated. Tracking the progress of water levels as well as other indicators will inform the effectiveness of water management actions, implemented projects, and quantification of water budget components.

Monitoring for degraded water quality will rely on ongoing, existing water quality monitoring programs and the specific monitoring wells and criteria established in those programs. Land subsidence in the Subbasin will rely upon existing and planned surface subsidence monitoring points and extensometers located in the subbasins, as well as periodic subsidence evaluations conducted in the Subbasin.

Monitoring the Subbasin's performance to interim milestones and measurable objectives will provide information needed to evaluate whether adjustments to management actions and monitoring networks are required. As stated in §354.34(g)(3), minimum thresholds, measurable objectives, and interim milestones will be established at each monitoring site or representative monitoring site. Where needed, interim milestones and minimum thresholds for groundwater levels or other sustainability indicators may be adjusted in the 5-year updates to maintain the objectives of this GSP.

4.2.1 Monitoring for Water Budget Components

One of the objectives of the monitoring network is to quantify or estimate water budget components to quantify the change in water budget over time. This aspect of the network will rely on local monitoring stations for water levels, but also regional weather stations, remote sensing methods for consumptive use, or estimates for seepage or other groundwater inflow outflow components. In addition, water supply import and export accounting is required for the water budget. These aspects of the network are briefly described below.

4.2.1.1 Subbasin Inputs

As described in **Section 2.3 – Water Budget Information**, water inputs to the Subbasin include:

- Diverted surface water (both imported and natural), that satisfies consumptive use, or becomes managed or unmanaged direct recharge to the Subbasin
- Precipitation
- Channel seepage
- Subsurface inflow

4.2.1.1.1 Surface Water Diversions

Surface water diversion provide a sources water to meet the agricultural and municipal demands in the Subbasin, and to a less extent as a source of direct groundwater recharge. As a component of the water budget diversions from local waterways, such as Cache Creek, or imports, through water rights or contractual agreements, from the Sacramento River will be monitored and quantified annually to support required water budget analysis and reporting.

4.2.1.1.2 Precipitation

Depending on the WY, precipitation may account for recharge as well as satisfying a portion of consumptive use in the Subbasin. It is a component of water budget accounting that is monitored by weather stations in the Subbasin. The following weather stations (**Table 4-1**) will be used for monitoring purposes in the Subbasin.

4.2.1.1.3 Subsurface Inflows

Historical quantities of groundwater inflow to the Subbasin underlying the study area have been estimated with the Subbasin's regional model and estimated by water budget accounting methods. Subsurface inflows include deep percolation, YCFC&WCD canal recharge, and managed aquifer recharge.

As the groundwater model of the study area continues to be refined, groundwater inflow calculations may become more accurate. In addition, annual water budget accounting as well as semiannual water elevation monitoring, contouring and gradient estimating, will continue to provide data that can support estimates of groundwater inflow in the future.

Table 4-1. Weather Stations within the Subbasin.

Station Type	ID	Latitude	Longitude	Elevation (feet msl)	Other
CIMIS	Bryte	38.599158	-121.54041	40	
CIMIS	Davis	38.535694	-121.77636	60	
CIMIS	Esparto	38.691786	-122.01381	174	Inactive
CIMIS	Woodland	38.672722	- 121.81172	82	
CIMIS	Zamora	38.808758	-121.90754	50	Inactive
NCDC	Davis 2 WSW Exp Farm	38.5349	-121.7761	60	
NCDC	Winters	38.525	-121.978	135	
NCDC	Woodland 1 WNW NCDC	38.6829	-121.794	69	
Touchtone	Davis	38.53	-121.76	60	
Touchtone	Winters	38.53	-121.96	135	

4.2.1.2 Subbasin Outputs

As described in **Section 2.3 – Water Budget Information**, water leaving the Subbasin includes:

- Consumptive use from crop demand, other vegetation, evaporation, and other beneficial use such as water recreation, domestic use, municipal or industrial use, etc.
- Surface outflows
- Subsurface outflow

4.2.1.2.1 Consumptive Use

Sources of water for consumptive use include surface water, precipitation, and groundwater. As described in the water budget section of this GSP, consumptive use from crop demand, other vegetation, and evaporation has been calculated at the basin level using remote sensing techniques.

4.2.1.2.2 Surface Outflows

Surface outflows include surface flows leaving the boundaries of the Subbasin, typically as flows into the Sacramento River, Yolo Bypass, or the Delta.

4.2.1.2.3 Subsurface Outflow

Historical quantities of groundwater outflow from the Subbasin underlying the study area have been estimated in various regional models and estimated by water budget accounting in the past.

As a model of the study area is refined, groundwater outflow calculations may become more accurate. In addition, annual water budget accounting as well as semiannual water elevation

monitoring, contouring and gradient estimating, will continue to provide data to support estimates of groundwater outflow in the future.

4.3 Monitoring Network Design

The monitoring network design considers the use of the WRID monitoring network and monitoring maintained by other local and state agencies. Network coverage includes areas within the Subbasin with current and projected groundwater use to adequately demonstrate the short-term, seasonal, and long-term trends in groundwater and related surface conditions.

The YSGA shall adjust the monitoring frequency and/or density to provide an adequate level of detail under circumstances including drought; minimum threshold exceedances; highly variable spatial or temporal conditions; impacts to beneficial uses and users of groundwater; and the potential to adversely affect the GSP implementation of adjacent subbasins.

4.3.1 Monitoring Frequency Design

The monitoring frequency is specified for sustainability indicators. In general, monitoring will occur semiannually for groundwater levels, land subsidence, and depletion of interconnected surface waters. Monitoring for water quality will occur at least semiannually, as determined by the water quality monitoring program responsible for collection of the water quality data. The frequency of monitoring will provide sufficient short-term, seasonal, and long-term data to evaluate the effectiveness of management actions. Further details on monitoring frequency are outlined in the discussions pertinent to each sustainability indicator.

4.3.2 Spatial Density Design

The spatial density of the monitoring network design accounts for the six MAs in the Subbasin that have been established to better implement and monitor sustainable groundwater management. These six MAs are described in more detail in **Section 2.4 – Management Areas**. The monitoring network has been designed to provide the best possible coverage of beneficial uses and users of groundwater, restricted by the current data gaps of this GSP. The representative monitoring network in relation to key beneficial users (DACs, domestic wells, GDEs, and Tribal lands) is presented in **Figure 4-1.** Please *refer to* the sections below for additional details on the monitoring spatial density for each of the sustainability indicators.

4.3.3 Rationale for Design

Rationale regarding the design of the monitoring network is provided in the sections below dedicated to each sustainability indicator. In general, monitoring stations were chosen based on the following scientific rationale:

- Aquifer representation – Per DWR Emergency Regulations §354.34, monitoring wells were chosen to represent each underlying aquifer under the boundaries of the Subbasin.
- Potential impacts to beneficial users of groundwater

- Access to monitoring location and monitoring data
- Availability of site-specific historical data and technical information
- Spatial and vertical representation
- Identification of dedicated monitoring wells
- Site accessibility

Additionally, data gaps within the monitoring network have been identified and a monitoring improvement plan (**Section 4.11 – Monitoring Network Improvement Plan**) has been developed, which identifies locations for supplemental (or future) monitoring sites for each sustainability indicator, as appropriate.

4.4 Chronic Lowering of Groundwater Levels and Reduction of Groundwater Storage

4.4.1 Representative Monitoring Network

The subbasin has 62 wells spread across the six MAs that have been designated as the representative monitoring wells for chronic lowering of groundwater levels. The selected representative monitoring network is a subset of all monitoring wells currently monitored in the Subbasin. The representative monitoring wells have been selected because they have a period of record that supports analysis required to develop measurable objectives and minimum thresholds for this sustainability indicator, and whose locations are representative of surrounding groundwater levels. The representative monitoring wells will identify groundwater level responses, during the implementation period (2022-2042), to monitor the Subbasin's performance to this sustainability indicator. As shown in **Figure 4-2**, these 62 wells have been spatially distributed to provide adequate coverage throughout the Subbasin. **Table 3-1** identifies these monitoring wells by each MA.

As explained in **Section 4.1 – Objectives**, groundwater levels are the key to informing the progress of the GSP's objectives. Historically, DWR has utilized changes in groundwater elevations to estimate changes in groundwater storage. Similarly, the Subbasin will use groundwater levels as a proxy for the change in groundwater storage that will be calculated by evaluating the volumetric difference between changes in groundwater surfaces created based on groundwater level data collected in the spring of each year.

As a result, representative monitoring wells for chronic lowering of groundwater levels will serve as a proxy for reduction in groundwater storage. Similarly, monitoring frequency and spatial density will be the same as for chronic lowering of groundwater levels, as described below.

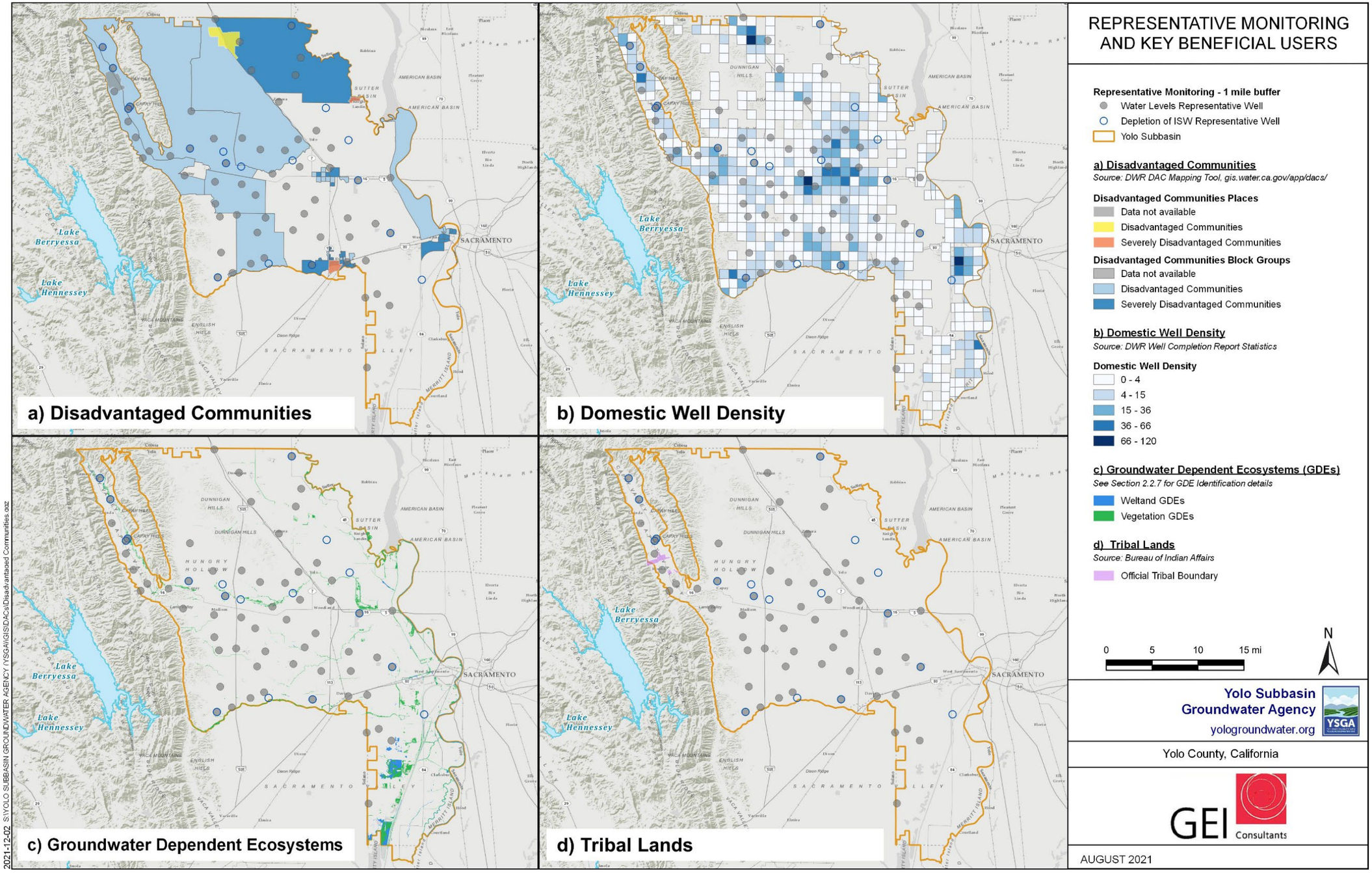

Figure 4-1. Monitoring Network for Key Beneficial Users.

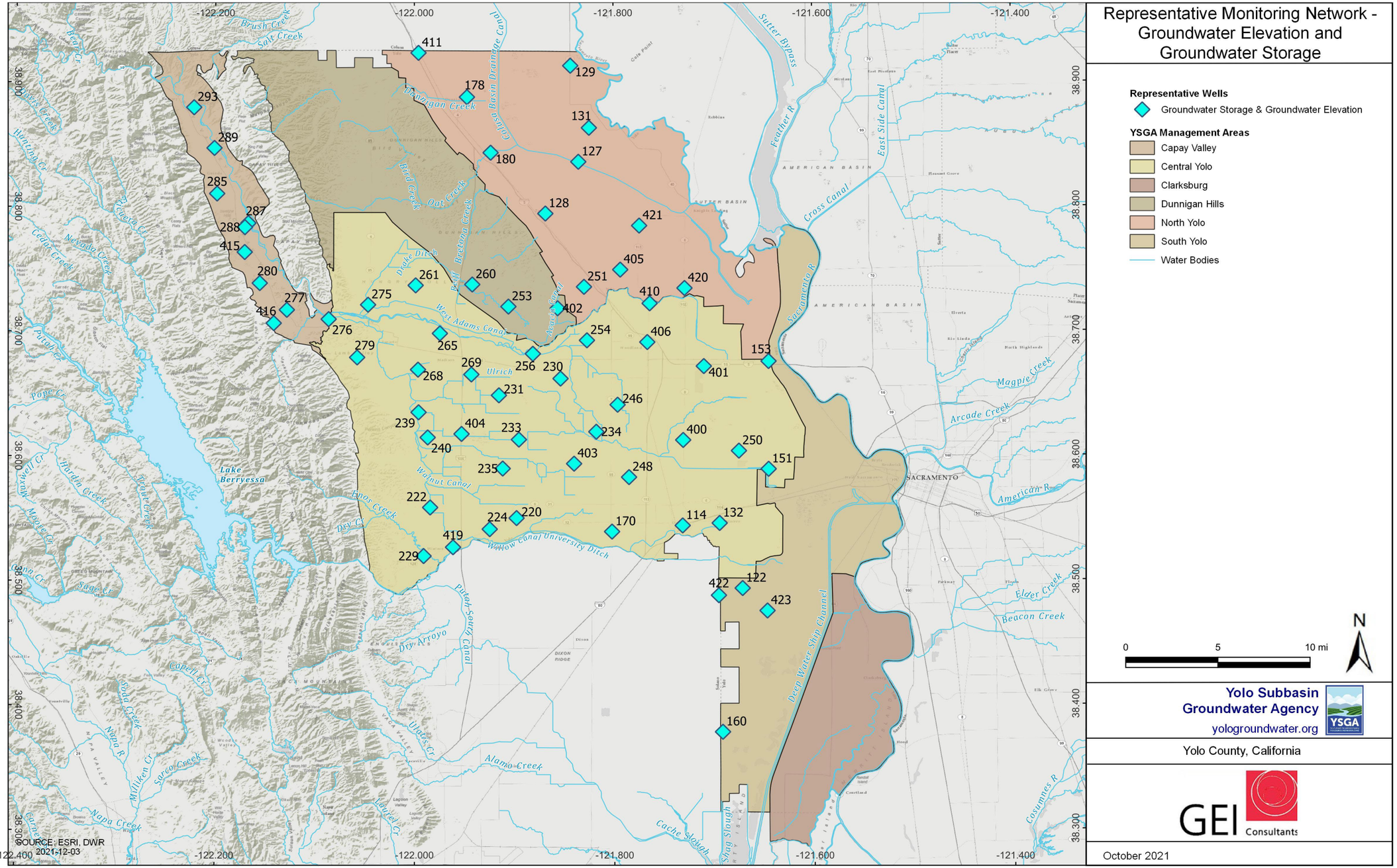

Figure 4-2. Yolo Subbasin Groundwater Elevation Representative Monitoring Wells.

4.4.2 Rationale

Representative monitoring wells were selected to represent the general conditions of the area surrounding the monitoring well and where minimum thresholds and measurable objectives have been established. The design and site selection for monitoring the groundwater levels was based on the same rationale outlined in **Section 4.3.3 – Rationale for Design**.

Monitoring will also continue for all other non-representative wells currently being monitored in the Subbasin to ensure a robust collection of data and thorough analysis of groundwater conditions in the Subbasin. As appropriate, representative monitoring wells may be modified to reflect:

- Improved understanding of the groundwater conditions
- Changes in land use conditions that warrant an increase or decrease and the spatial distribution of monitoring wells
- Changed conditions at the monitoring site (including well access)
- Establishment of nearby and equally representative dedicated monitoring wells

4.4.3 Monitoring Frequency

Frequency of groundwater level monitoring is cited in the Monitoring Networks and Identification of Data Gaps Best Management Practice (DWR 2016) which presents guidance on monitoring frequency based on the type of monitoring, aquifer type, confinement, recharge rate, hydraulic conductivity, and withdrawal rate. Historically, DWR has monitored groundwater levels on a semi-annual basis.

Based on the analysis of groundwater level condition and seasonal variations in the Subbasin, dating back several decades, it was determined that semi-annual groundwater level measurements at representative monitoring wells was sufficient to identify groundwater level trends in the Subbasin for changes in groundwater levels at the wells in the monitoring network shown on **Figure 4-2**.

Semi-annual groundwater levels will be collected in the spring (seasonal high prior to summer irrigation demands) and fall (seasonal low after the summer irrigation demands). In the spring, groundwater levels are typically higher than any other time of the year and groundwater pumping stresses are usually minimal. Fall measurements are taken after the heaviest pumping has occurred during the dry season and before substantial recharge has occurred from precipitation. The fall measurements are typically considered to be the regional minimum groundwater level for a given year.

Monitoring at representative wells will be completed during a 2-week window on either side of target dates (March 15 and October 15) to accommodate inclement weather and scheduling conflicts. The YSGA will also consult data from other Subbasin wells to confirm that data collected at representative wells is consistent with annual high and low groundwater level periods for the Subbasin. This spring/fall frequency of monitoring is sufficient to demonstrate seasonal, short-term (1-5 years), and long-term (5-10 years) trends in groundwater and related surface conditions and

yield representative information about groundwater conditions as necessary to evaluate plan implementation.

A well impact analysis has also been conducted and is included in **Appendix I – Well Impact Analysis**. This well impact analysis can be utilized to evaluate potential impacts to beneficial users of groundwater.

4.4.4 Spatial Density

A groundwater level well monitoring density goal ranges from 0.2 to 10 wells per 100 square miles (DWR 2016). The monitoring well density goals can also be based on the amount of groundwater use. For basins where groundwater pumping exceeds 10,000 AFY per 100 square miles, four wells per 100 square miles is recommended. Professional judgement is also essential to determining an adequate level of monitoring, frequency, and density based on the need to observe aquifer response near high pumping areas, cones of depression, significant recharge areas, and specific projects.

The Yolo Subbasin extends over an area of approximately 844 square miles and supplies about 320,000 acre-feet of groundwater annually. This equates to about 38,000 AFY per 100 square miles. There are 62 representative monitoring wells selected to monitor for chronic lowering of groundwater levels and reduction of groundwater storage in the Subbasin or a density of about seven wells per 100 square miles. The density of the representative monitoring wells exceeds the recommended density goals and are sufficient to provide representative groundwater levels throughout the Subbasin.

4.4.5 Data Gaps

As shown in **Figure 4-2**, there is an adequate density of monitoring wells in the Capay Valley, North Yolo, Central Yolo, and South Yolo MAs. However, data gaps are present in Dunnigan Hills and Clarksburg MAs. The YSGA will seek to add additional monitoring wells in the Dunnigan MA as irrigated agriculture increases in the area and new wells are installed. These additional wells will enable the YSGA to better assess groundwater conditions and to monitor performance to sustainability indicators. The Clarksburg MA is considered a monitoring area for chronic lower of groundwater and reduction of groundwater storage, due to the very limited amount of groundwater used in the area. In the event that land uses change or groundwater production increases in a manner that will affect local groundwater conditions, new monitoring wells will be sited in this MA.

4.5 Seawater Intrusion

As stated previously, in **Section 2.2.3 – Seawater Intrusion**, the Subbasin is more than 50 miles inland from the Pacific Ocean and seawater intrusion into the Delta is now controlled for freshwater management. Therefore, seawater intrusion is not likely to occur in the vicinity of the Subbasin and a representative monitoring network and monitoring is not required for this sustainability indicator.

4.6 Groundwater Quality

The representative monitoring network for groundwater quality consists of existing monitoring programs in the Subbasin. YSGA will review water quality monitoring data on an annual basis to monitor for potential changes in groundwater quality.

4.6.1 Representative Monitoring Network

As discussed in **Section 2.2.4 – Groundwater Quality**, groundwater quality monitoring and reporting is conducted through numerous public agencies. Rather than developing a new monitoring program, the YSGA will rely on existing programs to monitor water quality in the Subbasin. Specifically, the representative monitoring network will consist of public water system wells regulated by the State Water Board's DDW and YCEH; participating agricultural and on-farm domestic drinking water wells monitored by the Coalition under ILRP; and potential private domestic wells under the CV-SALTS Nitrate Control Program. **Table 4-2** provides an overview of these programs and the limits monitored for each constituent of concern identified in the Subbasin.

Other groundwater quality monitoring programs that exist within the YSGA boundary will be tracked by the YSGA, but not discussed in detail here, as hundreds of constituents are tested on a regular basis. These programs include GAMA managed by the USGS, the DPR's Groundwater Protection Program[59], and LUSTs[60], among others. For a detailed review of the various groundwater quality monitoring programs active in the YSGA area *please see* the 2016 Groundwater Quality Assessment Report (ch2m 2016b).

Table 4-2. Yolo Subbasin Existing Monitoring.

Constituent	Units	Drinking Water Standard		Agricultural Water Quality Thresholds	Monitoring Entity/Program		
		Limit	Type		DDW/Yolo County Health	ILRP	CV-SALTS[3]
Arsenic	ppb	10	Primary	100	X		
Boron[1]	ppb	1,000	State Notification Level	700	X	X	
Hexavalent Chromium (VI)[2]	ppb	n/a	n/a	n/a	X		
Nitrate	ppm	10	Primary	n/a	X	X	X
Total Dissolved Solids	ppm	500	Secondary	450	X	X	

[1]Unregulated chemical without an established MCL but monitoring is required if detected in initial source sampling or from Unregulated Contaminant Monitoring Rule (UCMR 1).
[2]No current MCL; however, MCL of 10 ppb was adopted in 2014 but rescinded in 2017 with anticipation that a new standard will be adopted and regulated in the future by DDW.

[59] https://www.cdpr.ca.gov/docs/emon/grndwtr/gwp_sampling.htm
[60] https://www.waterboards.ca.gov/ust

[3]Yolo Subbasin is a Priority II Subbasin under CV-SALTS Nitrate Control Program with Notice to Comply letters expected to be sent out January 2022.

4.6.1.1 DDW Public Water Systems

Water quality monitoring is currently conducted for the Subbasin's 83 public water systems through DDW. Data for these systems is publicly available through the SDWIS and will be reviewed by YSGA on an annual basis. Majority of this annual effort will focus on the 16 community water systems with regulated wells followed by the remaining non-community water systems consisting of NTNC or TNC water systems. *Refer to* **Table 2-12** for an overview of community water system wells within the Subbasin.

4.6.1.2 ILRP On-Farm Drinking Water Wells

There are approximately 32 agricultural and on-farm domestic drinking water wells that are monitored for various constituents including boron, nitrate, and TDS by the Coalition under the ILRP. Nitrate monitoring results are publicly available through GeoTracker. For TDS and boron, the YSGA will coordinate with the Coalition to obtain and will review results on an annual basis.

4.6.1.3 CV-SALTS Nitrate Control Program Private Wells

The Yolo Subbasin is classified as a Priority II Subbasin for the CV-SALTS Nitrate Control Program with Notice to Comply letters from CVRWQCB expected to be sent out January 2022. A residential sampling program is a requirement of the CV-SALTS Nitrate Control Program and is designed to assist in identifying residents affected by nitrate within a Management Zone. Private well owners may request to have their well tested for nitrate by the Management Zones. Upon implementation of the Nitrate Control Program in the Subbasin, the YSGA will coordinate with the Management Zones to obtain nitrate results and may include sampled wells as part of the groundwater quality monitoring network.

4.6.2 Monitoring Network Information

Figure 4-3 shows existing monitoring network sites for nitrate, arsenic, TDS, and boron in the Yolo Subbasin. These are not all of the wells that are monitored for water quality in the Subbasin, but a subset of Public Water System wells with publicly available data[61].

Table 4-3 shows the GAMA ID for these wells, their latitude/longitude, a local well description, and their status within the nitrate, arsenic, TDS, and boron monitoring networks.

[61] https://gamagroundwater.waterboards.ca.gov/gama/gamamap/public/

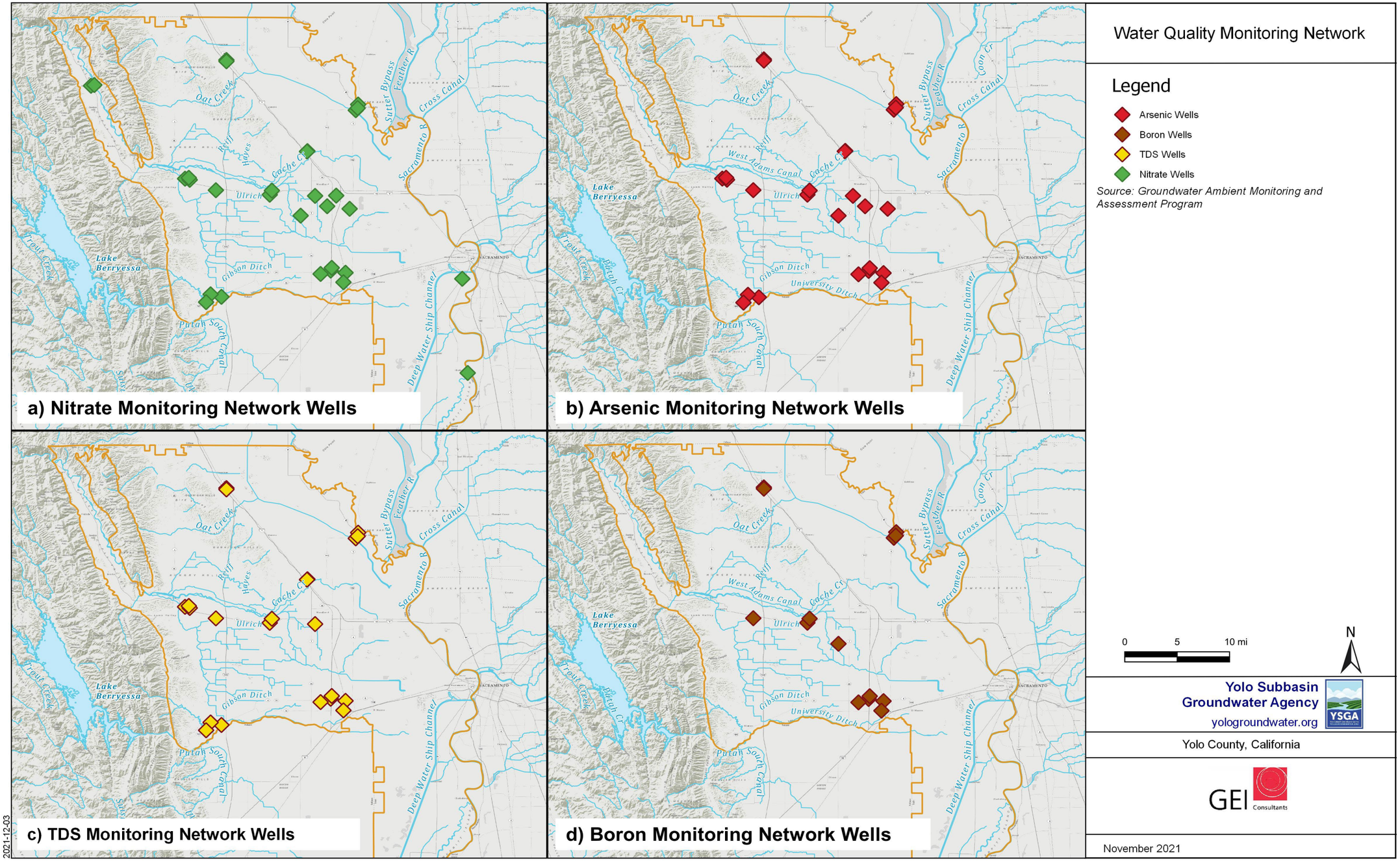

Figure 4-3. Monitoring Network for Nitrate, Arsenic, TDS, and Boron in the Yolo Subbasin.

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Table 4-3. Monitoring Network for Nitrate, Arsenic, TDS, and Boron in the Yolo Subbasin

GAMA WELL ID	Latitude	Longitude	Local Well Description	Monitoring Network Nitrate	Monitoring Network Arsenic	Monitoring Network TDS	Monitoring Network Boron
5710011-002	38.67242	-121.87596	Wildwings - Pintail Well	X	X	X	X
5710011-001	38.67829	-121.87212	Wildwings - Canvas Back Well	X	X	X	X
5710004-005	38.80071	-121.71942	Knights Landing Well 05 - Third Street Well	X	X	X	X
5710004-004	38.79259	-121.72364	Knights Landing Well 04 - Ridge Cut Well	X	X	X	X
5710004-003	38.79567	-121.72021	Knights Landing Well 03 - Railroad Street Well - RAW	X	X	X	X
5710001-052	38.56106	-121.7426	City of Davis - Well 33 (Lewis)	X	X	X	X
5710001-030	38.56411	-121.7687	City of Davis - Well 31	X	X	X	X
5710001-028	38.55936	-121.78653	City of Davis - Well 30	X	X	X	X
5710001-025	38.56809	-121.76683	City of Davis - Well 27	X	X	X	X
5710001-018	38.54746	-121.74632	City of Davis - Well 23	X	X	X	X
5700712-012	38.86453	-121.95231	Dunnigan Well 02	X	X	X	X
5700712-001	38.86263	-121.95225	Dunnigan Well 01	X	X	X	X
5700571-012	38.67891	-121.971	Madison Well 03	X	X	X	X
5710007-006	38.69533	-122.02543	Esparto Well 06	X	X	X	
5710007-001	38.69369	-122.01718	Esparto Well 01-A	X	X	X	
5710005-007	38.52695	-121.96128	City of Winters - Well 06	X	X	X	
5710005-006	38.53054	-121.98036	City of Winters - Well 05	X	X	X	
5710005-005	38.5194	-121.98829	City of Winters - Well 04	X	X	X	
5700643-001	38.64253	-121.82144	Plainfield Well 01	X	X		X
5710006-024	38.65213	-121.73501	Woodland - Well 24 (Town Center Well)	X	X		
5710006-015	38.65586	-121.77465	Woodland - Well 16 College Ave	X	X		
5710006-048	38.67096	-121.75867	Well 15S - RAW	X			
5710007-007	38.6966	-122.0188	Esparto Well 05 RAW	X	X	X	
5710006-056	38.67062	-121.79593	Woodland - Well 30 (ASR)	X	X	X	
5700700-002	38.73453	-121.80925	Yolo - Washington St Well	X	X	X	
5700700-001	38.73386	-121.81003	Yolo - Sacramento St Well	X	X	X	
5700552-001	38.41747	-121.52819	Clarksburg Well	X			
5700728-001	38.82758	-122.19181	Guinda Well 01	X			
5700713-003	38.82869	-122.18598	Guinda Well 02	X			
5700575-001	38.55178	-121.53689	West Sac - Jefferson BLVD	X			

Notes: ARS = Aquifer Storage and Recovery

Figure 4-3 and **Table 4-3** include wells that have been actively monitored by other programs or entities, primarily DDW. The selected wells shown are not necessarily the same wells that will be monitored moving forward, depending on the requirements of the existing programs. The YSGA will review the wells that have been monitored for water quality within the Yolo Subbasin on an annual basis and will provide an update on water quality in the annual reports.

Additional sources of data for domestic wells have been identified. The ILRP will begin testing domestic wells for water quality in 2022. The County currently requires a water quality test when a new domestic well is drilled. These one-time measurements, when aggregated, can provide useful information about trends in water quality data.

4.6.3 Rationale

To prevent duplicating monitoring efforts in the Subbasin, the YSGA has elected to utilize existing monitoring programs under DDW, ILRP, and future monitoring efforts under CV-SALTS. By utilizing existing programs, monitoring is more effective and spatially available across the Subbasin, allowing for more water quality monitoring coverage.

4.6.4 Monitoring Frequency

Evaluation of water quality results will be conducted annually by YSGA and published in the annual reports. Results will be obtained from public databases including SDWIS, GAMA, and GeoTracker. Data not publicly available will be obtained by the YSGA through coordination with monitoring entities. Monitoring is expected to expand once the Nitrate Control Program under CV-SALTS begins implementation.

4.6.5 Data Gaps

The YSGA will review water quality results for each system annually and will consider expanding the monitoring network if additional coverage is needed. Currently, water quality monitoring for domestic wells is considered a data gap in the monitoring network.

4.7 Land Subsidence Monitoring Network

4.7.1 Representative Monitoring Network

Land subsidence has been measured in the Yolo Subbasin since the late 1960s and has been subject to various technologies. This includes:

- Terrestrial (optical, laser) surveys
- Surveys of numerous stations *via* GPS on behalf of the WRA, in 1999, 2002, 2005, 2008, and 2016 (http://www.yolowra.org/projects_subsidence.html)
- Three continuous GPS stations
- Two extensometers

- DWR InSAR mapping

Of these, continuous GPS stations, extensometers and InSAR mapping are planned to be continued. As a result, YSGA intends to utilize these stations as the subsidence representative monitoring network for Yolo Subbasin.

4.7.1.1 Continuous GPS Stations

Three continuous GPS stations are located in the Yolo Subbasin as shown in **Figure 4-4** and provide "real-time" data on subsidence in the Subbasin. Two stations, P265 and P271 are part of the broad GPS network within California with data acquired daily since 2004 and 2005 respectively. Third station UCD1 is part of the Bay Area Regional Deformation Network and provides daily values since 1996.

Figure 4-4 shows the locations of these three continuous GPS stations. Station P265 is located near the southwestern corner of the Subbasin, east of Winters, on the western flank of the Sacramento Valley and the second station (P271) is located on the southeast side of Woodland, near the axis of the Sacramento Valley. This data is readily available from the UNAVCO website. Station UCD1 is located at UC Davis, along the southern boundary of the Subbasin, midway toward the center of the Sacramento Valley.

4.7.1.2 Extensometers

In general, an extensometer pipe (2-inches in diameter) is anchored in a cement grout base at a particular depth below a protective casing relative to a reference table over the pipe at the ground surface. Changes in the distance between the extensometer base and reference table occur due to compaction of soils between the base and reference table. Two extensometers were installed in the Subbasin during 1992 in association with the installation of two nested monitor wells. The first installation is located east of Woodland and included an extensometer (CON Ext, 09N03E08C004M) to a depth of 716 feet and a 3-completion monitor well. The second installation is located east of Zamora and included an extensometer (ZAM Ext, 11N01E24Q008M) to a depth of 1,000 feet and a 4-completion nested monitor well. **Figure 4-4** also shows the locations of these two extensometers.

4.7.1.3 DWR InSAR Subsidence Mapping

DWR monitors subsidence for medium- and high-priority basins across California using InSAR data obtained from ESA Sentinel-1A satellite and processed by TRE ALTAMIRA Inc. This InSAR data was calibrated with continuous GPS data from 232 stations and then checked against 160 continuous GPS stations not associated with the calibration as well as 21 calibration stations in northern California. At present, the DWR website includes an interactive mapping application that covers the Subbasin and depicts land subsidence as:

- Cumulative totals for various time periods beginning with June 2015 and extending monthly through September 2019

- Annual rates of subsidence beginning with July 2015-16 and proceeding monthly through September 2018-2019

4.7.2 Rationale

Continuous GPS stations that are currently part of the broad GPS network within California and the Bay Area Regional Deformation Network; two extensometers currently monitored and maintained by DWR. InSAR subsidence mapping data is planned to continue monitoring in the future. YSGA will utilize these stations to monitor subsidence in the Subbasin.

4.7.3 Monitoring Frequency

Data from continuous GPS stations, extensometers and DWR InSAR subsidence mapping will be downloaded in the spring and fall of each year coinciding with the semi-annual groundwater level data collection period and responsive to SGMA reporting requirements. This data will be plotted annually with the groundwater levels to assess changes in subsidence relative to established minimum thresholds and measurable objectives.

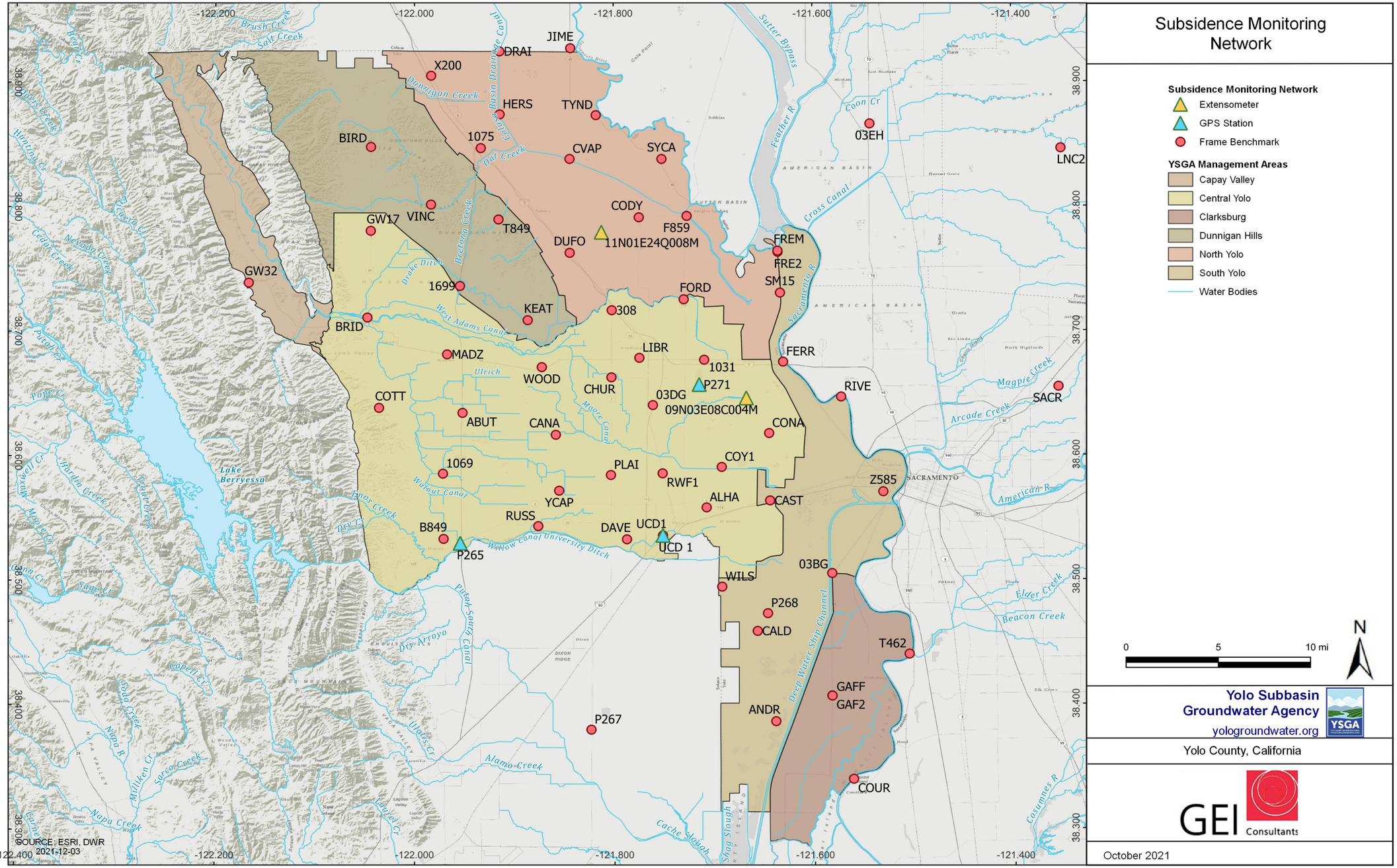

Figure 4-4. Yolo Subbasin Subsidence Representative Monitoring.

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4.7.4 Data Gaps

The exact causes of all subsidence in the Subbasin are not clearly understood. While certainly a portion of subsidence can be attributed to dewatering of compactable soils during dry years, there have also been reports of tectonic related subsidence in the region. In fact, a portion of the basin is experiencing modest uplifting, which would be an effect of tectonic activities. To better understand the effects of groundwater pumping on subsidence additional extensometers will be needed to determine the extent of subsidence that occurs within the groundwater pumping zone. This is especially important in areas where more aggressive groundwater pumping is expected to occur in the future.

4.8 Depletion of Interconnected Surface Water

4.8.1 Representative Monitoring Network

The subbasin has 17 near-stream, shallow wells that have been designated as the representative monitoring wells for depletion of interconnected surface waters. The selected representative monitoring network is a subset of all wells currently monitored in the Subbasin. The representative monitoring wells have been selected because they have a period of record that supports analysis required to develop measurable objectives and minimum thresholds for this sustainability indicator, and whose locations are representative of surrounding groundwater levels. The representative monitoring wells will identify groundwater level responses, during the implementation period (2022-2042), to monitor the Subbasin's performance to this sustainability indicator. **Table 4-5** and **Figure 4-4** identify the monitoring wells by each interconnected surface water management zone. As shown in **Figure 4-5**, these 17 wells have been spatially distributed to provide adequate coverage of major interconnected surface water bodies. The representative monitoring network for depletion of interconnected surface waters is divided into five groups, corresponding to the Interconnected Surface Waters Management Zones described in the Undesirable Results section.

4.8.2 Rationale

As described in **Section 2.2.6 – Interconnected Surface Water Systems**, groundwater levels at near-stream, shallow monitoring wells will be used as a proxy for the depletion of interconnected surface waters. *Addressing Regional Surface Water Depletions in California* (EDF 2018)[62], describes the rationale behind this approach, and provides recommendations for selecting representative wells. Based on Darcy's Law, "…the exchange of water between an aquifer and hydraulically connected surface waters is determined by the gradient across the boundary between the stream and the aquifer" (EDF 2018). Managing and monitoring this gradient allows for the management of the depletion of interconnected surface waters caused by groundwater extraction. Under this approach, the ideal monitoring location is at an intermediate distance from the stream, outside the direct influence of river stage and between the stream and the area of extensive groundwater development.

[62] https://www.edf.org/sites/default/files/documents/edf_california_sgma_surface_water.pdf

Wells were selected with the above approach in mind, according to the following criteria:

- A period of record that supports analysis required to develop measurable objectives and minimum thresholds for this sustainability indicator.
- Screened within, or close to, the shallow aquifer as defined in the hydrogeologic conceptual model. Wells shallower than 220 feet were preferred, with the deepest selected well drilled to a depth of 350 feet. Water levels at wells within the top portion of the intermediate zone are still considered to affect surface water bodies because both the shallow and intermediate zones are largely alluvial and there is no evidence showing a confining layer between the two zones.
- At locations representative of the hydraulic gradient between interconnected surface water bodies and the center of pumping, as described by EDF (2018).
- Wells with a historical variation in water levels of greater than 10 feet, and ideally a range of 50 feet or more. This ensures that the water levels at the RMW are not dominated by the influence of river stage.

Only a small subset of active monitoring wells in the Subbasin were selected as RMWs for monitoring depletion of interconnected surface waters. The many active monitoring wells not selected will continue to be monitored to ensure a robust collection of data and thorough analysis of groundwater conditions in the Subbasin.

Streamflow monitoring within interconnected surface water bodies will continue. Streamflow gages are maintained and monitored by several agencies, summarized in **Table 4-4**. While sustainable management criteria are not directly linked to this data, the YSGA will compile this data on an annual basis. Any observed changes in streamflow will be compared to known changes in surface water management and observed changes in groundwater levels. If consistent correlation between streamflow and groundwater levels is observed, these streamflow sites may be incorporated as representative sites or used to revise existing sustainable management criteria. Proximity to stream gages will be prioritized when siting additional shallow monitoring wells.

Table 4-4 Selected Stream Gages in the Yolo Subbasin.

Cache Creek			
Name	*Operator*	*Site Code**	*Type*
Cache Creek at Yolo	USGS	CCY	Stage and Flow
Cache Creek at Rumsey Bridge	USGS/DWR	RUM	Stage and Flow
Putah Creek			
Name	*Operator*	*Site Code**	*Type*
Headworks	SCWA		Flow
I-505	SCWA		Stage and Flow
I-80	SCWA		Flow
Pedrick Rd.	SCWA		Stage and Flow
Stevenson Bridge	SCWA		Stage and Flow
Mace Blvd	SCWA		Stage and Flow
University Spill	SCWA		Stage and Flow
Putah C Nr Winters	USGS	11454000	Stage and Flow
Putah South Cn Nr Winters	USGS	11454210	Stage and Flow
Putah Creek	DWR NCRO	PTC	Stage and Flow
Putah Creek	SCWA	PTF	Flow
Sacramento River			
Name	*Operator*	*Site Code**	*Type*
Sacramento R A Sherwood Harbor Nr W Sacramento	USGS	383155121314101	Stage and Flow
Delta Rmp Sacr-015	USGS	383205121310901	Stage and Flow
Sacramento R A Freeport	USGS	11447650	Stage and Flow
Sacramento R A Sherwood Harbor Nr W Sacramento	USGS	383155121314101	Stage and Flow
Byron Jackson Pumps	Sutter County	BJP	Stage and Flow
Sacramento River at I Street Bridge	DWR NCRO	IST	Stage and Flow
Sacramento River at Freeport	USGS	FPT	Stage and Flow
Sacramento R at Fremont Weir (Crest 32.0')	DWR NCRO	FRE	Stage and Flow
Sacramento River at Verona	USGS/DWR	VON	Stage and Flow
Sacramento River at Freeport Aux	USGS	FPX	Stage and Flow
Deep Water Ship Channel			
Name	*Operator*	*Site Code**	*Type*
Sacramento R Deep Water Ship Channel Nr Clarksburg	USGS	11455136	Stage and Flow
Sacramento R Deep Water Ship Channel Nr Freeport	USGS	11455095	Stage and Flow

Notes: * 3-letter site codes correspond to data on CDEC (cdec.water.ca.gov); numerical site codes correspond to data on USGS's NWIS (waterdata.usgs.gov/nwis)

Table 4-5. Yolo Subbasin Depletion of Interconnected Surface Waters Monitoring Wells.

Interconnected Surface Water Management Zone	YSGA Representative Well Number	State Well Number
Upper Cache Creek	287	11N03W23L001M
	289	11N03W33F001M
	293	12N03W20D001M
Lower Cache Creek	265	10N01W21J001M
	424	10N01W23P001M
	420	10N02E03R002M
	425	10N01E22H500M
	275	10N02W14A001M
Upper Sacramento River	420	10N02E03R002M
	427	12N01E03R003M
	421	11N02E20K004M
Lower Sacramento River	401	10N02E36E001M
	151	09N03E33B002M
	428	08N04E19N001M
Putah Creek	170	08N02E18M002M
	429	08N01E17F001M
	229	08N01W20R005M

As appropriate, representative monitoring sites may be modified in the future to reflect:

- Improved understanding of the groundwater conditions and/or the connection between surface water and groundwater
- Changes in land use conditions that warrant an increase or decrease in the spatial distribution of monitoring wells
- Changed conditions at the monitoring site (including well access)
- Establishment of nearby and equally-representative dedicated monitoring wells

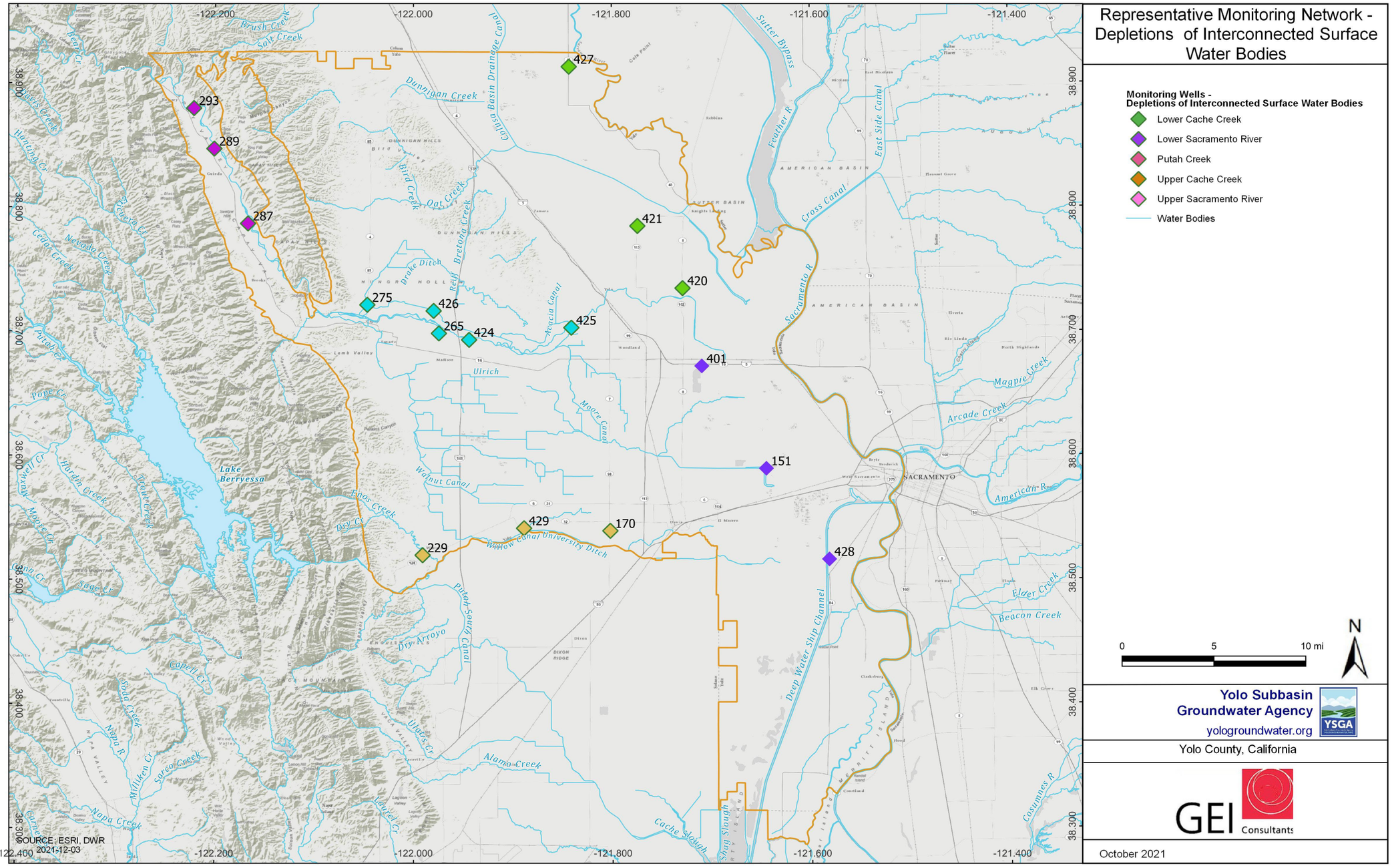

Figure 4-5. Yolo Subbasin Interconnected Surface Water Representative Monitoring Wells.

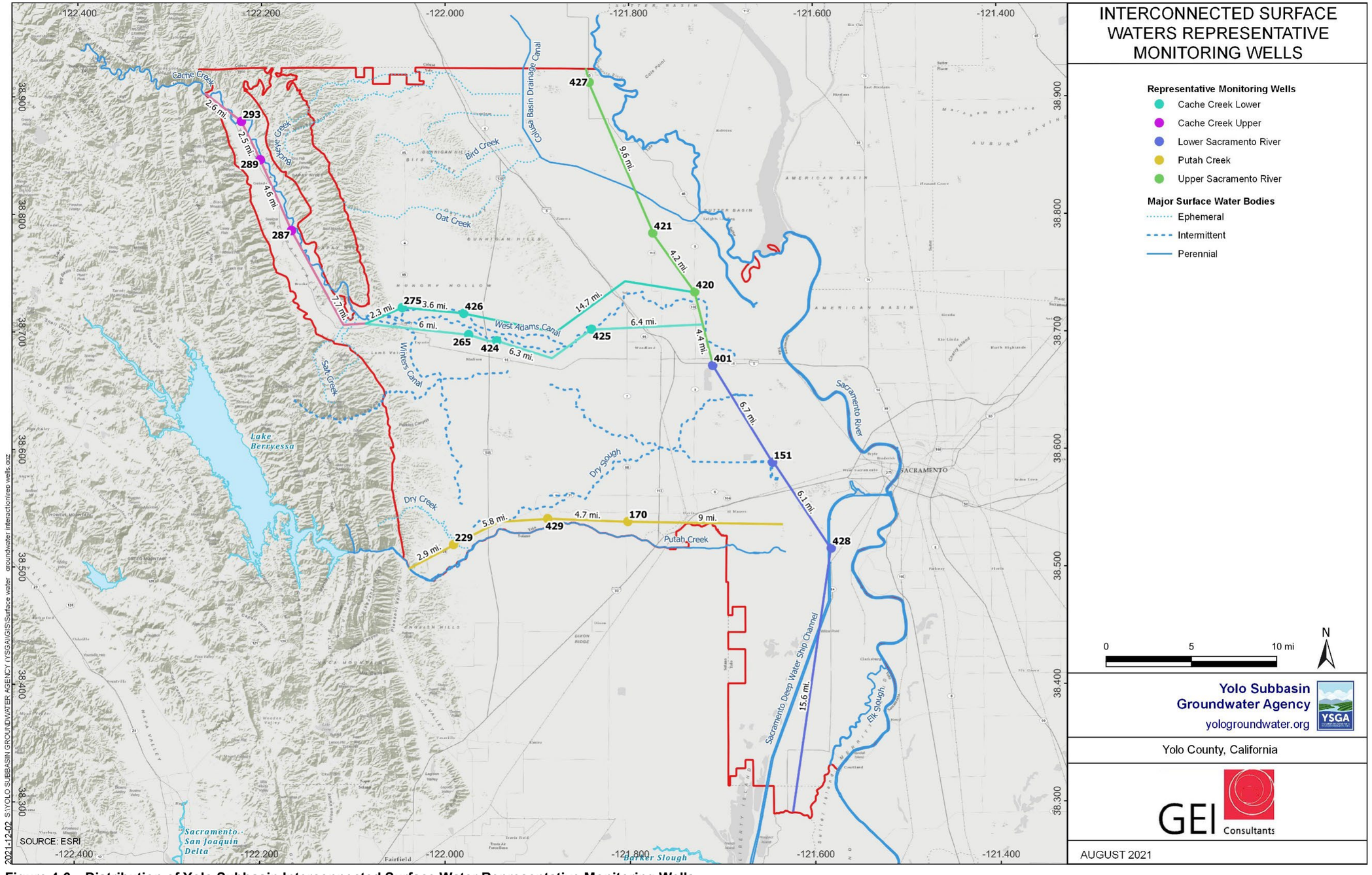

Figure 4-6. Distribution of Yolo Subbasin Interconnected Surface Water Representative Monitoring Wells.

4.8.3 Monitoring Frequency

The monitoring of groundwater levels for the depletion of interconnected surface waters will follow the same protocols and monitoring frequency outlined in **Section 4.4.3 – Monitoring Frequency**. Semi-annual measurements in spring and fall are intended to capture the full seasonal variation of groundwater levels, and therefore capture seasonal variation in surface water depletion. This frequency of monitoring is sufficient to demonstrate seasonal, short-term (1-5 years), and long-term (5-10 years) trends in groundwater levels, and by proxy, depletion of interconnected surface waters and yield representative information about groundwater conditions as necessary to evaluate plan implementation.

4.8.4 Spatial Density

Representative monitoring wells were selected to produce a good spatial distribution along major interconnected surface water bodies, ideally one well for every 4 to 6 miles along the stream (*see*: *Addressing Regional Surface Water Depletions in California*, EDF 2018). The representative monitoring network is designed around this methodology.

4.8.5 Data Gaps

The ephemeral streams in the Dunnigan Hills area, namely Oat Creek, Bird Creek, Dunnigan Creek, Buckeye Creek, and Little Buckeye Creek, are not well described. There is high uncertainty about when the streams are flowing, the groundwater levels and aquifer properties in the area, and how the streams may or may not be connected to groundwater. The YSGA will seek to add additional monitoring wells in the area and increase understanding of aquifer properties, surface water flow regimes, and potential groundwater-surface water interaction.

Due to a lack of significant groundwater development in the southern region of the Subbasin, coincident with the Clarksburg MA, the area is considered a monitoring area for depletion of interconnected surface waters. In the event that land use changes occur or groundwater production increases in a manner that will affect local groundwater conditions, new monitoring wells will be sited in this MA.

4.9 Monitoring Protocols and Reporting Standards

The YSGA has established monitoring protocols for collection of groundwater levels for the chronic lowering of groundwater, reduction in groundwater storage, and depletion of interconnected surface water. Separate protocols have been established for subsidence monitoring. Protocols for water quality samples will follow the protocols that have been established for the monitoring program that monitoring will occur, such as the State Water Board's DDW, Drinking Water Program; Yolo County's Environmental Health Division, Drinking Water Program; IRLP; and CV-SALTS.

4.9.1 Groundwater Level Monitoring Network Protocol and Standards

The monitoring network in the YSGA includes production wells, abandoned or unused production wells, and dedicated monitoring wells. Until enough dedicated monitoring wells are installed to fill data gaps, production wells will be used to provide the desired spatial coverage within the Subbasin.

As referenced in § 352.4 of the GSP emergency regulations, monitoring sites/wells will conform to a Best Management Practice (BMP) for geographic locations, identification, and details on well construction. **Table 4-6** provides the requested standards.

Table 4-6. DWR Standards for Required Monitoring Well Information.

	§ 352.4 Standards for Required Monitoring Well Information
Well Identification	Use the CASGEM well identification number. If a CASGEM well identification number has not been issued, appropriate well information shall be entered on forms made available by the DWR.
Well / Site Location	Geographic locations shall be reported in GPS coordinates by latitude and longitude in decimal degree to five decimal places, to a minimum accuracy of 30 feet, relative to NAD83, or another national standard that is convertible to NAD83. Reference point elevations shall be measured and reported in feet to an accuracy of at least 0.5 feet, or the best available information, relative to NAVD88, or another national standard that is convertible to NAVD88, and the method of measurement described.
Well Type and Construction Details	A description of the well use/type, whether the well is active or inactive, and whether the well is a single, clustered, nested, or other type of well. Casing perforations, borehole depth, and total well depth shall be reported. WCRs will be provided, if available, from which the names of private owners have been redacted. Geophysical logs, well construction diagrams, or other relevant information will be provided, if available, including any other relevant well construction information, such as well capacity, casing diameter, or casing modifications.
Monitoring Zone	Identification of principal aquifer or aquifer zones monitored.

4.9.1.1 Monitoring Protocols

As referenced in §352.4 of the Emergency Regulations, "…monitoring protocols shall be developed according to BMPs. Monitoring protocols shall be reviewed at least every 5 years as part of the periodic evaluation of the Plan and modified as necessary."

As discussed in DWR's *Monitoring Protocols, Standards, and Sites BMP* (Monitoring Protocols BMP)[63]:

[63] https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Sustainable-Groundwater-Management/Best-Management-Practices-and-Guidance-Documents/Files/BMP-1-Monitoring-Protocols-Standards-and-Sites_ay_19.pdf

- All groundwater levels in a basin will be collected within as short a time as possible, preferably within a 1- to 2o-week period.
- Depth to groundwater will be measured relative to an established Reference Point (RP) on the well casing. The RP is usually identified with a permanent marker, paint spot, or a notch in the lip of the well casing. By convention in open casing monitoring wells, the RP reference point is located on the north side of the well casing. If no mark is apparent, the person performing the measurement will measure the depth to groundwater from the north side of the top of the well casing.
- The sampler will remove the appropriate cap, lid, or plug that covers the monitoring access point listening for pressure release. If a release is observed, the measurement will follow a period of time to allow the water level to equilibrate.
- Field measurements of depth to groundwater and land surface will be measured and reported in feet to an accuracy of at least 0.1 feet relative to NAVD88, or another national standard that is convertible to NAVD88, and the method of measurement described (i.e., electric sounder, steel tape, plopper, transducer, acoustic sounder, or airline).
- The water level meter will be decontaminated after measuring each well.
- To assure that the same well is being measured each time, the YSGA will apply an outdoor-rated label to the well, including the SWN and contact information for the YSGA.
- The sampler will replace any well caps or plugs and lock any well buildings or covers.
- All data will be entered into the YSGA DMS (the WRID) as soon as possible. Care will be taken to avoid data entry mistakes and the entries will be checked by a second person for compliance with the data quality objectives.

4.9.1.2 Pressure Transducers

As per DWR's Monitoring Protocols BMP, groundwater levels and/or calculated groundwater elevations may be recorded using pressure transducers equipped with data loggers (or real-time telemetry) installed in monitoring wells. When installing pressure transducers, care will be exercised to ensure that the data recorded by the transducers is confirmed with hand measurements.

The following general protocols will be followed when installing a pressure transducer in a monitoring well:

- The sampler will use an electronic sounder or chalked steel tape and follow the protocols listed above to measure the groundwater level and calculate the groundwater elevation in the monitoring well to properly program and reference the installation.
- The sampler will note the well identifier, the associated transducer serial number, transducer range, transducer accuracy, and cable serial number.

- Transducers will be able to record groundwater levels with an accuracy of at least 0.1 foot. Consideration of the battery life, data storage capacity, range of groundwater level fluctuations, and natural pressure drift of the transducers will be included in the evaluation.
- The sampler will note whether the pressure transducer uses a vented or non- vented cable for barometric compensation. Vented cables are preferred, but non- vented units provide accurate data if properly corrected for natural barometric pressure changes. This requires the consistent logging of barometric pressures to coincide with measurement intervals.
- Follow manufacturer specifications for installation, calibration, data logging intervals, battery life, correction procedure (if non-vented cables used), and anticipated life expectancy to assure that data quality objectives are being met for the GSP.
- Secure the cable to the well head with a well dock or another reliable method. Mark the cable at the elevation of the reference point with tape or an indelible marker. This will allow estimates of future cable slippage.

The transducer data will periodically be checked against hand-measured groundwater levels to monitor electronic drift or cable movement. This will happen during routine site visits, at least annually or as necessary to maintain data integrity. The verification measurement will be recorded in the telemetry system and an offset will be applied, if needed.

The data will be downloaded as necessary to ensure no data is lost and entered into the YSGA's DMS following the Quality Assurance/Quality Control process described above. Data collected with non-vented data logger cables will be corrected for atmospheric barometric pressure changes, as appropriate. After the sampler is confident that the transducer data have been safely downloaded and stored, the data will be deleted from the data logger to ensure that adequate data logger memory remains. This step is not necessary for real-time telemetry connected transducers.

As mentioned above, for specific details regarding the monitoring network for groundwater level and change in groundwater storage for each MA, *please refer to* the respective individual sections. The data gaps and steps for improvement of the respective monitoring networks have also been identified in those sections.

4.9.2 Water Quality Monitoring Network Protocol and Standards

Water quality monitoring will be reliant on existing water quality monitoring programs for drinking water and irrigated lands. The existing programs in the Subbasin, include:

- State Water Board DDW, Drinking Water Program
- Yolo County Environmental Health Division, Drinking Water Program
- Irrigated Lands Regulatory Program
- CV-SALTS
- Other monitoring programs that may be implemented in the future

Data collection and analysis will continue to be the responsibility of the entities listed above. The YSGA will collect and review data from these entities to ensure that groundwater quality is not being affected by changes in groundwater management activities. The YSGA's annual review of water quality monitoring data and interpretation of linkages to groundwater management activities will be included as a component of it's the Annual Report to DWR and available for review by stakeholders.

To the extent possible the YSGA will coordinate with these existing water quality monitoring programs to include protocols and standards required in the GSP emergency regulations § 352.4 and the USGS *National Field Manual for the Collection of Water Quality Data* and DWR's *Groundwater Monitoring Protocols, Standards, and Sites BMP* (2016).

Groundwater quality sampling protocols will ensure that:

- Groundwater quality data are taken from the correct location
- Groundwater quality data are accurate and reproducible
- Groundwater quality data represent conditions that inform appropriate basin management and are consistent with the data quality objectives
- All important information is recorded to normalize, if necessary, and compare data
- Data are handled in a way that ensures data integrity

4.9.3 Land Subsidence Monitoring Network Protocols

Per DWR's Monitoring Protocols BMP, various standards and guidance documents for collecting data include:

- Leveling surveys will follow surveying standards set out in the California Department of Transportation, *Caltrans Surveys Manual (2018)*.
- GPS surveys will follow surveying standards set out in the California Department of Transportation, *Caltrans Surveys Manual (2018)*.
- USGS has been performing subsidence surveys within several areas of California. These studies are sound examples for appropriate methods and will be utilized to the extent possible and where available: http://ca.water.usgs.gov/land_subsidence/california-subsidence- measuring.html
- Instruments installed in borehole extensometers will follow the manufacturer's instructions for installation, care, and calibration.
- Availability of InSAR data is improving and will increase as programs are developed. This method requires expertise in analysis of the raw data and will likely be made available as an interpretative report for specific regions.

4.10 Data Reporting

All collected groundwater data for Representative Monitoring Wells will either be reported to DWR's SGMA Portal or stored in the DMS developed for the Subbasin (WRID), or both. All elevation data will be in coordinate datum NAVD88. All measurement locations are geographically referenced.

The data will be analyzed and reported in annual reports and shared with stakeholders. The data will be used to provide annual updates and to support revisions to the groundwater model. Groundwater level data can be viewed real-time by stakeholders at https://sgma.yologroundwater.org/.

4.11 Monitoring Network Improvement Plan

4.11.1 Data Gaps

The following areas are the primary data gaps that have been identified in the development of the Yolo Subbasin GSP: 1) groundwater levels and storage, 2) subsidence, 3) interconnected surface waters, and 4) groundwater dependent ecosystems.

Data gaps exist for the groundwater levels in the Dunnigan Hills, South Yolo, and Clarksburg MAs, and west of the city of Winters.

Data gaps exist related to interconnected surface waters. These data gaps exist mainly on smaller tributaries and unlined canals, or in the areas that have limited groundwater levels data described above.

Additionally, it is recognized that managed wetlands are an important part of groundwater sustainability in the Yolo Subbasin. Accurate characterization of managed wetlands is currently identified as a data gap. According to the DWR's 2016 Statewide Crop Mapping, there are approximately 31,000 acres of managed wetlands within the Subbasin[64]. This includes areas such as the Yolo Bypass Wildlife Area, the Davis Demonstration Wetlands, Cache Creek Conservancy, and waterfowl habitat in the North Yolo MA.

GDEs are described in the **Section 2 – Basin Setting**. Verification, classification, and ground truthing of these GDEs is considered a data gap and will be improved with the best available data.

Determining the cause of any existing subsidence and extent of subsidence caused by groundwater is also identified as a data gap. A plan to address each of these data gaps has been developed and is detailed in the following section

4.11.2 Plan to Address Data Gaps

Improving the monitoring network will be an important area of focus within the Yolo Subbasin. The primary focus of monitoring network improvements will be on data gaps identified throughout

[64] https://data.cnra.ca.gov/dataset/crop-mapping-2016

this GSP. Specific projects that are dedicated to improving the monitoring network have been identified and are described in **Section 5 – Proposed Actions, Description, and Timeline to Address Data Gaps**. In general, the focus of monitoring network improvements will be on:

- groundwater monitoring program improvements
- subsidence monitoring improvements
- surface water monitoring program improvements
- additional monitoring efforts near interconnected surface waters and GDEs
- Data gaps related to the hydrogeologic conceptual model

When identifying new representative monitoring wells in data gap areas, proximity to disadvantaged communities, domestic wells, Tribes, and GDEs will be prioritized.

4.11.2.1 Groundwater Levels Monitoring Network

Groundwater monitoring improvements are planned in areas identified as data gaps, areas of increasing development, and areas with low monitoring well density. This includes the Dunnigan Hills MA (data gap), the area surrounding the city of Winters (increasing development), and the South Yolo and Clarksburg MAs (low monitoring density).

To improve groundwater levels data in the Dunnigan Hills MA, several opportunities have been identified. Obtaining and digitizing existing monitoring data from wells in the Dunnigan Water District network would be beneficial. These wells are located along the northwest edge of the North Yolo MA and have long periods of record but aren't currently available digitally. This will also provide additional groundwater level data along Buckeye, Dunnigan, and Bird creeks.

Additional wells have been identified in Dunnigan Hills MA for the YSGA to consider incorporating into the monitoring network. Several existing wells have been identified with the landowners expressing interest in joining the monitoring program. Two wells north of Hungry Hollow, two wells west of Hungry Hollow, and several wells along Oat Creek have been identified that could be incorporated into the monitoring program. These wells do not have long periods of record but are beneficial for understanding current conditions and providing a baseline in case of future change. To incorporate these wells into the monitoring program, construction information may need to be obtained. The construction of dedicated monitoring wells may be considered in the Dunnigan Hills MA, depending on the well density that can be achieved with existing wells. Wells exist at the northern border of the Dunnigan Hills MA, at the southern border of the Colusa Subbasin; however, individual monitoring wells have not yet been identified in this area and will be considered moving forward. These additional wells at the Colusa boundary in the Dunnigan Hills would improve the understanding of boundary conditions and the classification of Buckeye Creek.

The Dunnigan Hills MA largely lacks baseline historical groundwater level measurements, making it difficult to evaluate current conditions. The YSGA will analyze historic water level measurements

provided in the DWR's digitized WCR database[65]. The County of Yolo maintains a similar database of completed well permits and has recently added a field for static water level. Ongoing coordination with the County, and use of the WCR dataset, will allow the YSGA to gather one-time information about water levels in data gap areas and areas of rapid development.

In the area surrounding the city of Winters, existing monitoring wells have been identified. Wells with monitoring data exist northwest of the city of Winters at the wastewater treatment facility and at the landfill location northwest of Winters. An additional well west of Winters has been identified with data starting in 2000 and continuing to present. This well will be incorporated into the overall monitoring program, although designation as a SGMA Representative Monitoring Well still needs evaluation.

There are some wells in the Subbasin that have long-term depth to water measurements but are no longer monitored. Some of these wells could be monitored, but currently are not. Others are no longer able to be monitored due to obstructions, access issues, or a number of other reasons. The YSGA will attempt to identify wells with long-term data sets that can begin to be monitored again. Wells that can no longer be monitored and have long-term datasets will also be identified. For these wells that can no longer be monitored, the plan is to identify new monitoring wells that are near the old wells. Ideally, these newer wells will have similar well construction and will exhibit similar hydrology of the initial wells. Data will be recorded for these new wells, and a connection between the initial well and the new well will be evaluated. If the new well and the old well exhibit the same hydrology, the YSGA will consider establishing minimum thresholds and measurable objectives for these newer wells using a combination of the newly collected data and the data from the nearby historic well.

In the South Yolo MA and Clarksburg Monitoring Area, there are wells that have some historical measurements and can be seen on the SGMA data viewer. Some of these wells have long term data records, but recently stopped being monitored. These wells will be evaluated, and if possible, incorporated into the monitoring network. In order to incorporate these wells into the monitoring network, it will likely be necessary to communicate with the original monitoring entity to determine the reason that the well was dropped from their monitoring program.

In addition, the YSGA has recently installed a real-time sensor near the Cacheville Community Services District to provide additional water supply security for the Cacheville Community Services District since it is solely groundwater dependent. Improvements to the existing monitoring network will ensure the preservation of long data records and the ability to continue monitoring wells into the future. These improvements include (1) obtaining up-to-date contact information for all sites, (2) labeling of wells within the YSGA monitoring network to provide clear identification, and (3) establishing formal monitoring and/or access agreements with landowners and cooperating agencies to document access and data sharing procedures. These efforts are already underway and will continue into the future to maintain the robust, long-term monitoring of the Subbasin.

[65] https://data.cnra.ca.gov/dataset/well-completion-reports

4.11.2.2 Well Construction Information Improvements

Some wells that are currently in the monitoring network lack known casing perforations, borehole depths, or total well depths. This information can be important to understand and manage groundwater in the basin, especially in areas where the alluvium is shallow. Efforts will be made to obtain well construction information for wells which do not have known casing perforations, borehole depths, or total well depths. These efforts may include videologging and a deeper investigation of existing WCRs.

4.11.2.3 Subsidence Monitoring Network

As InSAR data is published, it will be evaluated by the YSGA. Additionally, when DWR repeats their benchmark surveys, the results will be evaluated by the YSGA. Continuous GPS stations or extensometers are being evaluated to allow near real-time monitoring of subsidence, specifically in the North Yolo MA.

The YSGA will monitor impacts as a result of subsidence by creating and implementing a publicly accessible method of reporting subsidence impacts. In addition, creating an inventory of areas that are most susceptible to subsidence is a proposed project that would improve the subsidence monitoring network.

Subsidence in the Capay Valley is considered a data gap. InSAR data exists in Capay Valley. To improve the understanding of subsidence in the Capay Valley, when future GPS-based surveys are planned, the Capay Valley will be included.

4.11.2.4 Surface Water, Interconnected Surface Water, and Groundwater Dependent Ecosystem Monitoring Network

Improvements to the characterization of surface water bodies in the Yolo Subbasin can be made by improving monitoring of groundwater levels and surface water flows in areas with limited data. Additional streamflow gage(s) on Cache Creek may improve the quantification and timing of exchange with groundwater. In coordination with the Solano Subbasin, additional shallow, near-stream nested monitoring wells may be installed along Putah Creek. Characterization of surface water connection and GDE status of and near smaller creeks, sloughs, and canals may be improved with additional surface water monitoring and groundwater monitoring. Potential options to improve interconnected surface waters and classification of GDEs include seepage measurements, nested piezometers, and incorporation and analysis of existing streamflow gages.

GDEs in the Yolo Subbasin may be refined and characterized through a verification process that would include coordination with local entities, surveys, and additional field work. A process for monitoring wetland, aquatic, and vegetative GDE presence and health on an annual and inter-annual

basis is being considered. This process would include utilization of TNC's GDE Pulse[66] and Point Blue's Water Tracker[67].

The YSGA water budget currently contains a data gap surrounding the consideration of managed wetlands. To ensure accurate representation of managed wetlands moving forward, additional analysis and coordination will occur. Wetland extent in a given year can be calculated using Point Blue's Water Tracker and a modified methodology from Ducks Unlimited's Seasonal and Permanent Wetlands dataset (Petrik et.al. 2013). Audubon is developing a statewide managed wetlands dataset, which will be incorporated to improve the water budget's estimate of managed wetland acreage. The YSGA will coordinate with the managers of these wetlands to improve the modeled historical and projected water demand of managed wetlands.

Improving the understanding of groundwater surface water interaction along Cache Creek can be accomplished by utilizing stream flow gauges and nearby wells. Nearby monitoring wells exist, and data is regularly collected for the aggregate mining companies that exist along Cache Creek. The long-term records were obtained by the YSGA, state well numbers were assigned, and the data was entered into the WRID. There may be existing biological data that can be coupled with this water level data to improve the understanding and evaluate Minimum Thresholds and Measurable Objectives based on GDE and Interconnected Surface Water conditions observed historically. Additionally, communication with the Cache Creek TAC and utilization of the data collected and displayed on the Cache Creek Management Data website[68] would be beneficial for groundwater dependent ecosystems.

YCFC&WCD is working with the Solano County Water Agency, utilizing TSS funds from DWR, to install shallow monitoring wells on the north and south sides of Putah Creek. The shallow monitoring wells on the Solano side of Putah Creek should be drilled by the end of 2023.

4.11.2.5 Hydrogeologic Conceptual Model Data Gaps

Data gaps exist relating to aquifer characteristics and the bfw in the Yolo Subbasin. Reviewing upcoming and recent studies may yield beneficial information about the bfw. Airborne electromagnetic (AEM) surveys will also be utilized to improve the aquifer characteristics in the Yolo Subbasin.

4.11.2.6 Water Quality Data Gaps

Monitoring of domestic wells for water quality are currently considered a data gap. The ILRP program will be beneficial in addressing this data gap. Additionally, analysis of one-time water quality measurements on domestic wells is required by the County. This data may be useful for identifying trends in groundwater quality in the Yolo Subbasin. Additionally, the YSGA will work with the County to encourage implementation of a one-time required TDS test on all new wells.

[66] https://gde.codefornature.org/
[67] https://data.pointblue.org/apps/autowater/
[68] https://flowwest.shinyapps.io/cache-creek

4.11.3 Proposed Actions, Description, and Timeline to Address Data Gaps

Table 4-7 shows the potential actions that can be taken to address the known data gaps in the Yolo Subbasin.

Table 4-7. Proposed Actions and Timeline to Address Data Gaps.

Action Number	Data Gap Focus	Description	Affected Area	Timeline
1	Groundwater Monitoring	Obtain and digitize existing monitoring data from DWD	Dunnigan Hills	Within 5 years
2	Groundwater Monitoring	Incorporate existing wells into monitoring program	Dunnigan Hills, Hungry Hollow, Winters	Ongoing; completed within 5 years
3	Groundwater Monitoring	Outreach to expand voluntary monitoring program in data gap areas	All	Ongoing
4	Groundwater Monitoring	Utilize existing well completion databases to establish baseline groundwater levels	All	Within 5 years
5	Groundwater Monitoring	Continue monitoring of long-term monitoring wells with recent end to monitoring	Subbasin-wide-especially in South Yolo/Clarksburg	Ongoing, completed within 5 years
6	Groundwater Monitoring	Installation of additional real-time monitoring units	Yolo/Zamora	Ongoing
7	Groundwater Monitoring	Improvements to site access and well information for existing monitoring network	All	Ongoing
8	Groundwater Monitoring	Construction of additional monitoring wells	Interconnected Surface Waters, GDEs, Dunnigan Hills, data gaps	Ongoing, starting within 5 years
9	Groundwater Monitoring	Concentrated effort to link existing WCRs to current monitoring network	Subbasin-wide	Within 5 years
10	Groundwater Monitoring	Videologging of existing monitoring wells lacking screen intervals	Subbasin-wide	TBD
11	Subsidence Monitoring	Installation of continuous GPS stations or extensomenters	TBD	TBD
12	Subsidence Monitoring	Design and implemement accessible reporting of subsidence impacts	Subbasin-wide	Within 5 years
13	Subsidence Monitoring	Inventory areas most susceptible to subsidence	Subbasin-wide	TBD
14	Subsidence Monitoring	GPS-based surveys in the Capay Valley	Subbasin-wide/Capay Valley	Within 5 years
15	Surface Water & GDE	Additional streamflow gage(s) along Cache Creek	Cache Creek	Within 10 years

Action Number	Data Gap Focus	Description	Affected Area	Timeline
16	Surface Water & GDE	Additional shallow, nested monitoring wells along Putah Creek	Putah Creek	Within 5 years
17	Surface Water & GDE	Improve characterization of surface water and GDE status near smaller creeks, sloughs, and canals	Basinwide	Ongoing
18	Surface Water & GDE	Potential options to improve interconnected surface waters and classification of GDEs include seepage measurements, nested piezometers, and incorporation and analysis of existing streamflow gages.	Interconnected Surface Waters & GDEs	Ongoing
19	Surface Water & GDE	Refine and verify GDE dataset through coordination with local entities, surveys, and field work	Subbasin-wide	Ongoing
20	Surface Water & GDE	Develop and implement process for monitoring wetland, aquatic, and vegetative GDE presence and health	Subbasin-wide	TBD
21	Surface Water & GDE	Correct modeling of managed wetland acreage and water demands	Subbasin-wide	Within 5 years
22	HCM	Review upcoming and recent studies on base of freshwater	Subbasin-wide, North Yolo Management Area	Within 5 years
23	HCM	AEM surveys	Data Gaps, Capay Valley, Hungry Hollow, Western Edge	Within 5 years

5.0 Projects and Management Actions

This section describes projects and management actions proposed by the YSGA and its member agencies to meet the sustainability goal for the Yolo Subbasin. The projects and management actions presented here represent the best available engineering and analysis completed to-date. This list will be updated throughout the planning and implementation period (2022 to 2042) to reflect additional analyses and new and emerging opportunities.

As described in the Subbasin water budget in **Section 2.3 – Water Budget Information**, the Subbasin has an estimated Sustainable Yield of 346 TAF annually. Groundwater pumping under Subbasin future scenarios to support urban and agricultural demands and to maintain surface water – groundwater interactions at their current level are as follows:

- Future baseline 320 TAF
- Future 2030 337 TAF
- Future 2070 358 TAF
- Future 2070 DEW 400 TAF
- Future 2070 WMW 325 TAF

Based on the water budget information, the Subbasin will exceed its sustainable yield only in the Future 2070 and Future 2070 DEW scenarios. In all other scenarios the Subbasin will maintain a relative groundwater balance. However, the YSGA and its member agencies have identified a list of projects and management actions for implementation that will ensure that the Subbasin's groundwater resources and its beneficial users will not suffer undesirable results.

Throughout the remainder of this GSP, projects and management actions are referred to collectively as "management actions."

5.1 Management Actions Processes

The following sections describe the processes required for management actions to be implemented, the sustainability indicator addressed and overview of the expected benefits. A summary list of all management actions being considered by the YSGA are provided in **Table 5-1** and the detail related to the following management action information is presented in **Appendix J – Table of Projects and Management Actions**.

5.1.1 Goals and Objectives

Per Section 354.44 of DWR's GSP emergency regulations, GSPs are to include management actions to address any existing or potential undesirable results for the identified relevant sustainability

indicators. The YSGA and its member agencies plan to implement management actions to protect against violating the minimum thresholds of the following sustainability indicators: (1) chronic lowering of groundwater levels, (2) reduction of groundwater storage, (3) degraded water quality, (4) impacts to surface water – groundwater connections, and (5) land subsidence. **Table 5**-1 indicates the sustainability indicators that may be addressed by the proposed management actions.

5.1.2 Circumstances for Implementation

Management actions will be implemented as determined by the YSGA or its member agencies and certain management actions may be implemented as soon as 2022 following the adoption of this GSP. **Table 5-1** provides an estimated timeline for implementation of each management action and the circumstances for implementing.

5.1.3 Public Noticing

The public notice and outreach processes for the YSGA and its member agencies include public board meetings and the California Environmental Quality Act (CEQA) process each management action is required to undergo before implementation. The YSGA and its member agencies provide public noticing by publicly posting all board meeting notices, agendas, and minutes in accordance with Brown Act requirements. All projects funded or considered for implementation by the YSGA will be posted under a 'Projects' page on the yologroundwater.org website. The YSGA is committed to an open and transparent process in identifying and implementing projects and management actions.

5.1.4 Permitting and Regulatory Process

Permitting and regulatory requirements vary for the different management actions. Specific requirements will depend on the type of project, which could be recharge and infrastructure projects as well as administrative actions that improve data collection and analysis. The following is a list of the types of permitting at the federal, state, and county level that could apply, but not necessarily, to all management actions.

- Federal
    - If federal grants are used, National Environmental Policy Act documentation is required
    - National Pollution Discharge Elimination System stormwater program permit
- State
    - CEQA documentation may be required prior to implementation of some of the management actions. These documents include one or more of the following: Notice of Exemption, Initial Study, Negative Declaration, Mitigated Negative Declaration, and Environmental Impact Report
- Regional

    - Yolo-Solano Air Quality Management District permit and regulations
- Local/County
    - Encroachment Permits
    - Yolo County Grading Permit
    - Yolo County Well Permit

5.1.5 Implementation Timetable and Status

The current status of each management action is included in **Appendix J – Table of Projects and Management Actions**. Since most management actions are in the conceptual phase of development, the timelines for permitting and regulatory process requirements and other particulars are estimated and subject to change. The implementation of the proposed projects and management actions identified in **Table 5-1** will be done through an adaptive management process. Ultimately the YSGA will work its member agencies to manage the groundwater basin to avoid undesirable results, as described in the previous sections.

The status of each management action is also provided in **Appendix J – Table of Projects and Management Actions**. Each management action is designated as follows:

Conceptual: The management action is identified but has not undergone significant planning, engineer or feasibility analyses.

Not yet started: This management action as undergone some initial evaluations but has advanced to an implementation phase. The management action will likely require additional feasibility analyses.

Initiated: The management action has undergone initial planning and feasibility assessments and being advanced to implementation.

Ongoing: The management action is part of an ongoing effort and will continue to be implemented to meet the sustainability goals of the YSGA.

5.1.6 Expected Benefits

Table 5-1 provides the estimated benefits for each management. As previously stated, most of the proposed actions are in their conceptual phase of development; therefore, a range has been provided for the estimated benefits each action is expected to yield but is subject to change.

5.1.7 Source of Water

Some management actions require that the YSGA or its member agencies bring in supplemental water from outside the Subbasin to support its management actions. While not all management actions require water from outside the Subbasin, there are several that do. Where outside sources of water are required, the source of that water will be identified.

5.1.8 Legal Authority Required

The YSGA is a GSA and has the legal authority to implement projects and management actions in order to achieve groundwater sustainability. Member agencies of the YSGA, who will be leading the implementation of management actions, will do so under the authorities of that agency.

5.1.9 Estimated Costs and Funding

As previously stated, most of the projects are in a conceptual phase of development; therefore, costs may not available. Where costs have been estimated, they are subject to change as the management action undergoes more detailed analysis.

5.2 Management Actions Descriptions

Through the course of the implementation period, 2022 to 2042, the YSGA and its member agencies will implement a variety of management actions to protect groundwater sustainability. These management actions will include capital investment projects to develop additional water supplies to off-set groundwater pumping, a data collection and analysis program to better understand and manage the Subbasin, and improved outreach activities.

Many of the management actions will require additional planning, engineering, and environmental/regulatory analysis before they can be implemented. And the possibility exists that some project will not be feasible to implement. If the identified management actions cannot be implemented, the YSGA will consider additional management actions as needed to protect groundwater sustainability.

5.2.1 Projects and Management Actions

There are existing and on-going projects and management actions that contribute to sustainability in the Yolo Subbasin. Proposed future, existing, and ongoing projects and management actions are described below. **Table 5-1** includes ongoing and proposed projects, with a brief description of the relevant sustainability indicator, status, expected benefits, and ongoing costs. These projects and management actions are proposed by the YSGA for development over the 20-year implementation period. **Appendix J – Table of Projects and Management Actions** contains more detailed information for each of the projects and management actions listed in **Table 5-1**.

Table 5-1. YSGA Projects and Management Actions.

MA / Project Number	MA / Project Name	Summary Description	Relevant Sustainability Indicators Affected			
			GW Levels	GW Quality	Land Subsidence	GW/SW
MA 1	Continued and Improved Groundwater Monitoring Program	Several groundwater monitoring programs exist within the Yolo Subbasin. Efforts to aggregate these monitoring programs include the Yolo County Water Resources Information Database (WRID) and DWR's Water Data Library. The WRID also receives well water level data from the cooperating agencies, monitoring about 550 wells distributed Countywide semi-annually. Most groundwater level data received or collected in the WRID is submitted to the state's Water Data Library. Existing programs monitor both water quality and water levels. Continuing to monitor groundwater conditions in the Yolo Subbasin is a critical component of a sustainable future. Improvements can be made to the current program by expanding monitoring efforts into data gaps, improving coordination between programs, and ensuring sustainable funding of monitoring efforts.	●	●	●	●
MA 2	Continue coordination efforts with other management and monitoring entities	Coordination efforts are ongoing related to groundwater management and monitoring in the Yolo Subbasin. Continuing these coordination efforts will yield better information and allow for a collaborative and conjunctive decision-making process. This includes evaluation of well permit applications and working with Yolo County in the well permitting process.	●	●	●	●
MA 3	Subsidence Monitoring Program	Continue to investigate subsidence and causes of subsidence in the Yolo Subbasin.			●	
MA 4	Preparedness through Increased Groundwater Recharge and Managed Aquifer Recharge Projects	This project encompasses all efforts to increase groundwater recharge in the Yolo Subbasin. This includes diversion of winter flows for groundwater recharge, increased groundwater infiltration from precipitation, aquifer storage and recovery projects, for example. Increased groundwater recharge efforts and winter diversions may result in creational of seasonal wetlands in some scenarios. YCFC&WCD proposes to divert winter flows from Cache Creek into the canal system to increase groundwater recharge. Groundwater recharge and recovery is central to good conjunctive management of surface and groundwater resources. Currently, by YCFC&WCD policy, 160 miles of surface water canals remain unlined, providing summertime groundwater recharge services that benefit the aquifer and riparian habitat. The recharged groundwater is used by beneficial users in the Subbasin. Utilizing TNC's Multi-Benefit Recharge Project Methodology Guidance Document will help make	●		●	

MA / Project Number	MA / Project Name	Summary Description	Relevant Sustainability Indicators Affected			
			GW Levels	GW Quality	Land Subsidence	GW/SW
		these projects successful. Managed wetlands within the Subbasin already provide multi-benefit recharge services, and increased coordination with wetland managers will provide opportunity for information sharing and potential managed aquifer recharge projects. Additional methods of groundwater recharge that will be considered include flood water and drain flows in the Yolo Bypass, drain flows in the Colusa Basin Drain, and application of irrigation water in excess of crop evapotranspiration needs.				
MA 5	Conjunctive Water Use Program	This conjunctive water use project envisions using a variety of methods (recharge/recovery, off-stream storage and canal system modernization) to effectively store and conjunctively use groundwater in the District's service area. The new water that will be developed can be used to the benefit of agriculture, environmental and municipal interests. A significant amount of work has already been completed on this project including establishment of a groundwater monitoring program	●			
MA 6	Increased outreach and information sharing of groundwater resources and knowledge within the Yolo Subbasin.	Information sharing, collaboration, and communication will be an important part of groundwater sustainability in the Yolo Subbasin. This project will convey information, best practices, funding opportunities, data, and observations to as wide of a group as possible. This project relates to the Communication and Engagement Plan that the YSGA has created for the Yolo Subbasin.	●	●	●	●
MA 7	Domestic Well Impact Mitigation Program	The YSGA is working to create a domestic well impact mitigation program to mitigate any potential impacts to domestic well users. This program will identify potential funding sources for both temporary and permanent domestic water solutions in cases where domestic well users are impacted due to changing groundwater conditions as a result of groundwater management actions. The minimum thresholds and measurable objectives established in this document are generally protective of domestic well users in the Yolo Subbasin. The Domestic Well Impact Mitigation Program will provide resources and information in cases where management actions result in impacts to domestic well users.	●			
MA 8	Surface Water Monitoring Program	There is no coordinated Countywide surface water monitoring program at present. However, on-going monitoring programs are in-place on various waterways, and a large number of smaller temporary investigations have occurred over the years. These individual surface water monitoring efforts need to be consolidated to improve the value of the data for implementation of actions identified in this GSP.	●	●	●	●

MA / Project Number	MA / Project Name	Summary Description	Relevant Sustainability Indicators Affected			
			GW Levels	GW Quality	Land Subsidence	GW/SW
MA 9	Management Consideration of Grey Areas in the Yolo Subbasin	During the formation of the GSA for the Yolo Subbasin, the eligible entities were identified based on SGMA's definition. Irrigated areas outside of water or irrigation district service areas were known as "white areas" since they did not have an eligible entity (other than the County) to form or become a GSA. The YSGA was formed in June 2017, with Yolo County serving as a member of the JPA to cover these "white areas". The YSGA now has the authority and responsibility for this area; however, there is still no formal mechanism for receiving revenues for SGMA implementation, which has made these areas slightly complicated, or now known as "grey areas". There is a desire for the YSGA to work closely with landowners in these "grey areas" to assess the best solution for implementing the GSP and ensuring future sustainability. Ideas for these areas include, annexing the property into an existing irrigation or reclamation district (as an "Area B" or an Improvement District); creating or forming a new water district; or simply implementing a county-wide assessment for all properties in the Yolo Subbasin.	●	●	●	●
MA 10	Coordination Efforts with Land Use Planning Entities	The YSGA and member entities will work on an as-needed basis with Yolo County and municipalities within the Yolo Subbasin to promote the sustainable use and protection of groundwater resources including GDEs and interconnected surface water bodies. These coordination efforts will include inputs to general plan updates in the future.	●	●	●	●
MA 11	Continued Investigation of subsurface geology and aquifer properties in the Yolo Subbasin	There are portions of the Yolo Subbasin where the geologic properties of the aquifer are well understood. Alternatively, there are areas where geologic conditions are not well described or understood. This Management Action would work to improve geologic information in areas of the subbasin where the aquifer is poorly described. This includes looking at existing geologic cross-sections, AEM surveys, and investigation of driller's reports.	●	●	●	●
MA 12	Coordinated Response to Minimum Threshold Exceedances	The YSGA will coordinate responses to minimum threshold exceedances. When a single well minimum threshold is exceeded, the YSGA will verify the exceedance, analyze causes and trends, and evaluate mitigation. When multiple wells exceed minimum thresholds, causes and trends will be evaluated by MA entities and potential mitigation actions (projects and management actions) will be identified. When wells exceed the minimum threshold for a MA, causes and trends will be evaluated, potential mitigation actions (projects and management actions) will be evaluated and a plan for implementation will be developed. This will involve basin-wide coordination.	●	●	●	●

MA / Project Number	MA / Project Name	Summary Description	Relevant Sustainability Indicators Affected			
			GW Levels	GW Quality	Land Subsidence	GW/SW
P 1	Identification of Locations Vulnerable to Damage from Subsidence - Catalog of Infrastructure Damage Reports	This project would improve the ability to define and quantify the sustainable management criteria for subsidence. Sustainability indicators for subsidence could be better informed if the impacts caused by potential subsidence were catalogued. The sustainable management criteria for subsidence would be improved by identifying infrastructure that would be negatively impacted by subsidence.			●	
P 2	Groundwater Model Enhancement Program/YSGA Model Improvements	To better understand groundwater conditions in the Yolo Subbasin, the YSGA model can be used. This project would continue working with the YSGA model to calibrate and refine model inputs, outputs, and parameterization. Improved data on evapotranspiration could be utilized in enhancing the total water balance in the Subbasin. A primary groundwater model enhancement could be to improve the accuracy of crop ET through development local crop coefficients based on remote sensing/energy balance analyses. This project would include incorporating improved land use datasets for future scenarios and revising "managed wetlands" classifications in the current YSGA model. Additionally, there are other existing models with finer scale, specifically in the Capay Valley that might be useful to calibrate and parameterize the YSGA model. This will be a continuous project, and updates to the model can be made when improved input datasets are made available or created.	●	●	●	●
P 3	Water Resources Information Database Project	This project would include updates to the existing WRID system, and potential additional projects related to data storage and sharing. This project would improve the hosting, visualization, and storage of data related to the YSGA and the Yolo GSP.	●	●	●	●
P 4	Topographic Mapping (LiDAR Project)	This project would improve topographic mapping of the Yolo Subbasin, including surface water bodies.			●	●
P 5	Additional monitoring wells along ephemeral streams, interconnected surface water bodies, and near GDEs	Additional monitoring wells along ephemeral streams in the subbasin may improve understanding of surface water/groundwater of ephemeral streams in the subbasin.	●			●
P 6	Vegetative and aquatic surveys in related to groundwater dependent ecosystems	This project would Improve the ecological inventory of GDEs in the Yolo Subbasin.				●

MA / Project Number	MA / Project Name	Summary Description	Relevant Sustainability Indicators Affected			
			GW Levels	GW Quality	Land Subsidence	GW/SW
P 7	AEM Flights to improve subsurface geology data	Airborne Electromagnetic (AEM) surveys can provide useful information about subsurface geology. This data could potentially be utilized to better understanding aquifer conditions in the Yolo Subbasin. The YSGA is proposing partnering with DWR to implement AEM surveys in areas where the data obtained will be particularly useful. From DWR's AEM Survey datasheet, "During an AEM survey, a helicopter tows electronic equipment that sends signals into the ground which bounce back. The process has been compared to taking an MRI of the ground subsurface. The data collected is used to create continuous images that are interpreted for underground geology. The resulting information will provide a standardized, statewide dataset that improves the understanding of aquifer structures. It can also help with the development or refinement of hydrogeologic conceptual models and can help identify areas for recharging groundwater."	●		●	●
P 8	Abandoned Well Incentive Program	Creation of an incentive program that would pay for the destruction of old, abandoned wells. There are other existing programs that could be the foundation for this proposal. The objectives of this program would be to provide landowners an incentive-based, volunteer program with the intent of protecting the quality of groundwater, eliminating the safety hazard of open wells to humans and livestock, and promoting the importance of water quality within the Yolo Subbasin.		●		
P 9	Modernization Project: Integrated Precision Water Management	YCFC&WCD will modernize 16 miles of its main canal. Automatic water control gates will allow the YCFC&WCD to operate its main system with more flexibility.	●			
P 10	Exchanges between CVP or SWP system and Cache Creek System	This project includes any potential surface water transfers between the CVP or SWP and the Yolo Subbasin. Potentially Sites Reservoir.	●			
P 11	Flood Monitoring Network Project	This project would install flow monitoring stations at canals and sloughs in order to optimize conveyance capacity for both agricultural operations and during rain events, which could occur at the same time. It is not known how much flow sloughs contribute to the canal systems during rain events.	●			
P 12	Yolo County Drains and Sloughs - Governance and Maintenance Study	YCFC&WCD and County will work together to develop a governance and maintenance study that will assist in providing effective rural storm water management responsibilities based on the defined governing bodies. Plan/investigation will initiate a legitimate storm water management program in Yolo County.	●			

MA / Project Number	MA / Project Name	Summary Description	Relevant Sustainability Indicators Affected			
			GW Levels	GW Quality	Land Subsidence	GW/SW
P 13	Zamora area winter recharge from Cache Creek *via* China Slough	This project would be the development of groundwater recharge capacity by utilizing China Slough and conveying water to the Zamora area. Utilizing existing YCFC&WCD infrastructure would allow for water to reach China Slough and be conveyed to the Zamora area. This project is related to another proposed project - West Adams Canal Renovation and China Slough Rehabilitation. The rehabilitation of China Slough would likely need to occur prior to any successful groundwater recharge events occurring.	●		●	
P 14	Dunnigan Hills Winter Runoff Capture for Recharge	Runoff water in Dunnigan Hills and Hungry Hollow could be diverted into N Adams canal and sent to Yolo-Zamora for winter recharge. This project would utilize excess water in Dunnigan Hills and Hungry Hollow and send it east towards the Yolo Zamora area.	●			
P 15	Winter Diversions from Tehama-Colusa Canal	This project would divert excess winter water from the Tehama Colusa Canal to the Yolo-Zamora area for winter recharge.	●			
P 16	Bird Creek surface water storage	160TAF of potential storage exists in the Bird Creek basin. Installing a dam along Bird Creek would potentially decrease North Yolo MAs reliance on groundwater. Developing a reliable surface water supply would be beneficial to users in White Areas of the Subbasin and could be particularly beneficial to water users whose reliance on groundwater is high.	●			
P 17	Bird Creek, Oat Creek, Buckeye Creek, 2047 Canal groundwater recharge infrastructure improvements	This project is a proposal to improve groundwater recharge in the North Yolo MA. There are a couple options for doing this. Small weirs could be installed to increase the retention time of surface water in the creeks. Additionally, surface water that remains in the 2047 Canal during winter could be rediverted to a ditch with better percolation properties. Areas with high infiltration rates are known by local entities and operators; diversions for groundwater recharge could be directed to these areas.	●			
P 18	Hardwood Subdivision Recharge	CalTrans utilized a parcel on the SW side of the Hardwood Subdivision of Dunnigan to build the County Road 6 overpass of I-5. This parcel is owned by stakeholders in the Yolo Zamora area and may be suitable for recharge. The parcel is currently not utilized for agricultural production and may be an ideal location to develop a groundwater recharge site.	●		●	

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			GW Levels	GW Quality	Land Subsidence	GW/SW
P 19	Schaad Ranch/Buckeye Creek Recharge	Buckeye Creek runs through Schaad Ranch at approximately County Rd 88 where Buckeye Creek crosses it. There is a Dunnigan WD turnout nearby the stream course and several monitoring wells, including a DWR well nearby, also. 215 or other waters could be diverted into the stream course and small, temporary weirs placed or created to slow it and enable recharge.	●			
P 20	Trickle flow to ephemeral streams	The Tehama-Colusa Canal has several side gates used to dewater sections of the canal. These drain into ephemeral streams like Buckeye Creek in Yolo County. Additionally, there are several locations in Colusa and Glenn counties that may be suitable for similar projects. There is the potential to collaborate with CGA to streamline the permitting and regulatory process. Information on Buckeye Creek and the requirements for these side gates to be utilized are known. RD 108 and Dunnigan Water District are ideal partners to promote and implement this project.	●	●	●	●
P 21	Extension of Tehama Colusa Canal	This project would extend the existing Tehama Colusa Canal south. By extending the Tehama Colusa Canal, water users south of Bird Creek water users in the Yolo Zamora area of the North Yolo Management Area may be able to access additional surface water supplies in certain years. Easements may already exist on properties south of Bird Creek which would facilitate the extension of the TC canal.	●			
P 22	Conjunctive Use/groundwater recharge/surface water delivery extension to the area around Zamora	This project would enhance recharge, both actual and in-lieu, through extending surface water deliveries and exploring opportunities for enhanced recharge in the areas in and around Zamora.	●		●	●
P 23	Additional Extensometers in North Yolo MA	This project would help to better understand land subsidence in the North Yolo MA, additional extensometers are being proposed. This will provide a more complete understanding of where and when subsidence is occurring in this area.			●	
P 24	Add real time static level monitoring equipment to Washington Street well in Yolo	This project would help to better react to changes in available water and provide constant historical data that is shared directly to the GSA.	●	●	●	●
P 25	Add real time static level monitoring equipment to Ridgecut well in Knights Landing	This project would help to better react to changes in available water and provide constant historical data that is shared directly to the GSA.	●	●	●	●

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			GW Levels	GW Quality	Land Subsidence	GW/SW
P 26	Sites West Sac. Valley Water Filtration System	This would be a Domestic Water Use Filtration System for Sites Reservoir Sphere of Influence in West Sac Valley. Project could focus on Colusa and North Yolo counties or extend northward into Shasta County.	●	●		
P 27	Sutter Buttes and Willows Fault Arsenic and Saltwater Study	This is a Proposed USGS Study to Follow Up on “Future Work” detailed in the Masters’ Thesis of Stephen Springhorn entitled "Stratigraphic Analysis and Hydrogeologic Characterization of Cenzoic Strata in the Sacramento Valley Near the Sutter Buttes.	●	●	●	
P 28	Forbes Ranch Regulating Pond	This project would develop and construct a 200-acre-foot regulating pond to reduce drainage and flood waters through the town of Madison and District canal system. Divert stormwater flows to the pond through the existing conveyance. The regulating pond would provide storm water retention during the winter and would allow for groundwater recharge in the spring and summer when capacity and water is available. The regulating pond would provide water quality benefits.	●	●		
P 29	West Adams Canal Renovation and China Slough Rehabilitation	This project would result in the enlargement and improvement of the YCFC&WCD's West Adams, East Adams, and Acacia Canal system, and rehabilitation and improvement of China Slough (a natural storm drainage channel). YCFC&WCD's canal system could be modernized to allow for a “demand” system and to ensure no spills. China Slough would need to be cleaned, an operating road constructed, and installation of about eight check structures. Improvement of this system would increase capacity for groundwater recharge, both in-lieu and actual.	●			
P 30	Diaz in-line reservoir	The Diaz in-line reservoir project would include the creation of an in-line reservoir on Clover Canal. This would help with water use efficiencies and encourage increased conjunctive use by making surface water easier to utilize. This location could also possibly used for increased groundwater recharge.	●			

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			GW Levels	GW Quality	Land Subsidence	GW/SW
P 31	Magnolia Canal Loss Reduction and Extension Project	This is a proposed 1.5 miles of pipeline to extend and reduce loss in the Magnolia Canal system. This project might increase surface water usage in this area, and thus reduce groundwater demand. Currently, Magnolia Canal has high losses to groundwater, so this loss reduction project would likely decrease the current amount of surface water to groundwater recharge. Extending the canal, however, may allow for decreased reliance on groundwater at the end of Magnolia Canal. A cost-benefit analysis will be conducted prior to project implementation. Quantification of the changes in groundwater recharge will need to be made to determine the benefits of this proposed project.	●			
P 32	Demand Delivery on Yolo Central and Pleasant Prairie Canals	This project would Increase surface water usage by making it easier and more convenient for water users to use surface water on the Yolo Central and Pleasant Prairie Canals. This project should result in lower groundwater demands and lower reliance on groundwater. Infrastructure would need to be developed on these canals to allow water users to more easily utilize surface water supplies.	●			
P 33	North of Winters multi-use, stormwater, and water storage pond, Winters North Area Stormwater Pond'	This project proposes developing and constructing a 5,000 acre-feet storm water retention pond in the north area of Winters to reduce drainage and flood waters from the Chickahominy Slough. The retention pond would also be used for groundwater recharge in times when the capacity and water was available. The retention pond would provide water quality benefits by allowing the sediments in the runoff to settle and lessening the transfer of pollutants and chemicals downstream. The surrounding area would have native vegetation that would promote benefits for wildlife habitat, and the property would allow for groups to visit and learn about the multi-beneficial, multi-agency partnership. Similar to the District's Chapman Reservoir, the project would install automated gates and monitoring devices at the retention pond that would be connected to the District's SCADA system for real-time management.	●			
P 34	West Winters Aquifer Storage and Recovery (ASR) well field	Surface water from Putah Creek, or the YCFC&WCD canal system, could be injected west of Winters and extracted to blend with city of Winters wells exceeding arsenic or hex-chrome. Other city wells could be pumped directly to Putah Creek as in-lieu exchange for water injected to SARs field.	●			
P 35	Development of Surface Water Source for the city of Winters	Winters could purchase water from Solano Project, treat and blend with groundwater. Blending would reduce water quality issues and use of surface water would reduce reliance on groundwater. Long-term	●	●		

MA / Project Number	MA / Project Name	Summary Description	Relevant Sustainability Indicators Affected			
			GW Levels	GW Quality	Land Subsidence	GW/SW
		contracts would be required and because Winters historically declined Solano Project water rights, this could be problematic.				
P 36	City of Davis - ASR	This project would include researching the potential for ASR – placing treated surface water into the intermediate aquifer during winter months and using the stored water to augment surface water supplies in summer months. A feasibility study has been completed and pilot testing is underway.	●			●
P 37	Upstream Flow Management to Prevent Madison Flooding and to Facilitate GW Recharge	YCFC&WCD proposes to manage high flows from Lamb Valley, Cottonwood and S. Fork Willow Sloughs using the existing canal system as well as other means such as upstream check dams. During storm events Willow Slough floods the Town of Madison. The Canal system can be used to convey water away from the Town of Madison and reduce flood levels while also managing peak flows through use of check dams, particularly in Lamb Valley Slough. This project would increase groundwater recharge during winter storm events.	●			
P 38	Madison Farmer Field Stormwater Capture and Groundwater Recharge	This is a proposed modification of farmer fields around Madison, specifically those next to Highway 16 and those that will capture upstream flows. The two options considered include 1) 1,200 acres of farmer field modification for rainfall capture (8-inch-berm) and 2) modification of a farmer field near Cache Creek for rainfall and storm water runoff capture a 3-foot-high storm water detention basin. This project will require farmer participation and advanced planning for field modification.	●			
P 39	City of Davis -Site Survey for Hardscape Conversion to Pervious Pavement	This project proposes surveying public parking lots that currently have impervious surfacing to assess the practicality of converting these locations to pervious pavement when they are in need of resurfacing, maintenance or redesign. Portions of the pathways near the sites could potentially highlight permeable pavers in addition to the parking lots. Projects could be planned with improvements to incorporate bioswales, low water use plants, and other low-impact design measures into any landscape changes.	●			
P 40	City of Davis - West Area Pond Redesign	This would be a redesign the West Area Pond (detention basin) to utilize agricultural summer flows to enhance aquatic wildlife habitat and improve water quality. This proposal involves redirecting existing agricultural runoff through the Stonegate drainage pond and pumping it into the West Area Pond. This would enhance aquatic habitat while improving any water discharges through retention, enhancing opportunities for infiltration, transpiration and evaporation.	●			

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			GW Levels	GW Quality	Land Subsidence	GW/SW
P 41	Sac River Water to Davis/Woodland	This project has already been implemented. The Woodland-Davis Clean Water Agency will continue to use Sacramento River water when available and supplement with groundwater when needed. The average surface water utilization is around 40,000 AFY. Effects of this project are being studied.	●			
P 42	City of Woodland - Well 31 ASR Project	The project involves the design and construction of a new municipal ASR well #31 near the site of the existing Well #6. The new ASR well will facilitate groundwater recharge by injecting treated surface water into the gravel layer approximately 500 feet below the surface when surplus Sacramento River water is available during winter months.	●	●		
P 43	City of Davis Leak Detection Survey	This project proposes hiring a consultant to use acoustical listening technology to survey water mains and laterals within the city of Davis water distribution area to detect and locate leaks. Prioritize leaks based on severity. Purchase leak detection equipment to install within distribution system to continuously monitor for potential leaks at key areas identified through the leak detection survey.	●	●		

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			GW Levels	GW Quality	Land Subsidence	GW/SW
P 44	Woodland Recycled Water Utility Expansion Project (Phase II)	The city of Woodland currently has tertiary treated Title 22 effluent from the City's Water Pollution Control Facility (WPCF) providing a firm capacity of approximately 2,700 gpm for recycled water. Woodland has an existing recycled water utility serving 2 City parks and a large industrial user in the industrial area northwest of the WPCF. The City has planned for an expansion of the recycled water utility into the Spring Lake Area of the City and also to serve the planned Woodland Research & Technology Park. There are several existing large water users that would use the recycled water for irrigation of parks and roadside landscaping. Businesses in the Research Park would utilize recycled water for cooling buildings. In addition, recycled water would be available to extend into new development areas for landscape irrigation. Portions of recycled water pipelines in Spring Lake have already been constructed by development projects. Providing recycled water to these areas would reduce demands on the potable water distribution system and reduce the demand on the groundwater aquifer. The recycled water pipeline would be constructed in the City's existing right of way. The City has recently completed a Mitigated Negative Declaration for the project. The expected initial demand for recycled water would exceed 110-acre feet per year. The Capital Cost for the Project is approximately $2.5M. The recycled water project includes construction of approximately 10,000 feet of 8-inch-diameter purple pipe and a 100,000-gallon storage tank. The project also provides recycled water for expansion (Phase III) to west of Highway 113.	●	●		

MA / Project Number	MA / Project Name	Summary Description	Relevant Sustainability Indicators Affected			
			GW Levels	GW Quality	Land Subsidence	GW/SW
P 45	Woodland Recycled Water Utility Expansion Project (Phase III)	The city of Woodland currently has tertiary treated Title 22 effluent from the city's WPCF providing a firm capacity of approximately 2,700 gpm for recycled water. Woodland has an existing recycled water utility serving two city parks and a large industrial user in the industrial area northwest of the WPCF. The city has planned for an expansion of the recycled water utility into the Sports Park Area of the city and also to serve the planned SP1B and SP1C areas in the city's General Plan. There are several existing large water users that would use the recycled water for irrigation of parks and roadside landscaping. In addition, recycled water would be available to extend into new development areas for landscape irrigation. Providing recycled water to these areas would reduce demands on the potable water distribution system and reduce the demand on the groundwater aquifer. The recycled water pipeline would be constructed in the city's existing right of way. The city has recently completed a Mitigated Negative Declaration for the project. The expected initial demand for recycled water would exceed 70-acre feet per year. The Capital Cost for the Project is approximately $925,000. The recycled water project includes construction of approximately 4,300 feet of 8-inch-diameter purple pipe.	●	●		
P 46	City of Davis -Recycled Water Pump Station	With the completion of secondary and tertiary improvements, the City's Wastewater Treatment Plant is now capable of producing tertiary disinfected effluent that meets the requirements of Title 22 of the CCR for recycled water. However, a final component of these upgrades is a means of delivering the recycled water produced at the WWTP to potential future customers. New infrastructure is necessary to convey recycled water from the WWTP to potential	●	●		
P 47	YCFC&WCD Winter Recharge	This project increases winter recharge by utilizing YCFC&WCD sloughs and canals. This is an ongoing project and can only be conducted under certain circumstances. The water diverted into unlined district canals varies on an annual basis between a minimum of 0 AFY and a maximum of around 30,000 AFY.	●			
P 48	City of Winters Recycled Water Utilization	The city of Winters Waste Water Treatment Facility is secondary treatment. This water is currently discharged to 170 acres on two spray fields. No water leaves the facility, and none of the effluent comes in contact with any surface waterway. In 2020, 267.4 acre-feet of water were discharged for percolation and evaporation. In 2019, 240 acre-feet were discharged for percolation and evaporation. This project is ongoing. There may be opportunities to develop the groundwater recharge aspect of this project.	●			

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			GW Levels	GW Quality	Land Subsidence	GW/SW
P 49	Citrona Ditch Pressurization Project	This project would increase the adoption of surface water over groundwater when available. This is a 10-15 (cubic feet per second) cfs supply, for four customers on 10 fields.	●			
P 50	RD 2035 - Groundwater Studies	Reclamation District 2035's Ground Studies Project will consist of the identification and analysis of issues, if any, surrounding the quality and availability of groundwater within their district.	●	●	●	●
P 51	RD 2035 - Floodway Corridor Project	The project consists of piping (or lining) the Cross Bypass Canal and the installation of flow control and measurement devices to improve the conveyance system and increase water use efficiency.	●			
P 52	RD 2035 - Conjunctive Use Study	The project consists of the study and analysis of the coordinated use of surface and groundwater that could benefit the agricultural, urban, and environmental interests within, nearby and downstream of Yolo County, especially the North Delta region.	●			
P 53	Water Hexavalent Chromium (Cr6) Compliance Project	City of Winters Hexavalent Chromium related projects to improve water quality.		●		
P 54	UC Davis Arboretum Waterway Wetland Restoration and Enhancement	UC Davis is proposing to enhance the Arboretum Waterway, which captures stormwater discharge from 900 acres of the UC Davis campus, by establishing a wetland area to treat stormwater discharge and recycled water prior to discharge to Putah Creek.	●			
P 55	City of Woodland - North Regional Pond and Pump Station	This project involves the design and construction of an approximate 75-acre sedimentation pond and a pump station able to eventually accommodate a 120-cfs design flow. Project re-purposes an existing City evaporation pond that is no longer in use for any purpose. There may be some groundwater recharge benefits as a result of this project. The primary benefit is stormwater treatment and retention. This project is operational and is substantially completed.	●			
P 56	Improved hydrologic flows, increased runoff retention, and improved watershed health in the Capay Valley	These projects would improve groundwater levels, groundwater quality, and SW/GW Interaction in the Capay Valley Management Area. In the Capay Valley MA, this would include the creation of demonstration sites for capturing hillside run-off, process-based restoration in selected tributaries of Cache Creek, and improvement of overall watershed health to improve overall groundwater conditions. The processes established by these projects can be utilized throughout the subbasin.	●	●		●

MA / Project Number	MA / Project Name	Summary Description	Relevant Sustainability Indicators Affected			
			GW Levels	GW Quality	Land Subsidence	GW/SW
P 57	Enhanced water infiltration *via* grazing management and crop production practices in the Capay Valley	For every 1% increase in soil organic matter, water holding capacity can increase by 20,000 gallons per acre. Some crop production practices are known to improve water infiltration and water-holding capacity. Pilot projects, scaling, and community adoption are all components of these projects. This type of project could be expanded to the entire subbasin, or other areas within the subbasin.	●			
P 58	Oak woodland, riparian, and chaparral restoration in the Capay Valley	Develop a restoration plan and demonstration sites. Then scale-up the demonstration sites to other areas in the Capay Valley MA. Improving the health of oak woodlands, riparian areas, and chaparral can improve the hydrological and ecological function of these areas. Similar projects can be created for other areas within the Yolo Subbasin.	●			●
P 59	Establish an equipment and knowledge hub in the Capay Valley	A one-stop-service Equipment and Knowledge Hub will be established to make available services and equipment that support the projects described above and their application into perpetuity. Services and equipment will be tailored to the needs of livestock managers, crop producers and habitat restorationists. The aim will be to make available the knowledge and tools that are not readily available as yet and are necessary for farmers/ranchers/others to adopt practices for improving groundwater management. If successful, this knowledge hub could be expanded to other areas within the subbasin.	●	●	●	●
P 60	Rumsey and Guinda Ditch Winter Recharge	Development of groundwater recharge capacity by utilizing Rumsey and Guinda ditch and conveying water to the Capay Valley.	●			
P 61	Guinda Ditch summer irrigation and pipelines from Cache Creek to other side of Highway 16	Guinda ditch could be reactivated to provide additional Cache Creek water during the irrigation season to Capay Valley	●			
P 62	Yocha Dehe Wintun Nation - expansion of Surface Water Diversion	This is the continuation of an existing project that allows the YDWN to utilize surface water resulting in in-lieu recharge of groundwater.	●			
P 63	Improve Subsidence data collection and analysis in the Capay Valley MA	This encompasses projects to improve the understanding of subsidence in the Capay Valley. This can be done by installing extensometers or securing funding to better understand land subsidence in the Capay Valley.			●	

MA / Project Number	MA / Project Name	Summary Description	Relevant Sustainability Indicators Affected			
			GW Levels	GW Quality	Land Subsidence	GW/SW
P 64	Incorporation of Capay IGSM into the YSGA Model	This falls under the 'Updates to the YSGA Model' project that is applicable to the entire subbasin. The Capay Integrated Groundwater Surface water Model was developed by WRIME (now called RMC Water and Environment) in 2010 and updated by RMC in 2016. Components of this model may be incorporated into the YSGA Model to improve overall understanding of groundwater in the Capay Valley.	●			●
P 65	Yolo Bypass Conservation Projects	These are projects that relate to changes in land use, surface water flows, and groundwater use in the Yolo Bypass.	●			
P 66	Revisions to the YSGA Model for Urban Groundwater usage in the South Yolo MA	This project would ensure that the water budget for the South Yolo MA accurately reflects changes in urban groundwater usage in this area moving forward.	●	●	●	●
P 67	Methylmercury Impacts analyses for the Yolo Bypass	Yolo County proposes to collect data and analyze changes in methyl mercury production and bioaccumulation that could result from (1) a proposed Bay Delta Conservation Plan (BDCP) project to enhance fisheries habitat in the Yolo Bypass; and (2) a Central Valley Flood Protection Plan proposal to expand the Yolo Bypass to improve flood capacity		●		
P 68	West Sacramento Well Improvements that may Include ASR	Groundwater recharge and extraction project for groundwater storage, groundwater quality management, and system redundancy.	●	●		●
P 69	West Sacramento and city of Sacramento Intertie	Coordinate conjunctive use activities and provide emergency water supplies.	●	●		●
P 70	Dry well groundwater recharge on California Olive Ranch	*This proposed project would inject excess surface water* into the aquifer at a location on California Olive Ranch.	●			●
P 71	Projects to improve understanding of surface water/groundwater interaction around Oat Creek and Buckeye Creek/others in Dunnigan/North Yolo areas.	Additional streamflow monitoring and dedicated groundwater monitoring wells are proposed to better understand groundwater levels and surface water-groundwater interaction in the surface water bodies in the Dunnigan Hills area. Information from a recent pilot study on groundwater recharge in Oat Creek can be used to improve understanding of the creek's recharge potential.	●		●	

MA / Project Number	MA / Project Name	Summary Description	Relevant Sustainability Indicators Affected			
			GW Levels	GW Quality	Land Subsidence	GW/SW
P 72	Additional groundwater monitoring wells in the Dunnigan Hills MA	There are currently very few groundwater monitoring wells in the Dunnigan Hills MA. The addition of dedicated monitoring wells will improve the understanding of groundwater in this area. Few wells in this Management Area have long periods of record, but the YSGA has identified wells and landowners that would like to be involved in the groundwater monitoring program.	●	●	●	●
P 73	O'Halloran off-stream reservoir site	A proposed off-stream reservoir that would improve surface water delivery efficiency and conjunctive use. This project would also likely be utilized to generate peak-hour electricity.	●			
P 74	Additional groundwater monitoring wells in the Clarksburg MA	There are currently very few groundwater monitoring wells in the Clarksburg MA. The addition of dedicated monitoring wells will improve the understanding of groundwater in this area. This monitoring network would include water quality measurements in this area. There are few wells in this area with long periods of record, but monitoring could start now. Wells and landowners have been identified with interest in improving the groundwater monitoring network program.	●	●	●	●
P 75	Reclamation District 999 - Elk Slough Groundwater Quality Improvement and Flood Protection Project	Elk Slough is currently closed to the fresh water of the Sacramento River and is maintained by tidal inflows from Sutter Slough. Elk Slough water quality is typically similar to that of the river; however, when salinity intrusion increases during droughts, the slough water quality declines.	●	●		
P 76	Boards In Program	This would be a voluntary or financially incentivized program to have landowners keep the spill boards in their rice fields in during the winter. This would increase groundwater recharge in the subbasin and would be a multi-benefit project. Even though these fields tend to have low infiltration there would still be benefits out of this sort of program.	●			
P 77	Cover cropping, rangelands improvements, and other agricultural practices to improve groundwater recharge	Cover crops, compost application, and rangeland management strategies can provide multiple benefits, including increased groundwater recharge. This would be a landowner-based project, with potential incentives being created in the future.	●		●	●

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6.0 References

Links to all references lists herein can be found at:
https://www.yologroundwater.org/files/d626250c8/references_template_YoloGSP.pdf

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Yolo Subbasin Groundwater Agency
2022 Groundwater Sustainability Plan
Yolo County, CA

APPENDICES

Yolo Subbasin Groundwater Agency
2022 Groundwater Sustainability Plan

Yolo County, CA

Appendix A

Yolo Subbasin Groundwater Agency Joint Powers Agreements

JOINT EXERCISE OF POWERS AGREEMENT

ESTABLISHING THE YOLO SUBBASIN GROUNDWATER AGENCY

THIS AGREEMENT is entered into and effective this 19th day of June, 2017 ("**Effective Date**"), pursuant to the Joint Exercise of Powers Act, Cal. Government Code §§ 6500 *et seq*. ("**JPA Act**") by and among the entities listed in Exhibit A attached hereto and incorporated herein (collectively "**Members**").

RECITALS

A. On August 29, 2014, the California Legislature passed comprehensive groundwater legislation contained in SB 1168, SB 1319 and AB 1739. Collectively, those bills, as subsequently amended, enacted the "Sustainable Groundwater Management Act" ("SGMA"). Governor Brown signed the legislation on September 16, 2014 and it became effective on January 1, 2015.

B. Each of the Members and Affiliated Parties overlies the Yolo Subbasin of the Sacramento Valley Groundwater Basin, California Department of Water Resources Basin No. 5-21.67 as its boundaries may be modified from time to time in accordance with Cal. Water Code Section 10722.2 ("Subbasin").

C. Each of the Members is authorized by SGMA to become, or participate in, a Groundwater Sustainability Agency under SGMA through a joint exercise of powers agreement.

D. The Members desire, through this Agreement, to form the Yolo Subbasin Groundwater Agency, a separate legal entity, for the purpose of acting as the Groundwater Sustainability Agency for the Subbasin. The boundaries of the Agency are depicted on the map attached hereto as Exhibit B and incorporated herein.

E. The mission of the Agency is to provide a dynamic, cost-effective, flexible and collegial organization to ensure compliance with SGMA within the Subbasin.

F. Subject to the reservation of authority in Article 8.5 of this Agreement, the Agency will serve a coordinating and administrative role regarding SGMA compliance within the Subbasin. Each of the Members and Affiliated Parties (or groups of Members and Affiliated Parties) will have initial responsibility for groundwater management within their respective Management Areas as delineated in the Groundwater Sustainability Plan ("GSP") adopted by the Agency.

THEREFORE, in consideration of the mutual promises, covenants and conditions herein set forth, the Members agree as follows:

ARTICLE 1: DEFINITIONS

1.1 **Definitions**. As used in this Agreement, unless the context requires otherwise, the meaning of the terms hereinafter set forth shall be as follows:

a. "**Affiliated Parties**" shall mean those entities that are legally precluded from becoming members of this Agreement but that, after entering into a memorandum of understanding with the Agency, will be granted a voting seat on the Board of Directors pursuant to the terms of this Agreement and the memorandum of understanding. The Affiliated Parties as of the Effective Date are listed in Exhibit C.

b. "**Agency"** shall mean the Yolo Subbasin Groundwater Agency established by this Agreement.

c. "**Agreement**" shall mean this Joint Exercise of Powers Agreement Establishing the Yolo Subbasin Groundwater Agency.

d. "**Board of Directors**" or "**Board**" shall mean the governing body formed to implement this Agreement as established herein.

e. "**DWR**" shall mean the California Department of Water Resources.

f. "**Effective Date**" shall be as set forth in the Preamble of this Agreement.

g. "**Groundwater Sustainability Agency**" or "**GSA**" shall mean an agency enabled by SGMA to regulate portion of the Subbasin cooperatively with all other Groundwater Sustainability Agencies in the Subbasin, in compliance with the terms and provisions of SGMA.

h. "**Groundwater Sustainability Plan**" or "**GSP**" shall have the definition set forth in SGMA.

i. "**GSA Boundary**" shall mean those lands depicted on the map shown in Exhibit B.

j. "**JPA Act**" shall mean the Joint Exercise of Powers Act, Cal. Government Code §§ 6500 et seq.

k. "**Management Area**" shall mean the areas delineated in the GSP for which Members and Affiliated Parties will have initial authority and responsibility for groundwater management in accordance with SGMA.

l. "**Member**" shall mean any of the signatories to this Agreement and "Members" shall mean all of the signatories to this Agreement, collectively. Each of the Members shall be authorized to become, or participate in, a Groundwater Sustainability Agency under SGMA.

m. "**SGMA**" shall mean the California Sustainable Groundwater Management Act of 2014 and all regulations adopted under the legislation (SB 1168, SB 1319 and AB 1739) that collectively comprise the Act, as that legislation and those regulations may be amended or supplemented from time to time.

n. "**Subbasin**" shall mean the Yolo Subbasin of the Sacramento Valley Groundwater Basin, California Department of Water Resources Basin No. 5-21.67 as its boundaries may be modified from time to time in accordance with Cal. Water Code Section 10722.2.

ARTICLE 2: ORGANIZING PRINCIPLES

2.1 The Members and Affiliated Parties intend to work together in mutual cooperation to develop and implement a GSP for the Subbasin in compliance with SGMA.

2.2 To the extent any Member determines, in the future, to become a GSA separate and apart from the Agency, the Agency will allow such Member to become a GSA and the Agency will work cooperatively with such Member to coordinate implementation of SGMA within the Subbasin.

2.3 The Members intend through this Agreement to obtain cost-effective consulting services for the development and implementation of a GSP, in particular for the development of water balances.

ARTICLE 3: FORMATION, PURPOSE AND POWERS

3.1 **Recitals:** The foregoing recitals are incorporated by reference.

3.2 **Certification.** Each Member certifies and declares that it is a legal entity that is authorized to be a party to a joint exercise of powers agreement and to contract with each other for the joint exercise of any common power under Article 1, Chapter 5, Division 7, Title 1, of the Government Code, commencing with section 6500 or other applicable law including but not limited to Cal. Water Code § 10720.3(c).

3.3 **Creation of the Agency.** Pursuant to the JPA Act, the Members hereby form and establish a public entity to be known as the "Yolo Subbasin Groundwater Agency," which shall be a public entity separate and apart from the Members.

3.4 **Designation.** Pursuant to Government Code § 6509, the Members hereby designate the County of Yolo for purposes of determining restrictions upon the manner of exercising the power of the Agency.

3.5 **Purposes of the Agency**. The purposes of the Agency are to:

a. Provide for the joint exercise of powers common to each of the Members and powers granted pursuant to SGMA (subject to the restrictions contained in this Agreement);

b. Cooperatively carry out the purposes of SGMA;

c. Become a GSA for purposes of management of the Subbasin in accordance with SGMA; and

d. Develop, adopt and implement a legally sufficient GSP for the Subbasin, subject to the limitations set forth in this Agreement.

3.6 **Powers of the Agency.** To the extent authorized through the Board of Directors, and subject to the limitations set forth in this Agreement, the Agency shall have and may exercise any and all powers commonly held by the Members in pursuit of the Agency's purposes, as described in Article 3.5, including but not limited to the power:

a. To exercise all powers granted to a GSA under SGMA;

b. To take any action for the benefit of the Members and Affiliated Parties necessary or proper to carry out the purposes of the Agency as provided in this Agreement and to exercise all other powers necessary and incidental to the exercise of the powers set forth herein;

c. To levy, impose and collect reasonable taxes, fees, charges, assessments and other levies to implement the GSP and/or SGMA;

d. To borrow funds and to apply for grants and loans for the funding of activities within the purposes of the Agency;

e. To adopt rules, regulations, policies, bylaws and procedures related to the purposes of the Agency;

f. To sue and be sued; and

g. To issue revenue bonds.

3.7 **Powers Reserved to Members.** Each of the Members reserves the right, in its sole and absolute discretion, to become a GSA and to exercise the powers conferred to a GSA within the Member's boundaries in accordance with Article 6.7 of this Agreement.

3.8 **Relationship of Members and Affiliated Parties to Each Other.** Each Member and each Affiliated Party shall be individually responsible for its own covenants, obligations and liabilities under this Agreement. No Member or Affiliated Party shall be deemed to be the agent of, or under the direction or control of, or otherwise have the right or power to bind, any other Member or Affiliated Party without the express written consent of the Member or Affiliated Party.

3.9 **Term.** This Agreement shall be effective as of the Effective Date and shall remain in effect until terminated in accordance with Article 6.5 of this Agreement.

3.10 **Boundaries of the Agency**. The geographic boundaries of the Agency and that portion of the Subbasin that will be managed by the Agency pursuant to SGMA are depicted in Exhibit B**.**

3.11 **Role of Members and Affiliated Parties.** Each Member and Affiliated Party agrees to undertake such additional proceedings or actions as may be necessary in order to carry out the terms and intent of this Agreement. The support of each Member and each Affiliated Party is required for the success of the Agency. This support will involve the following types of actions:

a. The Members and Affiliated Parties will provide support to the Board of Directors and any third party facilitating the development of the GSP by making available staff time, information and facilities within available resources.

b. Policy support shall be provided by the Members and Affiliated Parties to either approve, or respond quickly to, any recommendations made as to funding shares, operational decisions, fare structures, and other policy areas.

c. Each Member and Affiliated Party shall contribute its share of operational fund allocations, as established and approved by the Board of Directors in the Agency's annual budget.

d. Contributions of public funds and of personnel, services, equipment or property may be made to the Agency by any Member or Affiliated Party for any of the purposes of this Agreement, provided that no repayment will be made by the Agency for such contributions in the absence of a separate written contract between the Agency and the contributing Member or Affiliated Party.

e. To the extent that Members and Affiliated Parties make personnel available to the Agency as contemplated under the provisions of Section 3.11, the Members acknowledge and agree that at all times such personnel shall remain under the exclusive control of the Member or Affiliated Party supplying such personnel. The Agency shall not have any right to control the manner or means in which such personnel perform services. Rather, the Member or Affiliated Party supplying personnel shall have the sole and exclusive authority to do the following:

(i) Make decisions regarding the hiring, retention, discipline or termination of personnel. The Agency will have no discretion over these functions.

(ii) Determine the wages to be paid to personnel, including any pay increases. These amounts shall be determined in accordance with the Member or Affiliated Party's published publicly available pay schedule, if any, and shall be subject to changes thereto approved by its governing body.

(iii) Set the benefits of its personnel, including health and welfare benefits, retirement benefits and leave accruals in accordance with the Member or Affiliated Party's policies.

(iv) Evaluate the performance of its personnel through performance evaluations performed by a management level employee that reports directly to a representative of the Member or Affiliated Party or its governing body.

(v) Perform all other functions related to the service, compensation or benefits of any personnel assigned to perform services on behalf of the Agency.

3.12 **Employees**. The Members do not anticipate that the Agency will have any employees. However, the Agency may do any of the following:

a. Engage one or more Members or third parties to manage any or all of the business of the Agency on terms and conditions acceptable to the Board of Directors as specified in a separate written contract. To the extent that a manager is appointed, the manager shall at all times maintain exclusive control over any employees of the manager assigned to perform services under the manager's contract with the Agency, including, but not limited to, matters related to hiring, probationary periods, disciplinary action, termination, benefits, performance evaluations, salary determinations, promotions and demotions, and leave accruals.

b. The Board shall have the power to contract with competent registered civil engineers and other consultants to investigate and to carefully devise a plan or plans to carry out and fulfill the objects and purposes of SGMA, and complete a GSP.

3.13 **Participation of Affiliated Parties**. The Agency shall allow Affiliated Parties to participate in the governance of the Agency and on its Board of Directors in the same manner as Members, provided that each Affiliated Party agrees, through a memorandum of understanding ("MOU") with the Agency, to adhere to all applicable terms of this Agreement, including the payment of the Affiliated Party's assigned share of operational fund allocations, as established by the Board of Directors in the annual budget. The MOU may include provisions tailored to the unique circumstances or characteristics of the Affiliated Parties. The MOU shall also address, without limitation, the nature and extent of any obligations of the Agency to hold harmless, defend and indemnify Affiliated Parties. The designated representative of an Affiliated Party shall join the Board of Directors as soon as that Affiliated Party has entered into an MOU with the Agency. Affiliated Parties shall have the right to withdraw from participation in the governance of the Agency and on the Board of Directors, subject to the provisions of the MOU between the Agency and that Affiliated Party. Entities not listed in Exhibit C may request to be included as Affiliated Parties, and the Board of Directors shall decide whether to allow such entities to become Affiliated Parties in accordance with Article 6.1.

ARTICLE 4: GOVERNANCE

4.1 **Board of Directors**. The business of the Agency will be conducted by a Board of Directors that is hereby established and that shall be initially composed of one representative from each of the Members and one representative from each of the Affiliated Parties. Without amending this Agreement, the composition of the Board of Directors shall be altered from time to time to reflect the withdrawal or involuntary termination of any Member or Affiliated Party

and/or the admission of any new Member or Affiliated Party. Each Member and each Affiliated Party will appoint one member of the Agency Board of Directors. Each Member and each Affiliated Party may designate one alternate to serve in the absence of that Member's or Affiliated Party's appointed Director. All members of the Agency Board of Directors and all alternates will be required to file a Statement of Economic Interests (FPPC Form 700). Each Member and each Affiliated Party shall notify the Agency in writing of its designated representative on the Agency Board of Directors.

4.2 **Term of Directors.** Each member of the Agency Board of Directors will serve until replaced by the appointing Member or Affiliated Party.

4.3 **Officers.** The Board of Directors shall elect a chairperson, a vice chairperson, a secretary and a treasurer. The chairperson and vice-chairperson shall be directors of the Board and the secretary and treasurer may, but need not, be directors of the Board. The chairperson shall preside at all meetings of the Board and the vice-chairperson shall act as the chairperson in the absence of the chairperson elected by the Board. The treasurer shall meet the qualifications set out in Government Code section 6505.5 as a depositary of funds for the Agency.

4.4 **Powers and Limitations**. All the powers and authority of the Agency shall be exercised by the Board, subject, however, to the rights reserved by the Members and Affiliated Parties as set forth in this Agreement.

4.5 **Quorum.** A majority of the members of the Agency Board of Directors will constitute a quorum.

4.6 **Voting.** Except as to actions identified in Article 4.7, the Agency Board of Directors will conduct all business by majority vote of those directors present. Each member of the Board of Directors will have one (1) vote. Prior to voting, the Members and Affiliated Parties shall endeavor in good faith to reach consensus on the matters to be determined such that any subsequent vote shall be to confirm the consensus of the Members and Affiliated Parties. If any Member or Affiliated Party strongly objects to a consensus-based decision prior to a vote being cast, the Members and Affiliated Parties shall work in good faith to reasonably resolve such strong objection, and, if the same is not resolved collaboratively, then the matter will proceed to a vote for final resolution under this Article 4.6 or Article 4.7, below, as applicable.

4.7 **Supermajority Vote Requirement for Certain Actions.** The following actions will require a two-thirds (2/3) vote by the directors present:

a. Approval of the Agency's annual budget;

b. Decisions related to the levying, imposition or collection of taxes, fees, charges and other levies;

c. Decisions related to the expenditure of funds by the Agency beyond expenditures approved in the Agency's annual budget;

d. Adoption of rules, regulations, policies, bylaws and procedures related to the function of the Agency;

e. Decisions related to the establishment or adjustment of the Members' or Affiliated Parties' obligations for payment of the Agency's operating and administrative costs as provided in Article 5.1;

f. Approval of a GSP;

g. Involuntary termination of a Member or Affiliated Party pursuant to Article 6.3;

h. With respect to the addition of Affiliated Parties other than those listed in Exhibit D, approval of (i) a memorandum of understanding between the Agency and any such Affiliated Parties, (ii) the addition of such Affiliated Parties to this Agreement, and (iii) a voting seat for such Affiliated Parties on the Agency Board of Directors;

i. Amendment of this Agreement; provided, however, that the provisions of Article 6.7 (Rights of Member to Become GSA in Event of Withdrawal or Termination) may be amended only by unanimous vote of the Board of Directors;

j. Modification of the funding amounts specified in Exhibit D;

k. The addition of new Members to this Agreement; and

l. Termination of this Agreement.

4.8 **Meetings.** The Board shall provide for regular and special meetings in accordance with Chapter 9, Division 2, Title 5 of Government Code of the State of California (the "Ralph M Brown Act" commencing at section 54950), and any subsequent amendments of those provisions.

4.9 **By-Laws.** The Board may adopt by-laws to supplement this Agreement. In the event of conflict between this Agreement and the by-laws, the provisions of this Agreement shall govern.

4.10 **Administrator.** The Members hereby designate Yolo County Flood Control and Water Conservation District to serve as administrator of, and keeper of records for, the Agency.

ARTICLE 5: FINANCIAL PROVISIONS

5.1 **Contributions and Expenses:** Members and Affiliated Parties shall share in the general operating and administrative costs of operating the Agency in accordance with the funding amounts set forth in Exhibit D attached hereto and incorporated herein. Each Member and Affiliated Party will be assessed quarterly, beginning on July 1 of each year. Members and Affiliated Parties shall pay assessments within thirty (30) days of receiving assessment notice from the Treasurer. Each Member and each Affiliated Party will be solely responsible for raising funds for payment of the Member's or Affiliated Party's share of the Agency's general operating and administrative costs. The obligation of each Member and each Affiliated Party to make payments under the terms and provision of this Agreement is an individual and several obligation

and not a joint obligation with those of the other Members and Affiliated Parties. Contributions of grant funding, state, federal, or county funding may be provided as funding or a portion of funding on behalf of Members and Affiliated Parties.

5.2 **Liability for Debts.** The Members do not intend through this Agreement to be obligated either jointly or severally for the debts, liabilities or obligations of the Agency, except as may be specifically provided for in Government Code § 895.2 as amended or supplemented; provided, however, that if any Member is held liable for the acts and omissions of the Agency caused by negligent or wrongful acts or omissions occurring in the performance of this Agreement, such Member shall be entitled to contribution from the other Members so that after such contribution each Member bears its proportionate share of the liability in accordance with Article 5.1 and Exhibit D. This Article 5.2 shall not apply to acts or omissions of a Member in implementing the GSP adopted by the Agency within such Member's boundaries or a Management Area managed in whole or in part by such Member.

5.3 **Indemnification.** The Agency shall hold harmless, defend and indemnify the Members and their officers, employees and agents, and members of the Agency Board of Directors, from and against any and all liability, claims, actions, costs, damages or losses of any kind, including death or injury to any person and/or damage to property arising out of the activities of the Agency or its Board, officers, employees or agents under this Agreement. These indemnification obligations shall continue beyond the Term of this Agreement as to any acts or omissions occurring before or under this Agreement or any extension of this Agreement. The obligations of the Agency to hold harmless, defend and indemnify Affiliated Parties, if any, will be addressed in the separate MOUs between the Agency and Affiliated Parties.

5.4 **Repayment of Funds**. No refund or repayment of the initial commitment of funds specified in Article 5.2 will be made to a Member or Affiliated Party ceasing to be a Member or Affiliated Party, whether pursuant to removal by the Board of Directors or pursuant to a voluntary withdrawal. The refund or repayment of any other contribution shall be made in accordance with the terms and conditions upon which the contribution was made, the terms and conditions of this Agreement or other agreement of the Agency and withdrawing Member or Affiliated Party.

5.5 **Budget**. The Agency's fiscal year shall run from July 1 through June 30. Each fiscal year, the Board shall adopt a budget for the Agency for the ensuing fiscal year. Within ninety (90) days of the effective date of this Agreement, the Board shall adopt a budget. Thereafter, a budget shall be adopted no later than June 1 of the preceding fiscal year. A draft budget shall be prepared no later than March 1 of the preceding fiscal year.

5.6 **Alternate Funding Sources.** The Board may obtain State of California or federal grants.

5.7 **Depositary.** The Board shall designate a Treasurer of the Agency, who shall be the depositary and have custody of all money of the Agency, from whatever source, subject to the applicable provisions of any indenture or resolution providing for a trustee or other fiscal agent. All funds of the Agency shall be held in separate accounts in the name of the Agency and

not commingled with funds of any Member or Affiliated Party or any other person or entity. The Treasurer shall perform the duties specified in Government Code §§6505 and 6505.5.

5.8 **Accounting.** Full books and accounts shall be maintained for the Agency in accordance with practices established by, or consistent with, those utilized by the Controller of the State of California for like public entities. The books and records of the Agency shall be open to inspection by the Members and Affiliated Parties at all reasonable times, and by bondholders and lenders as and to the extent provided by resolution or indenture.

5.9 **Audit.** A qualified firm, serving in the capacity of auditor, shall audit the records and the accounts of the Agency annually in accordance with the provisions of section 6505 of the Law. Copies of such audit reports shall be filed with the State Controller and each Member and each Affiliated Party within six months of the end of the Fiscal Year under examination.

5.10 **Expenditures.** All expenditures within the designations and limitations of the applicable approved budget shall be made upon the approval of any officer so authorized by the Agency Board of Directors. The Treasurer shall draw checks or warrants or make payments by other means for claims or disbursements not within an applicable budget only upon the approval and written order of the Board. The Board shall requisition the payment of funds only upon approval of claims or disbursements and requisition for payment in accordance with policies and procedures adopted by the Board.

5.11 **Reconsideration of Voting Structure and Expense Allocation.** No later than the first Board meeting following the two-year anniversary of the Effective Date of this Agreement, the Board of Directors shall consider whether to recommend to the Members that the voting structure described in Article 4.6 and/or the expense allocation provisions described in Article 5.1 and Exhibit D should be modified in any respect. If the Board of Directors recommends modification of Article 4.6, Article 5.1, or Exhibit D, the governing body of each Member and each Affiliated Party shall consider the modifications recommended by the Board of Directors and, within 45 days following the Board recommendation, shall report back to the Board of Directors regarding the Member's or Affiliated Party's position regarding the recommended modifications.

ARTICLE 6: CHANGES TO MEMBERSHIP, WITHDRAWAL AND TERMINATION

6.1 **Changes to Members and Affiliated Parties.** The Agency Board of Directors may, in its sole and absolute discretion, approve the addition of new Members or Affiliated Parties to the Agency by supermajority vote. In the event of Board approval of a new Member the new Member shall execute this Agreement but amendment of this Agreement will not be required. In the event of Board approval of a new Affiliated Party the new Affiliated Party shall execute a memorandum of understanding in accordance with Article 3.13. The Board of Directors shall provide all Members and Affiliated Parties with 30 days' advance written notice prior to any Board action to add a new Member or Affiliated Party.

6.2 **Noncompliance**. In the event any Member or Affiliated Party (1) fails to comply with the terms of this Agreement, or (2) undertakes actions that conflict with or undermine the functioning of the Agency or the preparation or implementation of the GSP, such Member or

Affiliated Party shall be subject to the provisions for involuntary removal of a Member or Affiliated Party set forth in of Article 6.3 of this Agreement. Such actions of a Member or Affiliated Party shall be as determined by the Board of Directors and may include, for example, failure to pay its agreed upon contributions when due, refusal to participate in GSA activities or to provide required monitoring of sustainability indicators; refusal to enforce controls as required by the GSP; refusal to implement any necessary actions as outlined by the approved GSP minimum thresholds that are likely to lead to "undesirable results" under SGMA.

6.3 **Involuntary Termination**. If the Board of Directors determines that a Member or Affiliated Party is in noncompliance as provided in Article 6.2, the Board of Directors may terminate that Member's or Affiliated Party's participation in this Agency, provided that, prior to any such vote, all of the Members and Affiliated Parties shall meet and confer regarding all matters related to the proposed removal. In the event of the involuntary termination of a Member or Affiliated Party, the terminated Member or Affiliated Party shall remain fully responsible for its proportionate share of all financial obligations and liabilities incurred by the Agency prior to the effective date of termination as specified in Article 5.1 and Exhibit D, as existing as of the effective date of termination.

6.4 **Withdrawal of Members and Affiliated Parties.** Subject to the provisions of Article 6.7, a Member or Affiliated Party may, in its sole discretion, unilaterally withdraw from participation in the Agency, effective upon ninety (90) days' prior written notice to the Agency, provided that (a) the withdrawing Member or Affiliated Party will remain responsible for its proportionate share of any obligation or liability duly incurred by the Agency, as specified in Article 5.1 and Exhibit D, as existing as of the effective date of withdrawal. A withdrawing Member or Affiliated Party will not be responsible for any obligation or liability that the Member or Affiliated Party has voted against or has voiced its disapproval on at a Board meeting, providing the Member or Affiliated Party gives notice of its withdrawal from the Agency as soon thereafter as is practicable. In the event the withdrawing Member or Affiliated Party has any rights in any property or has incurred obligations to the Agency, the Member or Affiliated Party may not sell, lease or transfer such rights or be relieved of its obligations, except in accordance with a written agreement executed by it and the Agency. The Agency may not sell, lease, transfer or use any rights of a Member or Affiliated Party who has withdrawn without first obtaining the written consent of the withdrawing Member or Affiliated Party.

6.5 **Termination of Agreement**. This Agreement and the Agency may be terminated by a supermajority vote of the Board of Directors. However, in the event of termination, each of the Members and Affiliated Parties will remain responsible for its proportionate share of any obligation or liability duly incurred by the Agency, in accordance with Article 5.1 and Exhibit D, as existing as of the effective date of termination. Nothing in this Agreement will prevent the Members or Affiliated Parties from withdrawing as provided in this Agreement, or from entering into other joint exercise of power agreements.

6.6 **Disposition of Property Upon Termination**. Upon termination of this Agreement, the assets of the Agency shall be transferred to the Agency's successor, provided that a public entity will succeed the Agency, or in the event that there is no successor public entity, to the Members and Affiliated Parties in proportion to the contributions made by each Member or Affiliated Party. If the successor public entity will not assume all of the Agency's

assets, the Board shall distribute the Agency's assets between the successor entity and the Members and Affiliated Parties in proportion to the any obligation required by Articles 5.1 or 5.6.

6.7 **Rights of Members and Affiliated Parties to Become GSA in Event of Withdrawal or Termination.** Upon withdrawal or involuntary termination of a Member or Affiliated Party, or termination of this Agreement pursuant to Article 6.5, whether occurring before or after June 30, 2017, the withdrawing or terminated Member or Affiliated Party will retain all rights and powers to become or otherwise participate in a GSA for the lands within its boundaries. In such event, the Agency and its remaining Members and Affiliated Parties shall (i) not object to or interfere with the lands in the withdrawing or terminated Member's or Affiliated Party's boundaries being in a GSA, as designated by the withdrawing or terminated Member or Affiliated Party or otherwise; (ii) facilitate such transition to the extent reasonably necessary; and (iii) where the withdrawing Member or Affiliated Party has authority under SGMA to be or participate in a GSA, withdraw from managing that portion of the Subbasin within the boundaries of the withdrawing or terminated Member or Affiliated Party and so notify the California Department of Water Resources. In order to maintain compliance with SGMA in the event of the withdrawal or involuntary termination of a Member or Affiliated Party, where the withdrawing Member or Affiliated Party has authority under SGMA to be or participate in a GSA, the withdrawal or involuntary termination will not be effective until a GSA has been established in accordance with SGMA for those lands overlying the Subbasin affected by the withdrawal or involuntary termination.

6.8 **Use of Data**. Upon withdrawal, any Member or Affiliated Party shall be entitled to use any data or other information developed by the Agency during its time as a Member or Affiliated Party. Further, should a Member or Affiliated Party withdraw from the Agency after completion of the GSP, it shall be entitled to utilize the GSP for future implementation of SGMA within its boundaries.

ARTICLE 7: SPECIAL PROJECTS

7.1 **Special Project Agreements.** Fewer than all of the Members and Affiliated Parties may enter into a special project agreement to achieve any of the purposes or activities authorized by this Agreement, and to share in the expenses and costs of such special project, for example, to share in funding infrastructure improvements within the boundaries of only those Members and Affiliated Parties and their Management Areas. Special project agreements must be in writing and documentation and must be provided to each of the Members and Affiliated Parties.

7.2 **Expenses.** Members and Affiliated Parties that enter into special project agreements agree that any special project expenses incurred for each such special project are the costs of the special project participants, respectively, and not of any other Members or Affiliated Parties not participating in the special project, and the special project expenses shall be paid by the parties to the respective special project agreements.

7.3 **Indemnification of Other Members.** Members and Affiliated Parties participating in special project agreements if conducted by the Agency, shall hold other Members and Affiliated Parties who are not parties to the special project agreement free and harmless from and indemnify each of them against any and all costs, losses, damages, claims and liabilities arising from the special project agreement. The indemnification obligation of Members and Affiliated Parties participating in special project agreements shall be the same as specified in Article 5.2 for Members and Affiliated Parties in general, except that they shall be limited to liabilities incurred for the special project.

ARTICLE 8: ACTIONS BY THE AGENCY WITHIN MANAGEMENT AREAS AND INDIVIDUAL JURISDICTIONS

8.1 **Role of the Agency.** Subject to the reservation of authority set forth in Article 8.5, the Agency will serve a coordinating and administrative role in order to provide for sustainable groundwater management of the Subbasin in a manner that does not limit any Member's or Affiliated Party's rights or authority over its own water supply matters, including, but not limited to, a Member's or Affiliated Part's surface water supplies, groundwater supplies, facilities, operations, water management and financial affairs.

8.2 **Members' and Affiliated Parties' Responsibility within Management Areas and Individual Jurisdictions.** Subject to the reservation of authority in Article 8.5, each of the Members and Affiliated Parties (or groups of Members and Affiliated Parties) will have initial responsibility to implement SGMA and the GSP adopted by the Agency within their respective Management Areas, as delineated in the GSP.

8.3 **Water Budgets.** The GSP will provide for the preparation of water budgets by Members or Affiliated Parties or groups of Members and Affiliated Parties for their respective Management Areas. The GSP will specify the elements to be included in water budgets and the timing for completion.

8.4 **Sustainability.** In the event a water budget prepared in accordance with Article 8.3 shows that groundwater pumping within a Management Area exceeds such area's sustainable yield, as defined in Cal. Water Code § 10721(v) and (w), or an "undesirable result," as defined in Cal. Water Code § 10721(x), exists, the Member or Affiliated Party or group of Members and Affiliated Parties with groundwater management responsibility over such area shall develop and implement a plan to achieve sustainability or eliminate the undesirable result within that area. The GSP will specify the elements to be included in and time requirements for implementation of the plan.

8.5 **Reservation of Authority**. In the event of a failure by a Member or Affiliated Party or group of Members or Affiliated Parties to develop and implement a plan to achieve sustainability or eliminate an undesirable result within a Management Area as provided in Article 8.4, the Agency reserves and retains all requisite authority to (i) develop and implement a plan to achieve sustainability or eliminate an undesirable result, and (ii) allocate the cost of development and implementation of such plan to Members or Affiliated Parties within such

Management Area. The GSP will specify the procedures for development and implementation of a plan by the Agency under such circumstances.

ARTICLE 9: MISCELLANEOUS PROVISIONS

9.1 **Amendments**. This Agreement may be amended from time to time by a supermajority vote of the Board of Directors; provided, however, that the provisions of Article 6.7 (Rights of Member to Become GSA in Event of Withdrawal or Termination) may be amended only by unanimous vote of the Board of Directors.

9.2 **Binding on Successors**. The rights and duties of the Members and Affiliated Parties under this Agreement may not be assigned or delegated without the advance written consent of the Agency (as evidenced by a majority vote of the Board of Directors) and any attempt to assign or delegate such rights or duties in contravention of this Article 9.2 shall be null and void. Any approved assignment or delegation shall be consistent with the terms of any contracts, resolutions, indemnities and other obligations of the Agency then in effect.

9.3 **Notice**. Any notice or instrument required to be given or delivered under this Agreement may be made by: (a) depositing the same in any United States Post Office, postage prepaid, and shall be deemed to have been received at the expiration of 72 hours after its deposit in the United States Post Office; (b) transmission by facsimile copy to the addressee; (c) transmission by electronic mail; or (d) personal delivery to the addresses or facsimile numbers of the Members and Affiliated Parties set forth in Exhibit E to this Agreement.

9.4 **Counterparts**. This Agreement may be executed by the Members in separate counterparts, each of which when so executed and delivered shall be an original. All such counterparts shall together constitute but one and the same instrument.

9.5 **Choice of Law**. This Agreement shall be governed by the laws of the State of California.

9.6 **Severability**. If one or more clauses, sentences, paragraphs or provisions of this Agreement is held to be unlawful, invalid or unenforceable, it is hereby agreed by the Members that the remainder of the Agreement shall not be affected thereby. Such clauses, sentences, paragraphs or provisions shall be deemed reformed so as to be lawful, valid and enforced to the maximum extent possible.

9.7 **Headings**. The paragraph headings used in this Agreement are intended for convenience only and shall not be used in interpreting this Agreement or in determining any of the rights or obligations of the Members to this Agreement.

9.8 **Construction and Interpretation**. This Agreement has been arrived at through negotiation and each Member has had a full and fair opportunity to revise the terms of this Agreement. As a result, the normal rule of construction that any ambiguities are to be resolved

against the drafting Member shall not apply in the construction or interpretation of this Agreement.

9.9 **Entire Agreement.** This Agreement constitutes the entire agreement among the Members and supersedes all prior agreements and understandings, written or oral. This Agreement may only be amended by written instrument executed by all Members.

IN WITNESS WHEREOF, the Members have executed this Agreement on the day and year first above-written to form and establish the Yolo Subbasin Groundwater Agency.

City of Davis

By: _____
Robb Davis, Mayor

ATTEST:

By: _____
Zoe Mirabile, City Clerk

APPROVED AS TO FORM:

By: _____
Harriet Steiner, City Attorney

City of West Sacramento

By: _____
Christopher L. Cabaldon, Mayor

ATTEST:

By: _____
Kryss Rankin, City Clerk

APPROVED AS TO FORM:

By: _____
Jeffrey Mitchell, City Attorney

City of Winters

By: _____
Wade Cowan, Mayor

ATTEST:

By: _____
Nanci G. Mills, City Clerk

APPROVED AS TO FORM:

By: _____
Ethan Walsh, City Attorney

City of Woodland

By: _____
Angel Barajas, Mayor

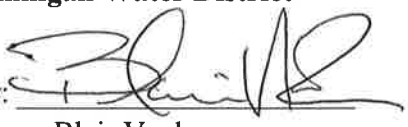
ATTEST:

By: _____
Ana Gonzalez, City Clerk

APPROVED AS TO FORM:

By: _____
Kara Ueda, City Attorney

Dunnigan Water District

By: 
Name: Blair Voelz
Its: President

Esparto Community Services District

By: _____
Name: Charlie Schaupp
Its: Chair

Madison Community Services District

By: _____
Name: Steve Gomez
Its: Chair

Reclamation District 108

By: _____
Name: Frederick "Fritz" Durst
Its: President

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Its: President

Reclamation District 537

By: _____
Name: KRISTEN E. PLOMAN
Its: PRESIDENT

Reclamation District 827

By: _____
Name: Daniel F. Ramos
Its: President

Reclamation District 730

By: _____
Name: James Heidrick
Its: Trustee

Reclamation District 1600

By: _____
Name: Kent Lang
Its: President

Reclamation District 765

By: _____
Name:
Its:

Reclamation District 2035

By: _____
Name: Robert Thomas
Its: President

Reclamation District 785

By: _____
Name: Ross Peabody
Its: President

Yocha Dehe Wintun Nation

By: _____
Name: James Kinter
Its: Tribal Secretary

Reclamation District 787

By: _____
Name: Roger Cornwell
Its: President

Yolo County Flood Control and Water Conservation District

By: _____
Name: Erik Vink
Its: Chair

Reclamation District 537

By: _____
Name:
Its:

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Reclamation District 787

By: _____
Name: Roger Cornwell
Its: President

Yolo County Flood Control and Water Conservation District

By: _____
Name: Erik Vink
Its: Chair

Yolo County

By: _____
Duane Chamberlain, Chair
Board of Supervisors

APPROVED AS TO FORM:

By: _____
Philip J. Pogledich, County Counsel

ATTEST: Julie Dachtler, Deputy Clerk
Board of Supervisors

By: _____
Deputy (SEAL)

Exhibit A
List of Members

Member Agencies
City of Davis
City of West Sacramento
City of Winters
City of Woodland
Dunnigan Water District
Esparto Community Service District (CSD)
Madison CSD
Reclamation District (RD) 108
RD 537
RD 730
RD 765
RD 785
RD 787
RD 827
RD 1600
RD 2035
Yocha Dehe Wintun Nation
Yolo County
Yolo County Flood Control and Water Conservation District

Exhibit B

Map of Agency Boundaries

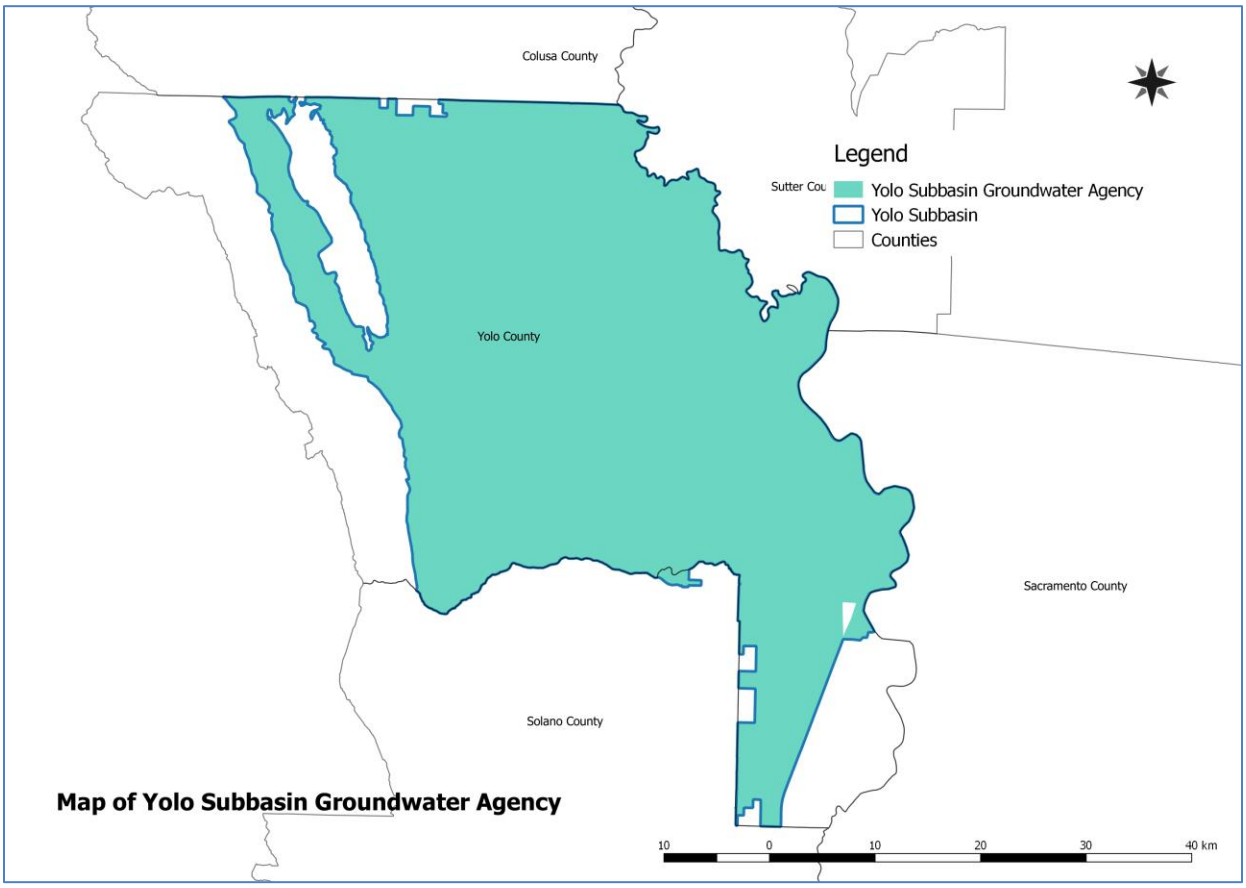

Exhibit C

List of Affiliated Parties

Affiliated Parties
California American Water Company -- Dunnigan
Colusa Drain Mutual Water Company
Environmental Party**
University of California, Davis
Private Pumper Representative as appointed by Yolo County Farm Bureau

**To be determined.

Exhibit D

Funding Amounts

It is proposed that administrative fees in the range of approximately $400,000 to $500,000 per year be collected for the first two years of the GSA. **After two years, the fee structure will be revisited and adjusted as appropriate.**

Key

Blue = JPA Parties and Existing WRA member

Orange = JPA Parties

Entity Contributions	
Municipal Agencies	**$**
City of Davis	$40,000
City of Woodland	$40,000
City of West Sacramento	$40,000
City of Winters	$20,000
Yocha Dehe Wintun Nation	$10,000
Esparto CSD	$5,000
Madison CSD	$5,000
	$160,000

Entity Contributions			
Rural Agencies ($0.50/acre)	0.5	**Acres**	**$**
Yolo County Flood Control & WCD		200,000	$100,000
Yolo County (White Areas)*		160,000	$40,000
Direct Contributions (White Areas)**		40,000	$20,000
Other Contributions from Rural Agencies***			$40,000
Dunnigan Water District		10,700	$5,350
RD 108		23,200	$11,600
RD 2035		18,000	$9,000
RD 537		5,200	$2,600
RD 730		4,498	$2,249
RD 765		1,400	$700
RD 785		3,200	$1,600
RD 787		9,400	$4,700
RD 827		1,225	$613
RD 1600		6,924	$3,462
		483,747	$241,874

**Yolo County is not $0.50/acre*

***Direct Contributions from private pumpers currently residing in "white areas"*

****RD 108, RD 787, RD 2035, and YCFCWCD ($10,000/each)*

Affiliated Parties with Board Voting Seats		
1	Base	**$**
University of California, Davis		$40,000
Colusa Drain Mutual Water Company		$10,000
California American Water Company - Dunnigan		$5,000
Yolo County Farm Bureau		$10,000
Environmental Party - TBD		
		$65,000

Sub Total:	$466,874

Exhibit E

Addresses for Notice

City of Davis
23 Russell Boulevard
Davis, CA 95616

Reclamation District 108
975 Wilson Bend Road
Grimes, CA 95950

Reclamation District 1600
429 First Street
Woodland, CA 95695

City of West Sacramento
1110 West Capitol Avenue
West Sacramento, CA 95691

Reclamation District 537
P.O. Box 822
West Sacramento, CA 95691

Reclamation District 2035
45332 County Road 25
Woodland, CA 95776

City of Winters
318 First Street
Winters, CA 95694

Reclamation District 730
429 First Street
Woodland, CA 95695

Yocha Dehe Wintun Nation
P.O. Box 18
Brooks, CA 95606

City of Woodland
300 First Street
Woodland, CA 95695

Reclamation District 765
1401 Halyard Drive Suite 140
West Sacramento, CA 95691

Yolo County
625 Court Street Room 206
Woodland, CA 95695

Dunnigan Water District
3817 First Street
Dunnigan, CA 95937

Reclamation District 785
429 First Street
Woodland, CA 95695

Yolo County Flood Control and Water Conservation District
34274 State Highway 16
Woodland, CA 95695

Esparto CSD
26490 Woodland Avenue
Esparto, CA 95627

Reclamation District 787
41758 County Road 112
Knights Landing, CA 95645

Madison CSD
2896 Main Street
Madison, CA 95653

Reclamation District 827
P.O. Box 781
West Sacramento, CA 95691

As allowed by Articles 6.1 and 9.4 of this YSGA Joint Powers Agreement, the following New Members were approved by the Board of Directors and formally added to the YSGA in 2019.

Reclamation District 999

By: Tom Slater
Name: Tom Slater
Its: President

Reclamation District 150

By: _____
Name: Warren Bogle
Its: President

Reclamation District 307

By: _____
Name: Pete Dwyer
Its: President

As allowed by Articles 6.1 and 9.4 of this YSGA Joint Powers Agreement, the following New Members were approved by the Board of Directors and formally added to the YSGA in 2019.

Reclamation District 999

By: _____
Name: Tom Slater
Its: President

Reclamation District 150

By: _____
Name: Warren Bogle
Its: President

Reclamation District 307

By: _____
Name: Pete Dwyer
Its: President

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Reclamation District 999

By: _____
Name: Tom Slater
Its: President

Reclamation District 150

By: _____
Name: Warren Bogle
Its: President

Reclamation District 307

By: _____
Name: Peter G. Dwyer, Jr.
Its: President

Yolo Subbasin Groundwater Agency
2022 Groundwater Sustainability Plan

Yolo County, CA

Appendix B

Communication and Engagement Plan

Communication and Engagement Plan

for Groundwater Sustainability Plan Development and Implementation in the Yolo Subbasin

Table of Contents

Contents

SGMA and Stakeholder Outreach

Our goal is to involve stakeholders and the public through the Groundwater Sustainability Plan (GSP) development and implementation process to ensure stakeholders' concerns, issues, and desires are continually understood and considered in the YSGA's decision-making process.

In compliance with GSP Regulations (Section 354.10), Yolo Subbasin Groundwater Agency's (YSGA) Communication and Engagement Plan has the following objectives:

1. To describe the YSGA's decision-making process,
2. To identify opportunities for public engagement and discuss how public input and response will be used to review the GSP,
3. To detail how the YSGA encourages the active involvement of diverse social, cultural, and economic elements of the population within the Yolo Subbasin, and
4. To outline the methods the YSGA will follow to inform the public about developing and implementing the GSP.

Unfortunately, public outreach and engagement opportunities during the development of the Yolo Subbasin GSP were limited because of the Governor's March 2020 state of emergency declaration and the continued the threat of COVID-19. The YSGA posted a draft version of this communication and engagement plan on the website at yologroundwater.org; however, there was not a rigorous effort to share this document during GSP development because meetings were limited to virtual platforms and the on-the-ground outreach and workshops envisioned were not feasible.

During the implementation period of the GSP, communication and engagement will continue to focus on accomplishing the objectives described above. A priority of the YSGA will be to ensure disadvantaged communities (DACs) and tribal stakeholders are involved in the GSP implementation process through effective and consistent communication and engagement.

Introduction to the Yolo Subbasin

The Yolo Subbasin is in the southwestern side of the Sacramento Valley Groundwater Basin and is about 27 miles wide from west to east and up to 45 miles long from north to south. The subbasin is a result of the consolidation of portions of the Capay Valley, Colusa, and Solano Subbasins with the Yolo Subbasin.

The western portion of the Yolo Subbasin is bound to the west by the uplifted, mountainous coast range consisting of marine sedimentary rocks. Within these nonmarine sedimentary deposits, fresh groundwater extends to an elevation of -3,000 feet. Cache Creek enters the subbasin at the northwest portion and flows south and east through the central part of the subbasin and the eastern boundary of the subbasin is coincident with the Sacramento River. Putah Creek forms the southern boundary from the southwestern edge of the basin to the City of Davis at which time the subbasin boundary follows the county line to the south.

The Yolo Subbasin consists of four cities (Davis, West Sacramento, Winters, and Woodland), nine census designated places (Clarksburg, Dunnigan, Esparto, Guinda, Knights Landing, Madison, Monument Hill, University of California, Davis, and Yolo), and 41 unincorporated communities. The majority of the Yolo Subbasin remains a relatively rural agricultural region, and it covers a wide range of stakeholder interests – private users, water service providers, land use authorities, urban users, business interests, public agencies, and the general public.

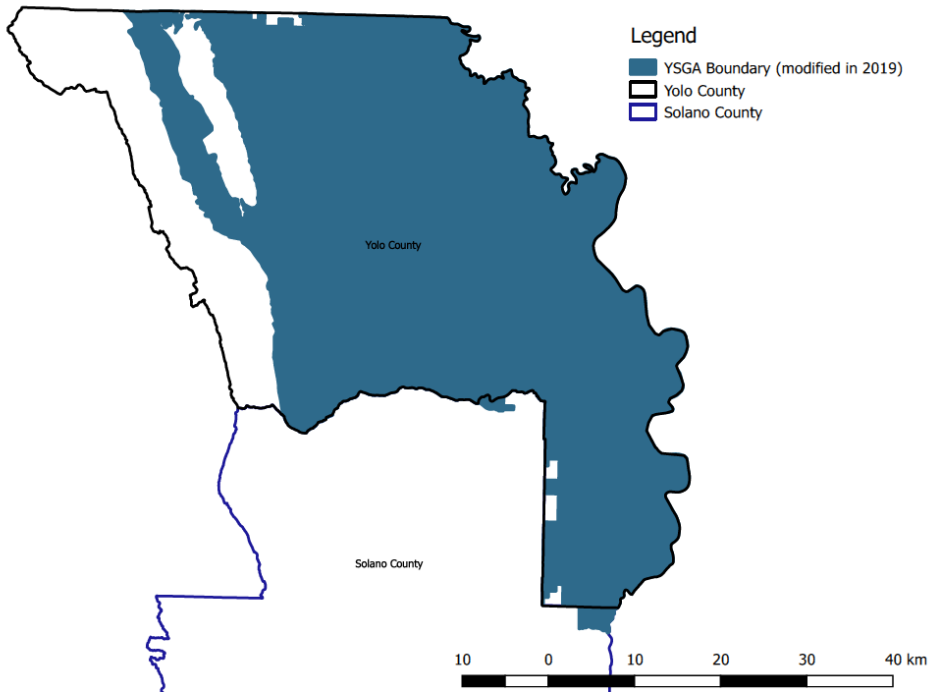


Figure 1. Yolo Subbasin Groundwater Sustainability Agency Boundary

Initial SGMA Efforts in the Yolo Subbasin

GSA Formation

Water interests in the Yolo Subbasin worked together for three years to develop an efficient and effective groundwater governance structure for complying with and implementing the basin-scale Sustainable Groundwater Management Act (SGMA). The overarching principle behind the formation was to continue and extend the cooperative, collaborative approach practiced for the past three decades by the Water Resources Association of Yolo County (WRA).

History of WRA

The WRA was established in 1993 to serve as a collaborative, consensus-based regional forum to plan, coordinate, and facilitate solutions to water management issues in Yolo County. In 2007, the WRA developed the Yolo Integrated Regional Water Management Plan (IRWMP), which serves as the road map for water resource planning in the region and is a component of the Westside-Sacramento IRWMP. The WRA has succeeded in securing millions of dollars of funding for its member agencies in areas of water efficiency, groundwater management, water quality, and environmental and recreational protection and enhancement.

Local implementation of the Sustainable Groundwater Management Act

In 2014, the California Legislature and Governor Brown signed into legislation the SGMA. This Legislation called for local management of groundwater basins to achieve and ensure groundwater sustainability. From the beginning, Yolo County interests approached this implementation process in a collaborative fashion that capitalized on the existing relationships among the parties and the robust groundwater monitoring network that has been in place for over 40 years. Recognizing and building on these values, eligible entities came together and accomplished the following in forming the Groundwater Sustainability Agency (GSA) for the Yolo Subbasin:

- Partnered with the Yolo County Farm Bureau to inform and educate the local landowners and Cities about the Legislation ("Year of Groundwater").
- Submitted multiple basin boundary modification requests to the California Department of Water Resources (DWR) to consolidate the original four Bulletin 118 groundwater subbasins into a single Yolo Subbasin.
- Developed a conceptual governance structure to maintain governance and decision making at the lowest (grassroots) level allowed by the Legislation while protecting and preserving the autonomy and authorities of local agencies.
- Collaborated in developing a single GSA for managing groundwater in the Yolo Subbasin to meet the June 30, 2017 deadline.
- Proposed a fee and voting structure for the GSA that attempted to equitably distribute the roles and responsibilities of implementing agencies and interested parties.
- Started planning processes, utilizing the GSA, to write the Groundwater Sustainability Plan (GSP) for the Yolo Subbasin by or before the January 1, 2022 deadline.

Yolo Subbasin Groundwater Agency Joint Powers Authority Formation

The Yolo SGMA Working Group (consisting of eligible entities and affiliated parties) proposed forming a new Joint Powers Authority for SGMA implementation in the Yolo Subbasin, which provides economies of scale to all participants, honors the regional community, recognizes the value of county partnerships, and creates shared accountability for the shared water resources on which we all depend. During the formation of the management structure of the YSGA, an equal partners' approach was used to help the subbasin-wide management agency be successful, which resulted in multiple signatories feeling mutually respected by each other. One voting board seat per signatory was recommended by the Yolo SGMA working group (for both the JPA and MOU signatories).

The YSGA's Joint Powers Agreement (JPA) was officially executed on June 19, 2017 by 19 member agencies and five affiliated parties via memoranda of understandings. Since the YSGA has formed, three additional member agencies have signed onto the JPA, three other member agencies consolidated into one member agency, and an affiliated party has signed onto the JPA, which has resulted in 20 member agencies and six affiliated parties for a total of 26 YSGA members (listed below).

YSGA JPA Membership

1. City of Davis
2. City of West Sacramento
3. City of Winters
4. City of Woodland
5. County of Yolo
6. Dunnigan Water District
7. Esparto Community Service District
8. Madison Community Service District
9. Reclamation District 108
10. Reclamation District 150
11. Reclamation District 307
12. Reclamation District 537 (Consolidation of RD 537, 785, and 827)
13. Reclamation District 730
14. Reclamation District 765
15. Reclamation District 787
16. Reclamation District 999
17. Reclamation District 1600
18. Reclamation District 2035
19. Yocha Dehe Wintun Nation
20. Yolo County Flood Control & Water Conservation District

YSGA Affiliated Membership

- California American Water Company, Dunnigan
- Colusa Drain Mutual Water Company
- Private Pumper Representative - Yolo County Farm Bureau appointed
- University of California, Davis
- Environmental Party Representative
- Rumsey Water Users Association

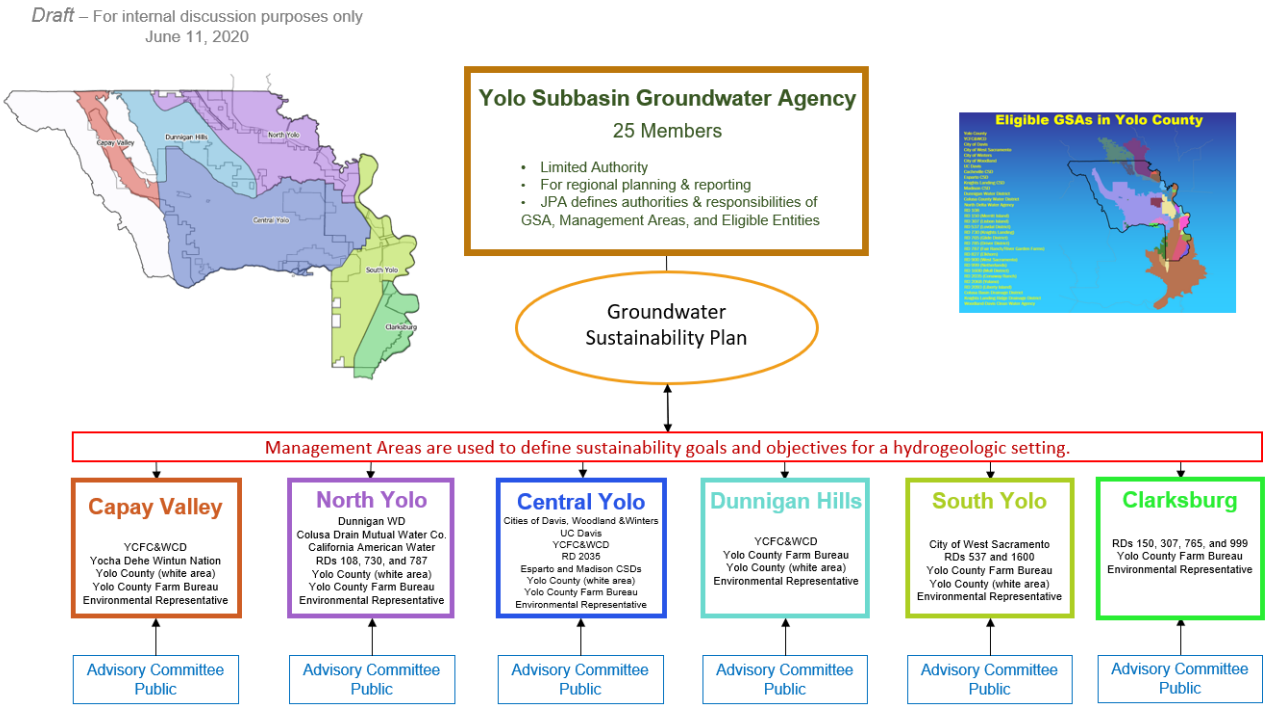


Figure 2. Yolo Subbasin Groundwater Sustainability Agency Management Area Diagram

Sustainable Groundwater Planning Grant

The YSGA received a $1M planning grant from the Department of Water Resources to assist in the development of the Yolo Subbasin GSP. The Yolo County Flood Control and Water Conservation District is acting as the fiscal entity for this grant and is administering the reimbursement process for the YSGA. The table below summarizes the schedule for utilizing state funding to develop the Yolo Subbasin GSP.

Table 1. GSP Planning Grant Schedule

Categories	Start Date	End Date
Project Administration	11/13/2017	1/31/2022
Stakeholder Engagement	9/26/2017	1/31/2022
Planning Activities	1/1/2015	12/31/2021
GSP Development	1/1/2019	12/31/2021

YOLO SUBBASIN GSP PLANNING PROCESS

The major components of the GSP planning process are listed below and illustrated in Figure 3:

1. Water Budget
2. Hydrogeologic Conceptual Model
3. Stakeholder Communication and Engagement
4. Groundwater Monitoring and Reporting
5. Surface Water and Groundwater Modeling

6. Sustainable Management Criteria

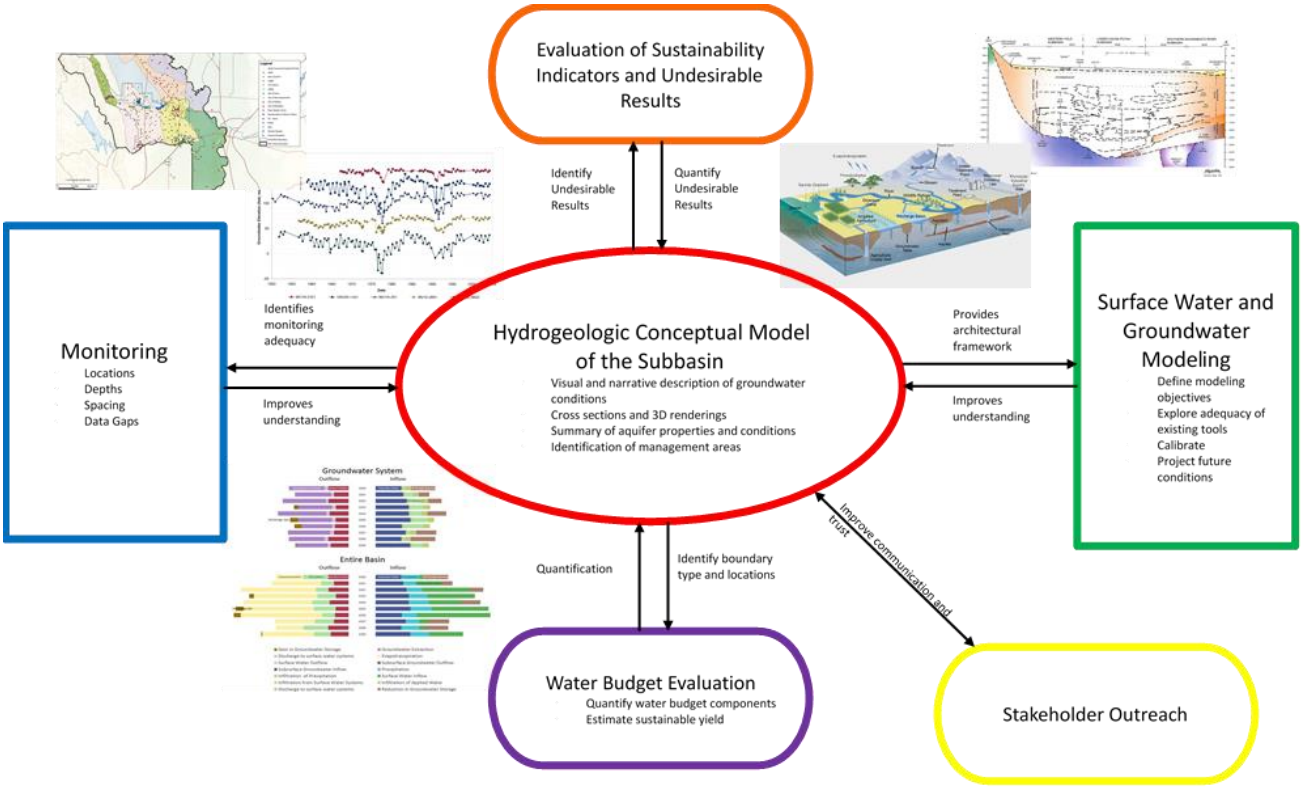


Figure 3. Groundwater Sustainability Plan Components Schematic

Water Budgets

The YSGA has chosen to work with the Stockholm Environment Institute (SEI) to develop the Yolo Subbasin Water Budget. SEI's Water Evaluation and Planning model (WEAP) is built on a basic principle of water balance accounting. All the processes in the hydrologic cycle are simulated by WEAP, and the database provides a system for maintaining and updating water demand and supply information. The current model that has been modified for use in the Yolo Subbasin is an enhancement of a published Cache Creek model built by SEI with the YCFC&WCD in 2011. WEAP has been coupled with MODFLOW to simulate the groundwater system more accurately. MODFLOW is the USGS modular finite-difference flow model that is widely used by hydrogeologists around the world to simulate the flow of groundwater through aquifers.

As part of this effort, as much data and information has been culled from member agencies to obtain the missing details for comprehensively developing the Yolo Subbasin Water Budget. The water budget includes the quantification of current, historical, and projected water budgets at the subbasin-level; an estimate of sustainable yield; and description of inflows, outflows, and change in storage. The model has been, and will continue, to be used to evaluate candidate sustainable management criteria and projects and management actions to assess measure performance for achieving basin-wide

sustainability. The Water Budget takes into consideration projected changes in climate, land use, and population, and will be calculated into the future for 50 years under several projections.

Hydrogeologic Conceptual Model

The YSGA has a significant amount of historical data, and numerous technical reports that were produced on behalf of the member agencies. Historical reports and empirical data that have been gathered have been the main source of information used to develop the Hydrogeologic Conceptual Model (HCM). A search of reports that have been created in the different parts of the Yolo Subbasin was conducted during the development of the HCM and Water Budget.

Communication and Engagement

The YSGA has developed this Communication and Engagement Plan to complete this component of the GSP requirement, and to develop a framework for improved communication during the GSP development and implementation process.

Groundwater Monitoring and Reporting

The members of the YSGA have an extensive groundwater level monitoring network that has been utilized for over 60 years comprising over 450 monitoring, agricultural, and domestic wells. There are also 12 wells that are outfitted with continuous, real-time telemetry. The data gathered from each agency is currently reported to the YSGA and included in the Water Resources Information Database (WRID).

The groundwater monitoring and reporting portion of the Yolo Subbasin GSP is captured in two tasks of the GSP Work Plan: 1) Monitoring Network Update and 2) Data Management System Update.

Surface Water and Groundwater Modeling

The coupling of WEAP and MODFLOW has created the Yolo Subbasin's surface water and groundwater "model". The model and participatory workshops will also be used to evaluate candidate sustainable management criteria and projects and management actions to assess how suggested measures may perform as tools for achieving basin-wide sustainability. The water budget simulations for future conditions will consider projected changes in climate, land use, and population for 50 years from present.

Sustainable Management Criteria

The development and implementation of the Sustainable Management Criteria is a culmination of the Hydrogeologic Conceptual Model, Water Budget, Monitoring Network Update, Data Management System Update, and Stakeholder Communication and Engagement tasks. The results of the WEAP/MODFLOW model, the hydrogeologic conceptual model, and data collected from the monitoring network have been, and will continue to be, used to inform the stakeholders of current conditions within the subbasin and to provide input for the development of measurable objectives and minimum thresholds for each sustainability indicator.

The criteria are also based on the information gathered during working group, committee, and entity meetings. During the implementation period, after the measurable objectives and minimum thresholds have been established, it may be necessary for the YSGA to develop surface water and groundwater management actions designed to enable the YSGA to achieve its sustainability objectives and avoid the occurrence of undesirable results. These management actions will be evaluated by the YSGA members and may not be necessary for each management area.

GSP Development Process in the Yolo Subbasin

GSP Development

The GSP Technical Team has served as the primary lead on developing and implementing the Yolo Subbasin GSP. The GSP Technical Team has and will conduct technical studies and investigations, including water budget analyses, groundwater modeling, sustainable management criteria evaluation, and drafting of the GSP sections. The GSP Technical Team consists of key staff from Yolo County Flood Control and Water Conservation District and selected consultants. The Technical Team will receive, evaluate, and respond to public input, incorporating modifications to processes and key components of GSP development and implementation, as necessary. The GSP Technical Team will keep the Working Group and Board of Directors updated and make recommendations regarding GSP development and implementation (refer to Figure 4 for GSP components).

Governing Body

The business of the YSGA is conducted by a Board of Directors established by the JPA that is composed of one representative from each of the Members and one representative from each of the Affiliated Parties. Each member of the YSGA Board of Directors serves until replaced by the appointing Member or Affiliated Party. The Board of Directors elected a chairperson, vice chairperson, secretary, and treasurer. All the powers and authority of the YSGA are exercised by the Board, subject, however, to the rights reserved by the Members and Affiliated Parties.

YSGA Board of Directors conduct most business by majority vote of those directors present. The following actions require a two-thirds vote by the directors present:

a. Approval of the Agency's annual budget;
b. Decisions related to the levying, imposition or collection of taxes, fees, charges, and other levies;
c. Decisions related to the expenditure of funds by the Agency beyond expenditures approved in the Agency's annual budget;
d. Adoption of rules, regulations, policies, bylaws and procedures related to the function of the Agency;
e. Decisions related to the establishment or adjustment of the Members' or Affiliated Parties' obligations for payment of the Agency's operating and administrative costs as provided in the JPA (Article 5.1);
f. Approval of the GSP;
g. Involuntary termination of a Member or Affiliated Party;
h. Approval of the addition of a Member or Affiliated Party;
i. Amendment and termination of the JPA Agreement; and
j. Modification of the Member and Affiliated Party fees.

Appointment of Executive Officer

The Executive Officer administers the activities of the YSGA and is the primary point of contact with the Board Chair. Among other duties, the Executive Officer works with the Board Chair and Vice Chair to establish Board of Directors' meeting agendas, carry out the directives of the Board of Directors, and coordinate the activities of the Working Group.

Establishment of Executive Committee

The Executive Committee administers the YSGA in accordance with policies and procedures as established by the Board. The Executive Committee is comprised of the Chair, the Vice Chair, the Executive Officer, an Urban Representative, and an Agricultural Representative. The Executive Committee shall meet at least twice each quarter and the Chair of the Executive Committee may convene additional Committee meetings as circumstances require. The main purpose of the Executive Committee is to provide direction to the Executive Officer, address administrative issues in a timely manner, and help prepare and review Board agendas. All meetings are open to the public and properly noticed in accordance with the "Brown Act".

Establishment of the Working Group

The process of creating the YSGA to oversee implementation of the SGMA in the Yolo Subbasin relied heavily on input and feedback from stakeholders working collaboratively in what was called the "Working Group".

This Working Group, which consisted of member agency staff, policymakers, and any other interested stakeholders that wished to participate, proved an effective forum for vetting issues and achieving consensus. At the June 2017 Board meeting, the Working Group was established as an official subcommittee of the YSGA and was charged with developing recommendations and providing guidance to the Board on the development and implementation of the GSP and other matters related to the efficient management of the YSGA.

Establishment of the Technical Advisory Committee

The GSP Technical Team identified the need to have a smaller committee of technical stakeholders involved in developing the Groundwater Sustainability Plan, also known as the Technical Advisory Committee (TAC). The TAC's role is to advise the GSP Technical Team and Working Group in making sound technical decisions. The TAC will be involved in reviewing the representative well selection process, evaluating the analysis or process for developing the sustainable management criteria, and advising on other processes necessary to complete the GSP.

Decision-Making Process

In forming the YSGA, the Members created a separate legal entity for the purpose of acting as the GSA for the Yolo Subbasin. Members agreed to serve a coordinating and administrative role regarding SGMA compliance within the Subbasin.

The YSGA Board of Directors will be approving and adopting the Yolo Subbasin GSP as allowed

Figure 1. Decision Making Process

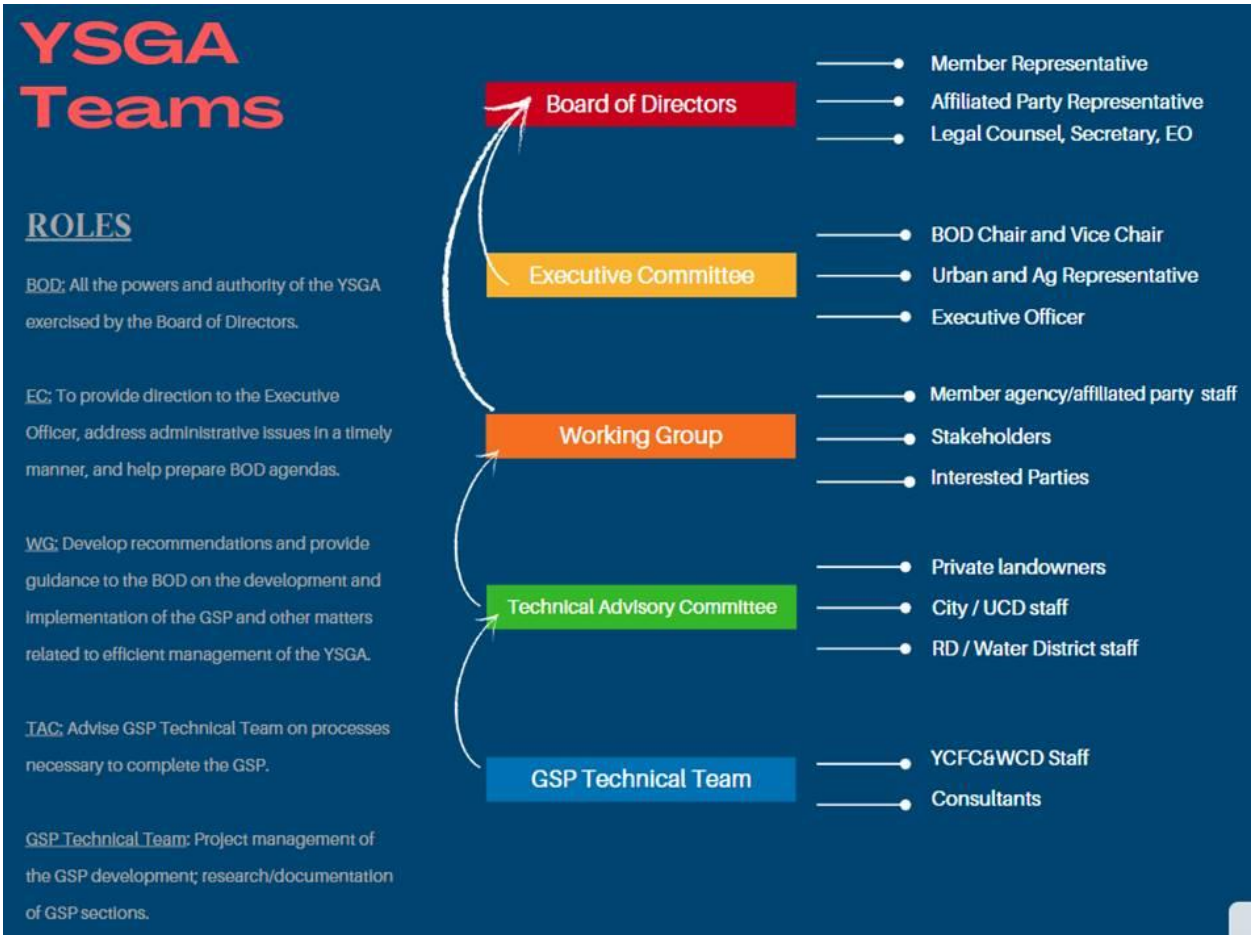


Table 1. Roles in GSP development

Group	Who	Role in GSP Development
GSP Technical Team	• YCFC&WCD staff • Consultants	• Management of GSP development and implementation • Research, documentation, and update of GSP sections
YSGA Technical Advisory Committee	• Grant Davids (Private Landowner) • Kurt Balasek (City of Winters) • Bill Vanderwaal (RD 108/Dunnigan Water District) • Matt Cohen (City of Woodland) • Camille Kirk (UC Davis) • Ken Loy (Private Landowner) • Bill Brewster/Barrett Kaasa (DWR)	• Advise GSP Technical Team on processes necessary to complete the GSP ○ SEI Model – Future Land Use projections ○ Representative Wells Selection ○ Sustainable Management Criteria: sustainability indicator, sustainability goal, etc.

YSGA Working Group	• Member agency staff • Affiliated party staff • Stakeholders • Interested parties	• Develop recommendations and provide guidance to the YSGA Board on the development and implementation of the GSP and other matters related to the efficient management of the YSGA
YSGA Executive Committee	• YSGA Board of Directors Chair and Vice Chair • YSGA Executive Officer • Urban Representative • Agricultural Representative	• To provide direction to the Executive Officer, address administrative issues in a timely manner, and help prepare and review Board agendas
YSGA Board of Directors	• One representative and alternative representative from each of the Members and Affiliated Parties	• All the powers and authority of the YSGA are exercised by the Board.
Interested Parties	• Holders of overlying groundwater rights, including agricultural users, domestic well owners • Municipal well operators • Public water systems • Local land use planning agencies • Environmental users of groundwater • Surface water users (if there is a hydrologic connection) • The federal government, including the military and managers of federal lands • California Native American tribes • Disadvantaged communities, including those served by private domestic wells or small community water systems • Entities monitoring under the California Statewide Groundwater Elevation Monitoring (CASGEM) Program	• Beneficial users • Stakeholders • Critical piece of the GSP to provide anecdotal information and engage in citizen science monitoring

Goals and Desired Outcomes

The YSGA is trying to accomplish the following goals:

- Compliance with SGMA regulations for stakeholder engagement (all beneficial users identified)
- A comprehensive GSP that ensures operations within the Yolo Subbasin result in sustainable groundwater supplies
- Conflict-limited development and implementation of the GSP, with the majority of stakeholders comfortable with the Sustainability Goal and Sustainable Management Criteria assessment

The indicators of success or desired outcomes are the following:

- High attendance and participation in workshops and public meetings by stakeholders and beneficial users – unfortunately, this was not achieved in developing the GSP because of the threat of COVID-19 and the inability to host in-person meetings and workshops. High attendance and participation will continue to be a focus during the implementation period of the GSP.
- Effective presentations and education to stakeholders, with a high-level of transparency and open communication that results in limited confusion or the spread of misinformation
- The majority of stakeholders approve of the Sustainable Management Criteria and Sustainability Goal
- Majority of comments received will be from the draft GSP sections, with limited comments received on the final GSP submitted to DWR in January 31, 2022

The challenges or barriers related to outreach activities as part of developing a large planning document such as the Yolo Subbasin GSP include:

- the lack of time or forethought available for planning large meetings;
- the inability to access all beneficial users, including DACs and tribes, and provide individual education on the process and purpose of the document; and
- potential limited focus by stakeholders regarding localized hot spots or singular-well concerns.

Two key opportunities that were identified in outreaching and engaging with the beneficial users to develop the Yolo Subbasin GSP include the potential 1) to develop a new and significant framework for groundwater management, and 2) to set reasonable thresholds for effective operation and management of the subbasin without needing to impose restrictions or metering requirements.

The Yolo Subbasin GSP is expected to be adopted and submitted to the California Department of Water Resources by January 31, 2022. Draft chapters of the GSP were released, as completed, on the https://www.yologroundwater.org website.

Public input will be most critical during the following workshops and meetings.

- All Sustainable Management Criteria Workshops
- YSGA Working Group and Board Meetings
- Larger Public Meetings

Public input provided at meetings or workshops will be documented, along with response or follow-up and draft GSP comments have been, and will be, considered and addressed in subsequent GSP revisions, annual reports, and 5-year updates.

Stakeholder Identification

SGMA requires consideration of beneficial uses and users of groundwater, including, but not limited to:

- Holders of overlying groundwater rights, including:
  - Agricultural users
  - Domestic well owners
- Municipal well operators
- Public water systems
- Local land use planning agencies
- Environmental users of groundwater
- Surface water users, if there is a hydrologic connection between surface and groundwater bodies
- The federal government, including the military and managers of federal lands
- California Native American tribes
- Disadvantaged communities, including those served by private domestic wells or small community water systems
- Entities monitoring under the California Statewide Groundwater Elevation Monitoring (CASGEM) Program

Stakeholder Group Identification

People with a financial, political, business, or personal stake in the issue

- Landowners (overlying right holder)
  - Irrigators (farms), domestic users, commercial, state-owned property (CDFW), Yolo Land Trust, tribal landowners
- Water purveyors/suppliers (not already members of the YSGA)
  - Cacheville CSD
  - Knights Landing CSD
  - North Davis Meadows CSA
  - Wild Wings CSA
- Gravel companies (Teichert, Granite)
- Well drillers, consultants, etc.

Organizations, agencies, or individuals that are critical to the GSP process

- YSGA Members and Affiliated Parties
- Yolo County Environmental Health
- CDFW, CDWR, SWRCB, CVRWQCB, USGS
- Interested parties: beneficial users/stakeholders with anecdotal information or beneficial users/stakeholders participating in the groundwater monitoring program
- California Department of Fish and Wildlife, California Department of Water Resources, State Water Resources Control Board, Central Valley Regional Quality Control Board, The Nature Conservancy, United States Geological Survey

Organizations, agencies, or individuals that have an interest or will be impacted by the development of the GSP

- Water Resources Association of Yolo County
- Yolo Resource Conservation District
- Yolo Habitat Conservancy
- Cache Creek Conservancy
- Yolo Audubon Society
- Westside IRWM
- Capay Valley Vision
- Yolo County Community Advisory Committees
- Esparto "Watch"
- Madison "Steering Committee"
- Solano County/Solano Subbasin – Solano Collaborative
- Sutter County/Sutter Subbasin
- Sacramento County/N. American Subbasin/S. American Subbasin – Sacramento Central Groundwater Authority
- Colusa County/Colusa Subbasin – Colusa Groundwater Authority

Stakeholder Survey

Yolo County is largely rural and agricultural. Farmer concerns, experiences, practices, and perceptions play an important role in our basin's groundwater sustainability. In 2017, a mail survey was sent out to 638 farmers and landowners in Yolo County. The survey included questions about farm characteristics, perceptions of change in the county, water scarcity and management practices, the SGMA policy, groundwater sustainability, and demographics. The survey received 137 responses – a response rate of 22%. The survey results are summarized in three briefings: 1) Farmer Concerns and Perceptions of Groundwater Conditions; 2) Farmer Participation and Policy Preferences for SGMA; and 3) Farmer Current and Future Groundwater Management Practices. This briefing summarizes farmer concerns and perceptions of groundwater conditions in the Yolo Subbasin.

D. Key findings

- The majority of farmers (at least 80%) indicated concern about groundwater in the basin, especially concern for water quality degradation (91%), reduction in groundwater storage (90%), and lowering of groundwater levels (87%) (Figure 1).
- The majority of farmers think that undesirable groundwater results are already occurring in the subbasin or will happen in the next 10 years (Figure 2). Sixty-five percent of farmers reported currently experiencing a lowering of groundwater levels or expect to experience it in the next 10 years. Similarly, the majority of farmers are experiencing or expect to be experiencing a reduction in groundwater storage (63%); a depletion of surface water (58%); local subsidence (57%); and water quality degradation (55%) in the next 10 years.
- A number of factors are important to farmers' use of groundwater in the Yolo Subbasin. In Figure 3, these factors are scored, with 1 signifying the most important ranking. Family/livelihood and wellbeing and economics ranked as the two most important factors while policy/regulatory factors ranked last.

Focus groups took place in October 2016 in Yolo County. With assistance from the Yolo County Flood Control and Water Conservation District, Meredith Niles et al. used an organizational recruitment strategy, relying on the YCFC&WCD as a key stakeholder in the GSA process with significant local connections to identify and recruit farmer participants. Farmers were selected to represent a diversity of different farm systems (conventional, organic, small, medium, different irrigation technologies, mix of surface water and groundwater) and agricultural products (diversified vegetable production, tree nuts, fruit, olives, row crops such as corn and alfalfa, rice, animal production).

Niles et al. designed 10 questions (see technical appendix) for the focus groups and recruited 20 farmers into four focus groups (four to six farmers per group). Focus groups were audio recorded, and the recordings were professionally transcribed to facilitate analysis. Results presented here represent dominant themes in the analysis, grouped by DPSIR codes and subcodes (table 1).

TABLE 1. Drivers, pressures, states, impacts and responses identified by Yolo County farmers for sustainable groundwater management

Drivers	Pressures	States	Impacts	Responses
Agricultural • Diverse land uses • Drilling new wells, new irrigated lands • Permanent crops in new areas **Nonagricultural** • Urban areas and domestic use **Water source** • Mix of surface water and groundwater (only groundwater in some areas) • Reduced surface water allocations, typically from drought, increasing reliance on groundwater	**Development** • Outside developers converting land and drilling deep wells • Irrigation and perennial crops on highly erodible ground **Irrigation technologies** • Drip increasingly common • Furrow and flood still used	**Water quantity** • Less water leaves fields now • Even if reservoirs are full, farmers may not get water • Uncertainty in groundwater levels and flow **Water quality** • Salts • Boron **Soil quality** • Subsidence • Boron and salts in soil	**Access to water** • Well levels have varied, but generally held up • Drip irrigation has allowed for agricultural expansion • Wells positively affected when surface water is available **Economic** • Costly to pump • Significant investment in water infrastructure • Land values increasing **Ecosystem** • Efficient irrigation is decreasing water for habitat • Competition for water between fish, farms and waterfowl	**Farm management** • Crop insurance • Fallowing land • Changing crops • Purchasing water • Monitoring wells • Digging new wells **Regulation** • Competing regulations from different agencies • Support for Yolo County Flood Control and Water Conservation District

TABLE 1. Drivers, pressures, states, impacts and responses identified by Yolo County farmers for sustainable groundwater management

Farmers expressed a range of perspectives on the SGMA process (table 2). Opinions were grouped into four categories: regulatory design, defining sustainability, potential policy mechanisms, and farmer involvement.

TABLE 2. Yolo County farmers' perspectives on SGMA

SGMA regulatory design	Definition of sustainability	Potential policy mechanisms	Farmer involvement
• Common sense • Locally relevant • Farmer involvement • Solutions oriented • Science of groundwater informed by farmer experience	• Capture and reuse • Transfers • Reasonable use	• Prioritize surface water over groundwater use • Drilling moratorium • Limit development • Incentives for farmers • Water trading • Investment in infrastructure	• Opportunity through districts • Involvement is critical • Lack representation in decisions

TABLE 2. Yolo County farmers' perspectives on SGMA

Survey results demonstrate that farmers in Yolo County have varying perspectives about the factors that led to SGMA and varying responses to the regulation. Some key themes emerged — farmers acknowledged the role of agriculture in sustainable surface water and groundwater management and recognized that many strategies may be necessary across different actors to achieve sustainable water management.

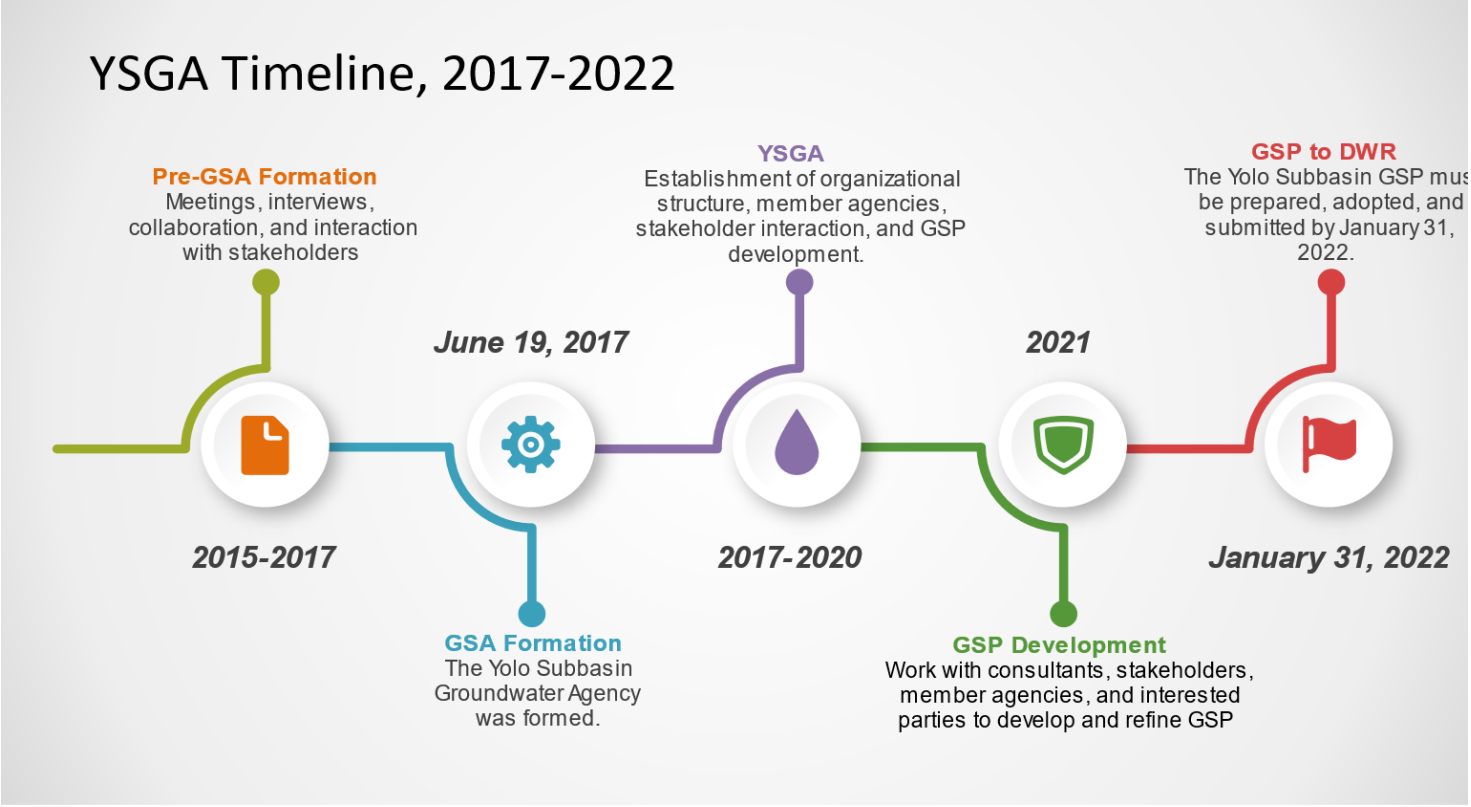
Venues and Tools: Opportunities for Engagement

Stakeholder Meetings and Workshops

Pursuant to Executive Orders from the State of California related to COVID-19, many of the YSGA's meetings in 2020 were required to be held remotely. Publicly accessible digital meetings were hosted by the YSGA in 202, continued into 2021, and will be utilized periodically by the YSGA in the future. The opportunities for engagement that are discussed in this section are subject to changes in state, local, and federal policies regarding COVID-19. As of January 2022, this section contains information regarding both physical and digital opportunities for engagement.

In 2014, upon legislation of SGMA, water interests in the Subbasin via the WRA and Yolo County Farm Bureau formed a Yolo SGMA Working Group develop an efficient and effective groundwater governance structure for complying and implementing SGMA. The Yolo Subbasin Groundwater Agency Joint Powers Agreement was officially executed on June 19, 2017. Figure 2 shows a timeline of the YSGA from 2017 – 2022. After the GSP is submitted to DWR on January 31, 2022 the implementation period begins.

Figure 2. YSGA Timeline from 2017 – 2022.



In 2021, the YSGA continued hosting public input meetings. At these meetings, stakeholders will have opportunities to address their ideas, questions, and concerns about GSP development. Section 8.2 contains a running list of public notices and hearings that have occurred. During the implementation period of the GSP, public meetings will continue to occur.

Physical venues for engagement

Physical venues have been identified for public engagement. Table 2 shows some selected venues and their addresses. Selecting meeting locations near DACs and tribal lands will be an important component of communication and engagement during the GSP implementation period.

Table 2. Selected public meeting venues.

Location	Address
Yolo County Flood Control and Water Conservation District Board Room	34274 CA-16, Woodland, CA 95695
Winters Community Center	201 Railroad Ave, Winters, CA 95694
Esparto High School	26675 Plainfield St, Esparto, CA 95627
Yolo County Fairgrounds	1250 Gum Ave, Woodland, CA 95776
Rumsey Townhall	14380 Manzanita St, Rumsey, CA 95679
Zamora Town Hall	9810 Blacks St, Zamora, CA 95698
City of Davis – Civic Center	23 Russell Boulevard, Davis, CA 95616

Meeting Notification Process

The YSGA's approach of notifying interested parties incorporates several different methods to contact the largest audience. These methods of notification include, but are not limited to email, physical delivery of notices, and utilization of community organizations and groups. The Interested Parties email list is regularly updated. Additionally, an existing database of physical addresses allows us to contact interested parties who prefer to receive mail or do not have the ability to receive digital notifications. The Yolo County Farm Bureau, Capay Valley Vision, and Cache Creek Conservancy are examples of community organizations that have shared YSGA meeting notifications within their network.

As the YSGA moves forward, we will continue to develop and refine our methods of meeting notification. Additional email addresses and physical addresses will be incorporated into existing datasets. Expanding our partnerships with local community organizations will allow us to reach a broader network and will be a focus moving forward.

The YSGA does not currently have a social media presence. The efficacy of a social media presence is something that will be evaluated and may be an additional strategy in the future.

Printed Materials

Printed materials can be a good strategy for succinctly sharing relevant information to broad swaths of interested parties. Additionally, useful information can be gathered from stakeholders by using printed materials. Methods of sharing or collecting information via printed materials include, but are not limited to:

- Fliers
- Fact Sheets
- Letter Correspondence
- Presentation Materials
- Stakeholder Surveys

Public Notices and Hearings

Figure 6 shows a list of GSA engagement opportunities that have occurred between 2015 and 2020. This table will be updated as additional meetings and events take place.

Figure 6. Engagement Schedule Aligned with GSP Development

Date	Organization	Location
January 10, 2022	YSGA Board of Directors	Remotely (COVID-19)
December 15, 2021	YSGA Executive Committee	Remotely (COVID-19)
November 16, 2021	Yolo County Farm Bureau Ag Roundtable	Woodland
November 15, 2021	YSGA Board of Directors	Remotely (COVID-19)
November 10, 2021	Lower Putah Creek Coordinating Committee	Remotely (COVID-19)
November 8, 2021	YSGA Executive Committee	Remotely (COVID-19)
October 18, 2021	YSGA Executive Committee	Remotely (COVID-19)
October 18, 2021	Winters Natural Resource Commission	Remotely (COVID-19)
October 11, 2021	Special YSGA Board of Directors	Remotely (COVID-19)
October 7, 2021	GSP Public Meeting – Hungry Hollow Area	Remotely (COVID-19)
August 10, 2021	Yolo County Farm Bureau Board of Directors Meeting	Woodland
September 22, 2021	Yolo RCD Board of Directors	Remotely (COVID-19)
September 20, 2021	YSGA Board of Directors	Remotely (COVID-19)
September 9, 2021	Yolo County Planning Commission	Remotely (COVID-19)
September 8, 2021	YSGA Executive Committee	Remotely (COVID-19)
September 2, 2021	YSGA Working Group	Remotely (COVID-19)
September 1, 2021	YSGA GSP Public Workshop	Remotely (COVID-19)
August 25, 2021	YSGA GSP Public Workshop	Remotely (COVID-19)
August 16, 2021	YSGA Executive Committee	Remotely (COVID-19)
July 29, 2021	YSGA Working Group	Remotely (COVID-19)
July 27, 2021	Yolo Land Trust Board of Trustees	Remotely (COVID-19)
July 26, 2021	YSGA Executive Committee	Remotely (COVID-19)
June 21, 2021	YSGA Board of Directors	Remotely (COVID-19)
June 9, 2021	GSP Public Meeting – Projects in Capay Valley	Remotely (COVID-19)
June 7, 2021	YSGA Executive Committee	Remotely (COVID-19)
May 11, 2021	YSGA Executive Committee	Remotely (COVID-19)
April 27, 2021	North Yolo MA Minimum Threshold Considerations	Remotely (COVID-19)
April 19, 2021	YSGA Working Group Meeting	Remotely (COVID-19)
March 22, 2021	North Yolo MA Discussion of Land Subsidence	Remotely (COVID-19)
March 9, 2021	YSGA Working Group Meeting	Remotely (COVID-19)
February 9, 2021	YSGA Technical Advisory Committee	Remotely (COVID-19)
January 14, 2021	YSGA Technical Advisory Committee	Remotely (COVID-19)

January 11, 2021	YSGA Board of Directors	Remotely (COVID-19)
December 18, 2020	Yolo Subbasin Farmers Update on GSP Development	Remotely (COVID-19)
December 8, 2020	YSGA Technical Advisory Committee	Remotely (COVID-19)
December 4, 2020	Central Yolo Management Area Working Session	Remotely (COVID-19)
September 29, 2020	Interbasin Coordination Mtg. with S. American Subbasin	Remotely (COVID-19)
June 15, 2020	WRA/YSGA Board of Directors' Board Meeting	Remotely (COVID-19)
June 8, 2020	NCWA's Groundwater Management Task Force Meeting	Remotely (COVID-19)
June 1, 2020	Yolo County/Yolo County Farm Bureau Coordination Mtg.	Remotely (COVID-19)
May 6, 2020	YSGA Working Group Meeting	Remotely (COVID-19)
May 6, 2020	Interbasin Coordination Mtg. with Solano Subbasin	Remotely (COVID-19)
April 13, 2020	NCWA's Groundwater Management Task Force Meeting	Remotely (COVID-19)
March 16, 2020	WRA/YSGA Board of Directors' Board Meeting	Remotely (COVID-19)
March 6, 2020	NCWA Annual Meeting	Chico
February 13, 2020	Capay Valley Discussion -	Sacramento
February 12, 2020	TNC's Agility Lab: Groundwater Recharge	Sacramento
February 11, 2020	ACWA Groundwater Committee Meeting	Sacramento
December 9, 2019	NCWA Groundwater Management Task Force Meeting	Winters
September 17-19, 2019	GRA's Western Groundwater Congress	Sacramento
September 16, 2019	WRA/YSGA Board of Directors' Board Meeting	Woodland
September 9, 2019	NCWA Groundwater Management Task Force Meeting	Winters
September 5, 2019	Interbasin Coordination Meeting with Solano Collaborative	Winters
August 20/23, 2019	NCWA Advancing Groundwater Recharge Meetings	Sacramento
July 31, 2019	Advancing GW Recharge Meeting with Resources Agency, State Water Board, DWR, NCWA	Sacramento
July 16, 2019	Yolo County Board of Supervisors' Strategic Workshop	Winters
June 17, 2019	WRA/YSGA Board of Directors' Board Meeting	Woodland
June 10, 2019	NCWA Groundwater Management Task Force	Woodland
May 30, 2019	Winters Rotary Club Meeting	Winters
May 23, 2019	Capay Valley YSGA SMC Workshop	Guinda
May 2, 2019	Yolo/Solano Subbasin Coordination Meeting	Winters
April 22, 2019	YSGA Board of Directors' Meeting	Woodland
April 3, 2019	YSGA Working Group Meeting	Woodland
March 21, 2019	DWR's GSA Forum	West Sacramento
March 1, 2019	NCWA Annual Meeting	Chico
February 21, 2019	RD 307 Board of Trustees' Meeting	Clarksburg
February 7-8, 2019	WEF's Workshop and Groundwater Tour	Woodland
February 5-6, 2019	GRA's Groundwater Sustainability Bootcamp	UC Davis
February 4-5, 2018	California Irrigation Institute 2019 Conference	Sacramento
January 25, 2019	Irrigated Lands Program (Farmer Group)	Winters
January 24, 2019	Irrigated Lands Program (Farmer Group)	Woodland
January 23, 2019	Irrigated Lands Program (Farmer Group)	Clarksburg
January 16, 2019	Capay Valley Groundwater Users' Meeting	Guinda
January 16, 2019	"NDGSA" Board of Directors' Meeting	Walnut Grove
January 14, 2019	YSGA Board of Directors' Meeting	Woodland
December 11, 2018	Meeting with NCWA and Yolo County Farm Bureau	Woodland
December 10, 2018	NCWA Groundwater Management Task Force	Orland
November 27-29, 2018	ACWA Fall Conference; Groundwater Committee	San Diego
September 17, 2018	YSGA Board of Directors' Meeting	Woodland

September 4, 2018	Meeting Yolo-Zamora Area PP Representative Hauss/Orth	Woodland
August 29, 2018	Grand Park GW Modeling Meeting (Woodard and Curran)	Woodland
August 28, 2018	"White Area" Meeting with Yolo-Zamora Landowners	Woodland
August 23, 2018	Environ. Meeting with Director Brice and Yolo Audubon	Woodland
August 13, 2018	Agricultural Entities Workgroup Group Meeting	Woodland
August 1, 2018	Meeting with David Gutierrez and Reclamation Districts	Woodland
July 19, 2018	Meeting with Golden Bear Estates' Representative	Winters
June 18, 2018	YSGA Board of Directors' Meeting	Woodland
June 14, 2018	State Water Board Water Rights Fee Stakeholder	Sacramento
June 14, 2018	Yolo County Planning Commission	Woodland
June 11, 2018	NCWA Groundwater Management Task Force Meeting	Marysville
June 6-7, 2018	GRA GSA Summit	Sacramento
May 24, 2018	NCWA Water Leaders' Program	Woodland
May 23, 2018	YSGA Urban Entity Meeting	Woodland
May 22, 2018	Colusa Groundwater Authority Board Meeting	Colusa
May 8-10, 2018	ACWA Spring Conference; Groundwater Committee	Sacramento
May 3, 2018	YSGA Entity Working Group Meeting	Woodland
April 16, 2018	TNC's Groundwater Resources Hub Unveiling	Sacramento
April 4, 2018	Anne Schneider Lecture: Groundwater-Surface Water	Sacramento
March 19, 2018	YSGA Board of Directors' Meeting	Woodland
March 19, 2018	Meeting with Jay Ziegler and Sandi Matsumoto	Davis
March 12, 2018	NCWA Groundwater Management Task Force Meeting	Oroville
March 2, 2018	NCWA Annual Meeting	Chico
February 16, 2018	Meeting with RD 150 and The Freshwater Trust	Clarksburg
February 7, 2018	YSGA Working Group Meeting	Woodland
January 29-30, 2018	California Irrigation Institute 2018 Conference	Sacramento
January 26, 2018	Meeting with RD 307 and RD 999 Board Members	Woodland
January 24, 2018	Irrigated Lands Program (Farmer Group)	Clarksburg
January 23, 2018	Irrigated Lands Program (Farmer Group)	Woodland
January 22, 2018	Irrigated Lands Program (Farmer Group)	Winters
January 18, 2018	YCFB Annual Meeting	Woodland
January 18, 2018	Meeting with "Capay Valley Voice"	Woodland
December 19, 2017	NCWA and Sacramento Valley Water Quality Coalition	Woodland
December 11, 2017	NCWA Groundwater Management Task Force Meeting	Willows
December 7, 2017	PPIC Sacramento Valley Tour Presentation	Woodland
Nov. 28-Dec. 2, 2017	ACWA Fall Conference; Groundwater Committee	Anaheim
November 21, 2017	YCFB/NCWA Groundwater Quality Trend Meeting	Woodland
November 20, 2017	Groundwater Meeting with Graham Fogg	Woodland
November 15, 2017	UC Cooperative Extension Groundwater Workshop	Davis
November 15, 2017	YCFB's Realtor Program	Woodland
November 13, 2017	YSGA Board of Directors' Meeting	Woodland
November 8, 2017	CDFA Managed Groundwater Recharge Forum	Sacramento
October 5, 2017	UC Davis Land Use Management Symposium	Davis
October 2, 2017	Rndtbl. Call to Action: Recharge CA's Depleted Aquifers	Davis
September 26, 2017	Woodland Chamber of Commerce Water Comm. Mtg.	Woodland
September 18, 2017	YSGA Board of Directors' Meeting	Woodland
September 14, 2017	YCFB 2017 Yolo County Irrigated Lands Program	Woodland
September 11, 2017	YSGA Working Group Meeting	Woodland

July 27, 2017	Center for Land Based Learning CA Farm Academy	Davis
July 25, 2017	Yolo Land Trust SGMA Presentation	Woodland
July 11, 2017	NCWA Groundwater Management Task Force	Woodland
June 19, 2017	Yolo Subbasin Groundwater Agency BOD Meeting	Woodland
June 19, 2017	RD 765 Trustees Meeting SGMA Public Hearing	West Sacramento
June 19, 2017	RD 827 Trustees Meeting SGMA Public Hearing	West Sacramento
June 19, 2017	RD 785 Trustees Meeting SGMA Public Hearing	West Sacramento
June 19, 2017	RD 537 Trustees Meeting SGMA Public Hearing	West Sacramento
June 7, 2017	RD 1600 Board Meeting SGMA Public Hearing	Woodland
June 6, 2017	Yolo County Board of Supervisors Meeting	Woodland
June 5, 2017	NCWA Groundwater Management Task Force Meeting	Woodland
May 22, 2017	Practitioner's Advisory Panel (PAP) Meeting with DWR	West Sacramento
May 18, 2017	Dunnigan WD Board Meeting SGMA Public Hearing	Dunnigan
May 16, 2017	Woodland Rotary SGMA Presentation	Woodland
May 16, 2017	RD 730 Board Meeting SGMA Public Hearing	Woodland
May 16, 2017	City of Davis Council Meeting SGMA Public Hearing	Davis
May 16, 2017	City of Woodland Council Meeting SGMA Public Hearing	Woodland
May 16, 2017	City of Winters Council Meeting SGMA Public Hearing	Winters
May 10, 2017	Madison CSD Board Meeting SGMA Public Hearing	Madison
May 10, 2017	Esparto CSD Board Meeting SGMA Public Hearing	Esparto
May 9, 2017	Yolo County Board Meeting SGMA Public Hearing	Woodland
May 8, 2017	UCD Water Data Workshop	Davis
May 4, 2017	RD 787 Board Meeting SGMA Public Hearing	Knights Landing
May 3, 2017	Tri-Counties/North Delta Meeting	Davis
May 2, 2017	City of Winters Council Meeting SGMA Presentation	Winters
April 28, 2017	RD 1600 Board Meeting SGMA Presentation	Woodland
April 25, 2017	RD 2035 Board Meeting SGMA Public Hearing	Woodland
April 20, 2017	California Water Commission Presentation	Sacramento
April 20, 2017	RD 108 Board Meeting SGMA Public Hearing	Knights Landing
April 19, 2017	City of West Sacramento SGMA Public Hearing	West Sacramento
April 12, 2017	DWR's CA Regional Sustainability Summit	Sacramento
April 11, 2017	Yolo Subbasin GSA-Eligible Entities Meetings	Woodland
March 23, 2017	Yolo Subbasin GSA-Eligible Entities Meeting	Woodland
March 21, 2017	City of Winters Council Meeting	Winters
March 17, 2017	Yolo County City Managers Meeting	West Sacramento
March 16, 2017	Dunnigan Water District Board of Directors	Dunnigan
March 13, 2017	NCWA Groundwater Management Task Force	Marysville
March 8, 2017	Yolo Subbasin GSA-Eligible Entities Meeting	Woodland
February 22, 2017	Yolo SGMA Public Meeting	Winters
February 15, 2017	Yolo Subbasin GSA-Eligible Entities Meeting	Woodland
February 8, 2017	Yolo SGMA Public Meeting	Woodland
February 7, 2017	Yolo County Board of Supervisors	Woodland
February 1, 2017	Meeting with Colusa Drain MWC	Woodland
January 30-31, 2017	California Irrigation Institute 2017 Conference	Sacramento
January 25, 2017	Yolo Subbasin GSA-Eligible Entities Meeting	Woodland
January 23, 2017	Meeting with Yolo County Supervisor Provenza	Davis
January 12, 2017	Water Utility Advisory Committee Meeting	Woodland
January 12, 2017	Woodland Sunrise Rotary Club Meeting	Woodland

January 7, 2017	Yolo County Farm Bureau Annual Retreat	Avila Beach
January 3, 2017	Woodland City Council Meeting	Woodland
December 29, 2016	Meeting with City of Woodland Councilman Davies	Woodland
December 15, 2016	Irrigated Lands Program (Farmer Group)	Clarksburg
December 14, 2016	Irrigated Lands Program (Farmer Group)	Woodland
December 14, 2016	Irrigated Lands Program (Farmer Group)	Woodland
December 13, 2016	Irrigated Lands Program (Farmer Group)	Winters
December 12, 2016	NCWA Groundwater Task Force Meeting	Richvale
December 1, 2016	ACWA Fall Conference SGMA Panel	Anaheim
November 23, 2016	Capay Valley Vision Meeting	Woodland
November 16, 2016	Yolo County Farm Bureau's Realtor Seminar	Woodland
November 9, 2016	Yolo Subbasin GSA-Eligible Entities Meeting	Woodland
November 3, 2016	Yolo County Landowner's Annual Meeting	Woodland
October 12, 2016	Yolo Subbasin GSA-Eligible Entities Meeting	Woodland
October 7-8, 2016	SGMA Focus Groups with Private Pumpers (x4)	Woodland
October 5, 2016	Water Education Foundation Groundwater Tour	Woodland
September 28, 2016	Yolo SGMA Private Pumpers Meeting	Woodland
September 27, 2016	Solano GSA Staff Advisory Group	Vacaville
September 21, 2016	Yolo Local Agency Formation Commission (LAFCo)	Woodland
September 20, 2016	Yolo SGMA Steering Committee Meeting	Woodland
September 14, 2016	Rumsey Water Users Association	Woodland
September 12, 2016	NCWA GW Management Task Force	Williams
September 8, 2016	Yolo County Supervisors Provenza and Villegas	West Sacramento
September 8, 2016	City of Woodland Chamber of Commerce Meeting	Woodland
August 31, 2016	Yocha Dehe Wintun Nation	Woodland
August 10, 2016	Groundwater Meeting with The Nature Conservancy	Woodland
August 4, 2016	Solano GSA Staff Advisory Group	Vacaville
July 27, 2016	Yolo Subbasin GSA-Eligible Entities Meeting	Woodland
July 21, 2016	Yolo Subbasin SGMA Meeting with RDs 787 and 108	Sacramento
July 21, 2016	California Water Commission BBM Meeting	Sacramento
July 20, 2016	Conaway Ranch SGMA Meeting	Conaway Ranch
July 19, 2016	Practitioner's Advisory Panel (PAP) Meeting with DWR	West Sacramento
July 15, 2016	DWR Basin Boundary Modification Public Meeting	West Sacramento
July 13, 2016	PPIC Event	San Francisco
July 12, 2016	Yolo County Farm Bureau Board Meeting	Woodland
July 11, 2016	Meeting with Solano County Supervisor Vasquez	Woodland
June 21, 2016	ACWA Region 2 & 4 SGMA Event	Antelope
June 20, 2016	NCWA GW Management Task Force	Marysville
June 15, 2016	Groundwater Recharge Event	Winters Canal
June 14, 2016	Meeting with Jay Lund and Corentin Girard	Woodland
June 9, 2016	GRA Conference	Sacramento
June 3, 2016	Water in the West Groundwater Meeting	Stanford
May 27, 2016	NCWA Young Water Leaders Meeting	Woodland
May 24, 2016	Glenn County SGMA Meeting	Willows
May 19, 2016	Conaway Ranch SGMA Meeting	Woodland
May 18, 2016	Westside IRWM Coordinating Committee	Woodland
May 17, 2016	Golden Bear Association SGMA Implementation	Winters
May 17, 2016	Yolo Subbasin GSA-Eligible Entities Meeting	Woodland

May 12, 2016	Solano County Water Agency (SCWA) Board Meeting	Vacaville
May 12, 2016	Clearlake Business Club	Clearlake
May 10, 2016	Solano County Board Meeting	Fairfield
May 4, 2016	Yocha Dehe Meeting	Woodland
April 25, 2016	BBM Request Meeting with Yolo County, DWR, & RDs	West Sacramento
April 21, 2016	Dunnigan Water District Board Meeting	Dunnigan
April 19, 2016	Yolo Subbasin GSA-Eligible Entities Meeting	Woodland
April 13, 2016	Meeting with DWR to discuss BBM Request	Woodland
April 7, 2016	California Farm Academy	Winters
March 31, 2016	Yolo SGMA Public Meeting	Clarksburg
March 30, 2016	Yolo SGMA Public Meeting	Winters
March 29, 2016	Yolo SGMA Public Meeting	Woodland
March 23, 2016	Meeting with RDs 150, 307, and 999	Clarksburg
March 15, 2016	Ag Roundtable	Woodland
March 14, 2016	NCWA GW Management Task Force	Woodland
March 10, 2016	SGMA Presentation	Rumsey
March 8, 2016	Lake County Rotary	Clearlake
March 7, 2016	Solano SGMA Public Meeting	Davis
March 4, 2016	NCWA Annual Meeting	Chico
March 2, 2016	Capay Valley Vision Advisory Committee	Guinda
March 2, 2016	Delta Region SGMA Meeting	Walnut Grove
February 29, 2016	Solano SGMA Meeting	Vacaville
February 11, 2016	Local Government Commission Conference	Portland
February 9, 2016	Yocha Dehe Meeting	Brooks
February 8, 2016	SCWA Water Policy Committee Meeting	Vacaville
January 26, 2016	DuPont Pioneer Grower Meeting	Woodland
January 20, 2016	Yocha Dehe Meeting	Woodland
January 8, 2016	PAP Meeting with DWR	West Sacramento
January 8, 2016	Yolo County Farm Bureau Annual Retreat	Monterey
January 6, 2016	KCRA Groundwater Interview	Esparto
December 29, 2015	Meeting with DWR's David Gutierrez	Sacramento
December 17, 2015	Irrigated Lands Program (Farmer Group)	Clarksburg
December 16, 2015	Irrigated Lands Program (Farmer Group)	Woodland
December 16, 2015	Irrigated Lands Program (Farmer Group)	Woodland
December 15, 2015	Irrigated Lands Program (Farmer Group)	Winters
December 14, 2015	NCWA GW Management Task Force	Orland
December 8, 2015	PAP Meeting with DWR	West Sacramento
November 18, 2015	Yolo County Farm Bureau Realtors Meeting	Woodland
November 5, 2015	Yolo Landowners Meeting	Woodland
October 28, 2015	Yolo Leaders	Winters
September 29, 2015	GSA Boundary Meeting with Yolo County staff	Woodland
September 28, 2015	Patwin Community Meeting	Davis
September 24, 2015	Water Education Foundation Groundwater Tour	Woodland
September 21, 2015	NCWA GW Management Task Force	Marysville
September 21, 2015	Stanford Water in the West	Woodland
September 2, 2015	Groundwater Resources Association Workshop	Modesto
July 24, 2015	PAP Meeting with DWR	West Sacramento
July 9, 2015	Surface-GW Interaction with The Nature Conservancy	Sacramento

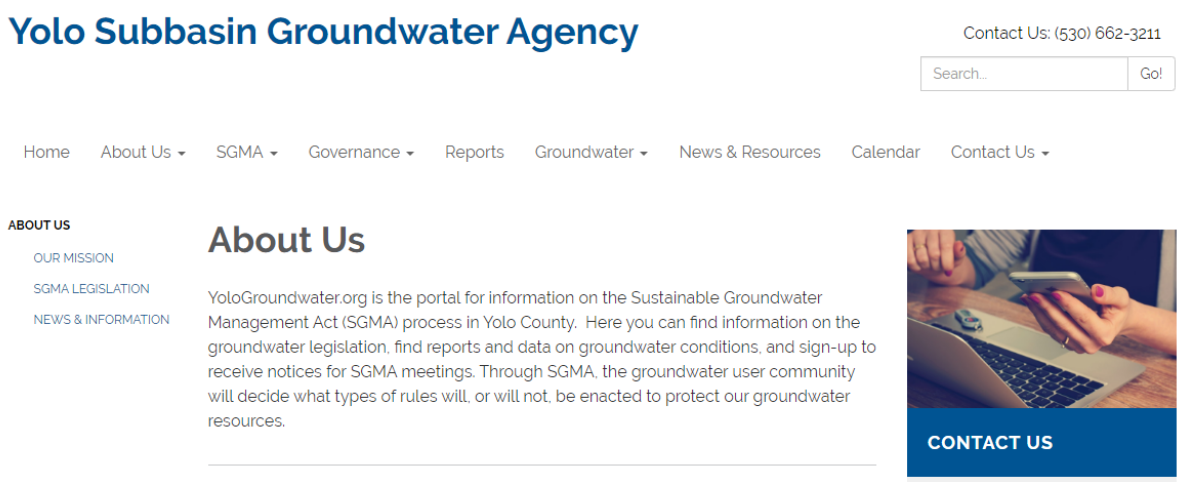
July 9, 2015	Colusa Basin Groundwater Governance Meeting	Willows
July 7, 2015	DWR Critical Conditions Meeting	Sacramento
June 22, 2015	PAP Meeting DWR	West Sacramento
June 4, 2015	California Farm Academy	Winters
May 20, 2015	Capay Valley Vision	Esparto
May 5, 2015	Yolo County Board of Supervisors	Woodland
March 24, 2015	Yolo Land Trust	Woodland
March 20, 2015	Farm City Breakfast	Woodland
March 19, 2015	CA Counties Departments of Environmental Health	Woodland
March 12, 2015	Yolo County Planning Commission	Woodland
March 9, 2015	Solano County Water Committee	Vacaville
February 24, 2015	Yolo County Board of Supervisors	Woodland
February 17, 2015	City of Davis City Council	Davis
February 9, 2015	Yolo County Landowners Association	Woodland
February 2, 2015	UC Davis California Water Policy Seminar	Davis
January 26, 2015	California Water Foundation Workshop	Willows
January 12, 2015	WRA of Yolo County Board of Directors	Woodland
December 18, 2014	Irrigated Lands Program (Farmer Group)	Winters
December 18, 2014	Irrigated Lands Program (Farmer Group)	Woodland
December 17, 2014	Irrigated Lands Program (Farmer Group)	Woodland
December 16, 2014	Irrigated Lands Program (Farmer Group)	Clarksburg
December 4, 2014	ACWA Groundwater Panel	San Diego
November 17, 2014	WRA of Yolo County Board of Directors	Woodland
November 6, 2014	Yolo Basin Foundation	Davis
October 9, 2014	Cache Creek Conservancy	Yolo County
September 30, 2014	Woodland Chamber of Commerce	Woodland
September 15, 2014	WRA of Yolo County Board of Directors	Woodland
September 9, 2014	Yolo County Board of Supervisors	Woodland
July 30, 2014	Groundwater Resources Association	Napa
June 24, 2014	Yolo County Ag Futures Alliance	Woodland
June 16, 2014	Reclamation District 108	Grimes
June 16, 2014	WRA of Yolo County Board of Directors	Woodland
June 12, 2014	Yolo County Planning Commission	Woodland
June 10, 2014	Yolo County Board of Supervisors	Woodland
May 20, 2014	City of Winters	Winters

Informational Materials

All stakeholders will have an opportunity to review draft products and materials prepared as part of the development of the Yolo Subbasin GSP.

GSA Website

All relevant information will be posted to the YSGA's website: https://www.yologroundwater.org/ (screenshots are shown below). Public meeting notes, minutes, and agendas are posted on the YSGA's website.



Additionally, on our website, users can find information about:

Table 3. Useful website information.

Partnerships	**Handouts/Brochures**	**Community Groups**
Stakeholder Meetings	**Community Events**	**Educational infographics**
Physical Venues for engagement	**Joining our mail-list**	**Links to helpful resources**

Draft chapters of our GSP will be published to our website. These draft chapters are made available to the public so the YSGA can receive comments and feedback on the plan and make necessary revisions to the GSP.

Interested Persons List

As required by SGMA 10723.4 "Maintenance of Interested Persons List," YSGA is required to maintain to have a contact list and to regularly send emails to individuals, agencies, organizations, or other interested parties who have expressed interest in the YSGA's progress.

As the YSGA moves forward, this list will continue to be maintained and continue to grow through additional contact and outreach with community stakeholders. To sign up for this list, please utilize our website: https://www.yologroundwater.org/contact-us.

Limitations of Existing Outreach Methods

Limitations of current outreach methods exist. Some of these limitations have been identified below. This list is not comprehensive and will continue to change as the YSGA moves forward.

- Language barrier.
- Lack of coordination between methods.
- When meetings are digital only, people without access to the internet cannot join.
- When meetings are in person only, people without access to transportation cannot join.

If the YSGA determines that limitations our existing outreach methods are hindering the ability to effectively communicate with the public, action will be taken to address these limitations.

Talking Points

Key Messages

Key messages and talking points have been established by the YSGA to effectively communicate with stakeholder groups. These messages and talking points will evolve as the GSP is developed. This section will be reviewed and revised as communication and engagement efforts continue. Our selected key messages are shown below:

- What is SGMA?
- The role of the YSGA and GSAs in general.
- The Mission of the YSGA - The mission of the Yolo Subbasin Groundwater Agency (YSGA) is to provide a dynamic, cost-effective, flexible collegial organization to ensure compliance with SGMA within the Yolo Subbasin. Each of the Member and Affiliated Parties will have initial responsibility for groundwater management within their respective jurisdictional boundaries and the YSGA will serve a coordinating and administrative role for developing the Groundwater Sustainability Plan.
- What will the GSP be doing?
- How YSGA will implement GSP
    - The GSP is a living document.
    - Incorporating feedback.
- Common uses of groundwater.
- Role of projects and management actions in ensuring sustainability.

When necessary, fact sheets, presentations, or other materials may be made available to help express these key messages to interested stakeholders.

FAQs

In addition to key messages and talking points, the YSGA has created a list of questions and issues that are likely to be brought up in the GSP development process. Table 4 will evolve with the GSP development and implementation process. As additional questions and issues arise, this table will be updated. As the YSGA's GSP is developed and implemented, responses to these questions and issues will be updated.

Common, Question, or Issue	Response
What is the history for the formation of the Yolo Subbasin Groundwater Agency?	Background information can be found in the Critical Elements of the Proposed Yolo Subbasin Groundwater Agency.
How is the YSGA funded?	Currently the 26 member entities are funding the administrative and monitoring efforts of the YSGA and development of the GSP. The YSGA Board of Directors intend to reconsider the YSGA's revenue structure and determine whether there is a more equitable, sustainable revenue mechanism for implementing the GSP through 2042.
What is a Groundwater Sustainability Plan?	A plan that includes criteria and projects for ensuring groundwater sustainability over a 20-year period in a groundwater basin. The Yolo Subbasin is a high-priority basin and a GSP needs to be submitted to the California Department of Water Resources (DWR) by January 31, 2022. The plan must include an assessment of groundwater conditions and criteria that will protect groundwater resources today and in the future.
What is considered "sustainable" groundwater management?	The Sustainable Groundwater Management Act (SGMA) requires the following to be considered as part of sustainable groundwater management – sustainability criteria must be developed to ensure that each basin avoids "undesirable results" defined as follows 1. Chronic lowering of groundwater levels 2. Reduction of the amount of storage available for groundwater 3. Degradation of water quality 4. Land subsidence 5. Depletion of interconnected surface water from groundwater use 6. Seawater intrusion
How will SGMA and GSP development and implementation affect my well?	From an operational perspective, there will be little to no change experienced by individual users of wells, including domestic and agricultural users. The GSP is intended to ensure that groundwater use remains sustainable at the subbasin scale.
How can I express my opinions and concerns about how the Yolo Subbasin GSP will affect me?	The public is encouraged to attend committee, Working Group, and Board of Director meetings of the YSGA. Public outreach workshops occurred in Fall 2021 and public outreach meetings will continue in 2022 as the GSP is implemented. Stakeholders may also reach out via info@yolosga.org, online at www.yologroundwater.org, or via phone at 530.662.3211.
Who will fund the projects that are included in the GSP?	The YSGA still needs to discuss the implementation plan for projects that are listed in the GSP. The YSGA JPA discusses the beneficiary pays concept for project implementation, and the YSGA Board of Directors will be considering how to prioritize and fund basin-wide initiatives (projects and management actions) in the future.

Common, Question, or Issue	Response
How do I submit a project for inclusion into the GSP?	The YSGA solicited projects and management actions for the GSP in Spring and Summer 2021. Now that the first version of the Yolo Subbasin GSP is complete, the YSGA Board of Directors will need to determine what schedule or process they'd like in place for considering the inclusion of additional projects and management actions. Compiling the annual report may prove to be a good time to solicit new projects and adopt them in the GSP.
What happens if the GSP is not submitted on time to the State or is considered insufficient in the State's review?	If the GSP is not submitted by January 31, 2022, the State Water Resources Control Board will intervene and take over management of the subbasin. The State Water Board developed a proposed fee schedule related to subbasin intervention that can be accessed here. If DWR finds that the GSP is incomplete, the YSGA will have the opportunity to revise the GSP and resubmit it for further review. If DWR finds that the GSP is insufficient, the State Water Board will intervene in the Yolo Subbasin.
Will agricultural pumps be metered? If they will be, who will pay for it?	Metering of agricultural pumps is not currently included as a project or management action (PMA) in the Yolo Subbasin GSP.
What types of projects or management actions can improve groundwater conditions?	A table of project and management actions (PMAs) for ensuring groundwater sustainability in Yolo Subbasin are included in the Yolo Subbasin GSP. PMAs related to improving groundwater conditions mainly focus on increasing groundwater recharge. One example project is utilizing unlined canals or natural sloughs or creeks to facilitate increased winter recharge of groundwater.
How are you going to know who is pumping and where?	The GSP does not currently intend to identify pumping of groundwater at the individual user scale. Groundwater use and sustainability will be determined at the basin-wide scale, and further examined at the Management Area scale.
Are you going to identify whether well pumps are operated by electricity or fuel?	The GSP does not include projects or management actions related to how pumps are powered.
Will groundwater users have to sign a compliance agreement?	The GSP does not include projects or management actions related to individual groundwater users signing a compliance agreement.
Are you going to share information with Yolo Air Quality Management District or CARB?	The YSGA does not intend to collect, or share, information that would be relevant to the Yolo Air Quality Management District or CARB.
Are you tracking what crops are irrigated for each well?	Information about crop acreages is widely available and can be beneficial to determining total groundwater use in the Yolo Subbasin. Tracking fields linked to individual wells is not currently plan as part of the GSP implementation process and is not a PMA in the GSP.
Are you tracking how many acres the well services?	Information on total irrigated acres and crop types will be evaluated periodically. The GSP does not include PMAs tracking how many acres an individual well services.

Table 4. Common Questions or Issues

Evaluation and Assessment

The goals and desired outcomes outlined in Section 5 of this Communication and Engagement Plan will be evaluated using the criteria described in this section of the document. It is necessary to evaluate and assess our outreach and communication efforts that are laid out in this plan. Evaluation and assessment have occurred during the GSP development process and will continue to occur during GSP implementation.

Regular updates of progress will be made to the Executive Officer or Board of Directors. These updates will include, but will not be limited to:

- Upcoming event status.
- Recaps of recent events.
- Updates and revisions to the Communication and Engagement Plan.
- Requests for review and approval of printed materials – including fact sheets, talking points, and fliers.

Periodic Communication and Engagement reviews will also take place. During these reviews, in-depth discussions will take place between staff, the Executive Coordinator, and/or Board of Directors with a focus on evaluating and assessing our communication and engagement efforts. These periodic reviews will cover:

- Identifying strategies and topics that have worked well.
- How can we improve our outreach and communication for more effective results?
- Lessons learned.
- Additional outreach steps that need to occur.
- What are our next steps?

The YSGA is committed to an open, transparent, stakeholder-driven process. This has been an important component of the GSP development process and will continue to be the YSGA's philosophy during GSP implementation.

Yolo Subbasin Groundwater Agency
2022 Groundwater Sustainability Plan

Yolo County, CA

Appendix C

Public Comments Received and YSGA Response

Contents

Comment #	Commenter	Representing	GSP Reference (Public Draft)	Remark	YSGA Response
12	Dave Pratt	Individual	General Comment	(See full letter) The big issue for the GSP is groundwater levels. The GSP is good on how to assess the situation: It establishes reasonable minimum thresholds for groundwater levels and then proposes a reasonable way to use these to decide what makes an "undesirable result" for the Basin. But then it says nothing at all about who does what in an attempt to correct any undesirable results. If control of ground water is to be kept local as much as possible, the GSP will have to include this. Maybe it's not the job of GEI to discuss this, but somebody has to.	Thank you for your comment. We do recognize that there are many more details involved in ensuring undesirable results are avoided, such as implementing projects and if necessary, demand management strategies. We have received similar comments and recognize this problem will need to be addressed as part of GSP implementation.
13	Dave Pratt	Individual	p. 1-25	(See full letter) Has a farmer really ever had to wait 6 weeks to get water on a crop?	During 'waiting lists' a typical wait time might be a few days to one week. This sentence is supposed to mean that 'waiting lists' as imposed by the YCFC&WCD may last up to six weeks during the hottest part of the summer, during high demand periods, for growers within our service area. An individual farmer does not have to wait six weeks for water. The sentence has been revised for clarity in the GSP.
14	Dave Pratt	Individual	p. 1-25	(See full letter) well permitting process: Does the county, at present, have any authority to refuse a permit on the grounds that there isn't enough water or that the proposed use of the water is not in the public interest? Control of issuing permits ought to be worth a major discussion in the GSP.	The County well permitting process only covers the proper construction of the well, not location or amount of water to be pumped. However, the County does have land use authority and could implement more regulations on location of new wells (setback requirements) or request additional information related to the quantity of water pumped. The YSGA is coordinating closely with the County to improve the data collecting in the well permitting process. Additional coordination with the County as a land use authority is an ongoing effort of the YSGA, as indicated in Management Action 2 and in the GSP Preface.
15	Dave Pratt	Individual	Table 1-4	(See full letter) Public Meetings and workshops: Many of these are listed as YSGA Executive Committee meetings. Weren't these actually solo efforts by Tim O'Halloran?	This table lists public meetings of the YSGA Executive Committee, which includes the YSGA Chair, Vice Chair, an additional Director, Executive Officer, and County staff (meant to serve as equal representation of the ag and urban sectors). Between 2014 and 2016, YCFC&WCD and YSGA staff presented at more than 115 public meetings of various groups, such as Farm Bureau events, Chambers of Commerce, City Council, IRWM, neighboring counties, and other groups.
16	Dave Pratt	Individual	p. 3-1	(See full letter) The word should be sustainably rather than sustainability.	Changed sustainability to sustainably.
17	Dave Pratt	Individual	Figure 3-2	(See full letter) If this figure is to be used for anything important, there should be a discussion about the accuracy of drawing lines in places where there are few data points. For example, how can it be that the 10, 20, 30, 40, 50, 60, and 70 contours of minimum threshold elevations in the southeast part of the county extend right to the Sacramento River, which is essentially at sea level?	The values of these contours are -70, -60, -50, -40, -30, -20, -10, and 0 feet, relative to sea level. The land surface elevations in the southeast portion of the Yolo Subbasin are close to sea level, so groundwater levels below sea level can be observed.
18	Dave Pratt	Individual	Table 3-1	(See full letter) Were some wrong numbers entered for well 249? From the numbers as entered, you would conclude that the ground elevation at the well was sea level, which doesn't figure for central Yolo County. (The maps of well locations don't seem to show this well at all.)	Thank you for bringing this to our attention. Well 249 was not supposed to be in that table. It has been removed.
20	Carrie McGregor	Individual	General Comment	I am concerned about the declining groundwater levels. I ask that those who live and work in the area of Hungry Hollow be supported by delaying or ending continued development of unirrigated land, i.e. a moratorium on further well drilling and groundwater extraction for development of new irrigated lands. I urge you to listen to those who have witnessed the water levels dropping over the decades. Those whose desire is to grow large crops for the worldwide market are not considering the needs of the good people who call this area their home. The good people who have worked as farmers, for decades and generations, to grow food for their own and neighboring communities. We have a lovely system, a genuine community of people who care about each other: farmers and consumers interacting on a face to face basis--not a corporation looking to extract what to them comes down to money. There are more valuable things here to consider. Thank you for your time.	Thank you for your comment. We have received similar comments and recognize this problem will need to be addressed as part of GSP implementation. We encourage you to continue to participate in this process and to provide your feedback in upcoming advisory committee, working group, and board meetings. This will be considered in our process for updating the GSP by 2027.

Comment #	Commenter	Representing	GSP Reference (Public Draft)	Remark	YSGA Response
24	Cynthia Goldberg	Individual	General Comment	I tried to make sense as a non-water scientist, but it was difficult to understand all the details. I have one big overriding concern. Clearly drought and groundwater management are critical problems to solve and managing groundwater (in addition to use of surface water) is long overdue. Water resources have been limited and of major concern since I move to CA in 1991. BUT...why are farms, especially large corporate farms able to plant new nut tree orchards at the present time. Nut trees are a great income producer and export product, but it seems to me we must focus on basic food needs and those who grow with existing farms rather than allow diversion of very limited water to nurture trees that produce nuts in 5 years. I read through the Projects & Management Actions and nowhere did I read creating a process for oversight and control of who is farming what and where. Nowhere did I see a 'freeze' or 'moratorium' on new farming or managing food resources use of the water as a priority. And gosh I really think my ability to purchase healthy affordable local food to cook with is more critical than an almond or pistachio orchard. Can our region support MORE irrigated farmland/ranches? I don't think so when current farmers are without enough water. And what do we really know about aquifers and deep wells? Not much at this point. The recharge process may take years or decades or longer...and we don't know how much we are using future water resources. We humans have a lousy track record for being good stewards of the planetary resources....how much more foolish about this will we be. You have the opportunity to push the PAUSE BUTTON before this gets worse. I really don't understand much more than the simple reality of drought, heat, climate change, irrigation needed for food I need to eat. If we are sort-of in balance now, how can we tip the scales by allowing more and bigger new irrigated farms? Not at all I think.	Thank you for your comment. We have received similar comments and recognize this problem will need to be addressed as part of GSP implementation. We encourage you to continue to participate in this process and to provide your feedback in upcoming advisory committee, working group, and board meetings. This will be considered in our process for updating the GSP by 2027.
27	Heather Rowan	Individual	General Comment	I agree with Good Humus Produce, who have been farming in Capay for decades: • Accountability of our groundwater usage-We are suggesting a moratorium on further groundwater extraction for development on what have been historically non-irrigated lands until there is an understanding of groundwater sustainability in the Dunnigan hills and other “special concern” areas. • Accountability by our community- To move forward in the change of climate we suggest an active informative educational process to help agricultural landowners and urban dwellers how to go into the future on how we each can participate in decreasing water usage together.	Thank you for your comment. We have received similar comments and recognize GSP implementation will need to consider the framework for executing accountability of groundwater usage in the near and long-term future. We encourage you to continue to participate in this process and to provide your feedback in upcoming advisory committee, working group, and board meetings. This will be considered in our process for updating the GSP by 2027.
28	Katie Demers	Individual	General Comment	Accountability of our groundwater usage-We are suggesting a moratorium on further groundwater extraction for development on what have been historically non-irrigated lands until there is an understanding of groundwater sustainability in the Dunnigan hills and other “special concern” areas. Accountability by our community- To move forward in the change of climate we suggest an active informative educational process to help agricultural landowners and urban dwellers how to go into the future on how we each can participate in decreasing water usage together.	Thank you for your comment. We have received similar comments and recognize GSP implementation will need to consider the framework for executing accountability of groundwater usage in the near and long-term future. We encourage you to continue to participate in this process and to provide your feedback in upcoming advisory committee, working group, and board meetings. This will be considered in our process for updating the GSP by 2027.
29	Ashlie Kirby	Individual	General Comment	I suggest a moratorium on further groundwater extraction for development on what have been historically non-irrigated lands until there is an understanding of groundwater sustainability in Dunnigan Hills and other “special concern areas.” To move forward in the change of climate I suggest an active informative educational process to help agricultural landowners and urban dwellers know how to go into the future on how we each can participate in decreasing water usage together. Please help small farms like Good Humus continue to provide local food to the Sacramento area.	Thank you for your comment. We have received similar comments and recognize this will need to be addressed as part of GSP implementation. We encourage you to continue to participate in this process and to provide your feedback in upcoming advisory committee, working group, and board meetings. This will be considered in our process for updating the GSP by 2027.
30	Chris Noey	Individual	General Comment	I support proposing a moratorium on further groundwater extraction for development of unirrigated lands. Additionally, I believe further education is needed on how we each can participate in increasing groundwater recharge and decrease water usage.	Thank you for your comment. We have received similar comments and recognize this will need to be addressed as part of GSP implementation. We encourage you to continue to participate in this process and to provide your feedback in upcoming advisory committee, working group, and board meetings. This will be considered in our process for updating the GSP by 2027.

Comment #	Commenter	Representing	GSP Reference (Public Draft)	Remark	YSGA Response
31	Cathy Marcinkevage/ Amanda Cranford	NMFS	General Comment	(See full letter) The GSA should describe what conditions within the subbasin would constitute an undesirable result with regard to streamflow depletion, ensuring that the description accounts for impacts to instream habitat that support all life-stages of ESA-listed species. The currently proposed sustainable management criteria for streamflow depletion do not include any explanation of how they will meet this requirement. For instance, the Lower Cache Creek streamflow depletion minimum threshold of "the recurrence of the spring (March-May) average measurement for 1975 to present in at least one spring in every seven (7) years" (p 3-24) has no apparent basis in ecology or any linkage to the aquatic habitat degradation caused by streamflow depletion that ultimately influences whether migrating and spawning salmon, steelhead, and sturgeon survive. If a lack of available data prevents such an effort, NMFS recommends the GSA follow guidance from California Department of Fish and Wildlife (2019) and develop conservative streamflow depletion thresholds as a precautionary principle until the surface flow/groundwater dynamic in the Yolo subbasin is better studied and understood.	Thank you for the comment, the YSGA added the following to section 3.8.2.1 Criteria for establishing minimum thresholds (p 3-24). The primary sustainability criteria for establishing minimum thresholds for interconnected surface waters is to maintain interconnection of the local groundwater system to critical surface water bodies at levels consistent with recent conditions. In this manner, the YSGA is establishing sustainable management criteria that protects the existing level of interconnection, which in turn supports existing habitat and ecosystem conditions associated with critical surface water bodies, while preventing further degradation.
32	Cathy Marcinkevage/ Amanda Cranford	NMFS	General Comment	(See full letter) If the GSA intends to propose groundwater elevations as a minimum threshold for streamflow depletion, the GSA should provide an explanation, with supporting best available science, for why groundwater levels are a reasonable proxy for interconnected surface water depletion. In addition, please explain why those levels are sufficient to avoid streamflow depletion that significantly impacts surface water beneficial uses.	Thank you for the comment, please see our response to Comment 31. The YSGA is setting criteria to maintain historical conditions and prevent further degradation. The YSGA added the following statement to section 3.8.2.1: The established minimum thresholds have been developed to maintain interconnection of local groundwater systems to the adjacent water body at levels consistent with recent conditions, thereby, supporting existing habitat and ecosystem conditions associated with the water bodies, while preventing further degradation.
33	Cathy Marcinkevage/ Amanda Cranford	NMFS	General Comment	(See full letter) Proposing groundwater elevations from the 2011-2016 period as streamflow depletion minimum thresholds and measurable objectives is likely inappropriate for avoiding significant impacts to ESA-listed species and their critical habitats, and EFH for Pacific Coast salmon. A basic hydraulic principle is that groundwater flow is proportional to the difference between groundwater elevations at different locations along a flow path. Using this basic principle, groundwater flow to a stream or, conversely, seep from a stream to the underlying aquifer is proportional to the difference between water elevation in the stream and groundwater elevations at locations away from the stream. Minimum thresholds and measurable objectives consistent with groundwater elevations seen during California's recent historic drought, such as that crafted for the Upper Sacramento River (p 3-25), would likely create historically high streamflow depletion rates and result in instream conditions that negatively affect ESA-listed species and their critical habitats, and EFH for Pacific Coast salmon. If a lack of data prevents the development of appropriate sustainable management criteria, the GSA should commit to designing and implementing studies that better inform appropriate "ecologically-based" minimum thresholds and measurable objectives for streamflow depletion.	Thank you for the comment, please see our response to Comment 31. The intent of establishing the selected MTs and MOs was to maintain historical conditions and prevent further degradation.

Comment #	Commenter	Representing	GSP Reference (Public Draft)	Remark	YSGA Response
34	Cathy Marcinkevage/ Amanda Cranford	NMFS	General Comment	(See full letter) We suspect that groundwater recharge projects are likely to be an important action implemented as part of the effort to achieve groundwater sustainability in the Yolo subbasin. NMFS encourages the GSA to consider implementing recharge projects that facilitate floodplain inundation and offer multiple benefits, including downstream flood attenuation, groundwater recharge, and ecosystem service. Managed floodplain inundation can recharge floodplain aquifers, which in turn slowly release stored water back to the stream during summer months. These projects also reconnect the stream channel with floodplain habitat, benefitting juvenile salmon, steelhead, and sturgeon by creating off-channel habitat characterized by slow water velocities, ample cover in the form of submerged vegetation, and high food availability. As an added bonus, these types of multi-benefit projects likely have more diverse grant funding streams that can lower their cost as compared to traditional off-channel recharge projects. NMFS is available to work with any GSA interested in designing and implementing floodplain recharge projects.	Two sentences were added to MA 4 describing multi-benefit recharge projects and managed wetlands recharge projects.
35	Eliza Gregory	Individual	General Comment	Accountability of our groundwater usage: I want to see a moratorium on further groundwater extraction for development on what have historically been non-irrigated lands until there is an understanding of groundwater sustainability in the Dunnigan hills and other "special concern" areas. Accountability by our community: I would like to see an active informative educational process to help agricultural landowners and urban dwellers make intentional choices going into the future so that we can all participate in decreasing water usage together. I am deeply concerned with groundwater regulation in California and want to see policies that prioritize small farming operations over large companies. I worry about hedge fund and venture funded operations that have no stake in the local impact of their companies' activities doing material harm to our ecosystems, water supply and economy.	Thank you for your comment. We have received similar comments and recognize GSP implementation will need to consider the framework for executing accountability of groundwater usage in the near and long-term future. We encourage you to continue to participate in this process and to provide your feedback in upcoming advisory committee, working group, and board meetings. This will be considered in our process for updating the GSP by 2027.
36	Jill Shirley	Individual	General Comment	I would like to see a moratorium on further groundwater extraction for development on what have been historically non-irrigated lands until there is an understanding of groundwater sustainability in the Dunnigan Hills and other "special concern" areas. It is CRAZY to allow development until the security and sustainability of water supplies are assured.	Thank you for your comment. We have received similar comments and recognize this will need to be addressed as part of the GSP implementation. We encourage you to continue to participate in this process and to provide your feedback in upcoming advisory committee, working group, and board meetings. This will be considered in our process for updating the GSP by 2027.
37	Oscar Villegas	County Supervisor, District 1	p. 2-54	Supervisor Villegas expressed concerns over potential seawater intrusion as a result of changes in Delta operations. If the proposed Delta tunnels are completed, there is the potential for seawater intrusion to occur in the surface water system, and then into the groundwater system.	The following was added to Section 2.2.3: There is the potential for changes in surface water conditions within the Sacramento-San Joaquin River Delta. Sea level rise, Delta water conveyance modifications, and changing land use have the potential to allow surface water with higher salinity values to move farther into the Delta than they have in the recent historic period. This has the potential to affect the South Yolo and Clarksburg Management Areas. These actions or projects are related to surface water management, and are not directly considered in this plan; however, the quality of groundwater, specifically the increase or intrusion of salinity in the South Yolo and Clarksburg Management Areas will be considered when potential changes are proposed in the Delta within the Degraded Water Quality Sustainable Management Criteria.
38	Mary Kaltenbach	Individual	General Comment	GSP, As the groundwater declines during drought conditions and during an unprecedented development of our diminishing groundwater resource, we would like to ask GSP to consider the following: · Accountability of our groundwater usage-We are suggesting a moratorium on further groundwater extraction for development on what have been historically non-irrigated lands until there is an understanding of groundwater sustainability. · Accountability by our community- To move forward in the change of climate we suggest an active informative educational process to help agricultural landowners and urban dwellers how to go into the future, on how we each can participate in decreasing water usage together. Please consider our request, for the future generations of farmers hoping to grow food for our community. Sincerely, Mary Kaltenbach and family	Thank you for your comment. We have received similar comments and recognize GSP implementation will need to consider the framework for executing accountability of groundwater usage in the near and long-term future. We encourage you to continue to participate in this process and to provide your feedback in upcoming advisory committee, working group, and board meetings. This will be considered in our process for updating the GSP by 2027.

Comment #	Commenter	Representing	GSP Reference (Public Draft)	Remark	YSGA Response
39	Stephen Kaltenbach	Individual	General Comment	GSP, As the groundwater declines during drought conditions and during an unprecedented development of our diminishing groundwater resource, we would like to ask GSP to consider the following: · Accountability of our groundwater usage-We are suggesting a moratorium on further groundwater extraction for development on what have been historically non-irrigated lands until there is an understanding of groundwater sustainability. · Accountability by our community- To move forward in the change of climate we suggest an active informative educational process to help agricultural landowners and urban dwellers how to go into the future, on how we each can participate in decreasing water usage together. Please consider our request, for the future generations of farmers hoping to grow food for our community. Sincerely, Stephen Kaltenbach	Thank you for your comment. We have received similar comments and recognize GSP implementation will need to consider the framework for executing accountability of groundwater usage in the near and long-term future. We encourage you to continue to participate in this process and to provide your feedback in upcoming advisory committee, working group, and board meetings. This will be considered in our process for updating the GSP by 2027.
41	Marguerite Fleming	Individual	General Comment	I'm greatly concerned by water use of new nut farms that have popped up on so many county roads, and would like a moratorium on water extraction on currently unirrigated land until we know that currently farmed land and homes will have adequate water for their current uses. Find a way to make water users accountable for use. Everyone needs to work together on this, especially in this time of climate change.	Thank you for your comment. We have received similar comments and recognize this problem will need to be addressed as part of GSP implementation. We encourage you to continue to participate in this process and to provide your feedback in upcoming advisory committee, working group, and board meetings. This will be considered in our process for updating the GSP by 2027.
42a	Shaundra Cashdollar	CDFW	p. 2-101	(See full letter) Comment #1 – i. Interconnected Surface Water Systems (2.2 Groundwater Conditions, 2.2.6 Interconnected Surface Water Systems; starting p 2-101): The GSP should add clarity to its description of interconnected surface waters (ISW) within the subbasin. a. Issues: i. Groundwater Elevations: The GSP states that to identify ISW within the subbasin, the "minimum groundwater elevation" from water years 2006-2015 was compared with stream surface elevations (p 2-103, line 27). Presumably this should say either maximum groundwater elevation, or minimum depth to groundwater, as indicated in Figure 2-47. Additionally, groundwater levels should be compared to the streambed elevation, rather than the stream surface elevation, for assessment of interconnectedness. Recommendations: i. Groundwater Elevations: The GSP should be revised to clarify whether the ISW methodology used the minimum or maximum groundwater elevations. The Department recommends using the maximum groundwater elevations to be inclusive when identifying ISW within the subbasin. The methodology should be narrowly updated to compare groundwater levels with the streambed elevation, rather than the stream surface.	The statement on page 103, line 27 (in the Public Draft) was revised to reflect that maximum groundwater elevation was used. Language in Section 2.2.6.1 was added to more explicitly explain the estimation of stream bottom elevation.
42b	Shaundra Cashdollar	CDFW	p. 2-110	(See full letter) Comment #1 – ii. Quantity and Timing of Depletions: Though Table 2-17 (p 2- 110) presents the modeled annual average seep volumes from ISW within the subbasin, the GSP does not include sufficient detail on the timing of depletions as required by 23 CCR § 354.16(f). In order to adequately assess ISW that may be gaining or losing at different times of the year, it is preferential to present seep values by month, rather than by year. Additionally, the Department recommends including seep values for the Upper Sacramento River and Lower Sacramento River separately. Figure 2-47 appears to show the Upper Sacramento as a primarily losing reach while the Lower Sacramento is a gaining reach. Aggregating seep values across the entire Sacramento River makes it difficult to assess current conditions within shorter river segments. As the ISW sustainable management criteria (SMC) sets thresholds separately for the Upper and Lower Sacramento River, presenting current conditions in the same manner would allow for a more direct comparison of baseline conditions and those that would occur under the SMC. b. Recommendations: ii. Quantity and Timing of Depletions: The Department recommends updating Table 2-17 to include average depletions by month. Information for the Upper and Lower Sacramento River should be presented individually.	Table 2-17 has been modified to present monthly average seep values. The values presented for the Sacramento River have been split into two reaches corresponding to the interconnected surface water management zones.

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43	Shaundra Cashdollar	CDFW	p. 2-109	(See full letter) Comment #2 – Groundwater Dependent Ecosystems (2.2 Groundwater Conditions, 2.2.7 Groundwater Dependent Ecosystems; starting p 2-109): The GSP does not include sufficient detail or metrics on how the assessment of GDEs within the subbasin will be used to evaluate undesirable results or guide management criteria and actions. a. Issues: i. GDE Unit Susceptibility: The Department recognizes and appreciates the conservative approach to identifying GDEs with the subbasin, as well as the subsequent analysis assessing trends in Normalized Difference Vegetation Index (NDVI), groundwater levels, species dependence, and biodiversity values for GDE units. However, other than assessing trends within the subbasin, the GSP does not identify specific targets or metrics associated with these GDE trends that would indicate an undesirable result or trigger management actions within the subbasin. ii. Special Status Species: Table 2-20 (p 2-124) lists the number of freshwater species present in each GDE unit, subcategorized by listed species, vulnerable species, and endemic species. The GSP does not specifically identify which special status species are present within the subbasin, and it is unclear whether this assessment included aquatic species supported by ISW within the subbasin. b. Recommendations: i. GDE Unit Susceptibility: To leverage the robust GDE analysis for meaningful groundwater management, the Department recommends the GSP clarify what constitutes an undesirable result for GDEs and how potential undesirable results will be avoided under the proposed SMC. The GSP should identify monitoring metrics for GDEs that will enable the YSGA to characterize GDE vulnerability to groundwater depletion and associated undesirable results, and to undertake management intervention accordingly. If undesirable results are occurring before minimum thresholds (MTs) are reached, SMC should be adjusted (See Comment #3). ii. Special Status Species: The Department recommends the GSP clarify whether the species identification included aquatic species supported by ISW within the subbasin. The GSP should include a discussion of listed aquatic species present in ISW within the subbasin, including the federally threatened California Central Valley steelhead (O. mykiss), state and federally endangered winter-run Chinook salmon (O. tshawytscha), state and federally threatened spring-run Chinook salmon (O. tshawytscha), and the federally threatened Southern distinct population segment of the North American green sturgeon (A. medirstris). The Department recommends the YSGA consider including a supplemental list of the identified special status species within the subbasin as an appendix to the GSP.	The YSGA has considered the presence and impact of sustainable management criteria on GDEs. The YSGA has also established SMC to protect existing conditions of groundwater levels and interconnected surface waters, which in turn support existing levels of habitats and GDEs. The YSGA will also continue to evaluate the presence of GDE's in the Subbasin and the effects of groundwater conditions on those habitats. Clarification statements were added to Section 3.6.2.1. An appendix including the groundwater dependent species in the Yolo Subbasin was added to the GSP - Appendix G.

Comment #	Commenter	Representing	GSP Reference (Public Draft)	Remark	YSGA Response
44	Shaundra Cashdollar	CDFW	p. 3-3	Comment #3 – Sustainable Management Criteria (3.3 Chronic Lowering of Groundwater Levels, 3.6 Depletion of Interconnected Surface Water; starting p 3-3): Groundwater level and interconnected surface water SMC may not protect against undesirable results for fish and wildlife beneficial uses and users... (continues in letter)	Thank you for the comment, please see the response to Comment 43.
45	Shaundra Cashdollar	CDFW	p. 4-29	(See full letter) Comment #4 – Monitoring Networks (4.11 Monitoring Network Improvement Plan, 4.11.2.3 Surface Water, Interconnected Surface Water, and Groundwater Dependent Ecosystem Monitoring Network; starting p 4-29): Improvements to the monitoring network are necessary to better characterize GDEs and ISW within the subbasin. a. Issue: The GSP identifies improvements to the subbasin monitoring network that would allow for better characterization of ISW and GDEs, including the installation of additional shallow, near-stream nested monitoring wells, piezometers, and streamflow gages. It is unclear whether the YSGA intends to move forward with these identified improvements to the monitoring network. Figure 2-46 identifies existing stage and flow gages within the subbasin, but the GSP does not include these streamflow gages in the monitoring network for interconnected surface waters. The GSP states that gages are influenced by multiple factors, leading to difficulty in characterizing the specific impacts of groundwater pumping on streamflow depletion (p 3-22, line 6). Though the GSP relies on groundwater levels as a proxy for assessing ISW, it is still necessary to tie the impacts of groundwater pumping to the volume of groundwater depletions. Paired flow gages and monitoring wells can help to better characterize ISW and the volume and timing of depletions and refine subbasin modeling of surface-groundwater interactions, leading to a more robust assessment of potential impacts to ISW within the subbasin. b. Recommendation: The Department recommends that the GSP include specific plans and timelines associated with improvements to the monitoring network that will better characterize ISW and GDEs within the subbasin. The ISW monitoring network should include paired streamflow gages and shallow monitoring wells to better characterize the volume and timing of depletions related to groundwater pumping.	Table 4-5 was created and inserted into the GSP to provide guidance and actions that can be taken to improve the understanding of ISWs and GDEs within the Yolo Subbasin. The monitoring network chapter has been modified to reflect the ongoing evaluation of data from streamflow gages.
46	Shaundra Cashdollar	CDFW	p. 5-4	(See full letter) Comment #5 – Projects and Management Actions (5.2.1 Projects and Management Actions; starting p 5-4): The GSP does not include projects and management actions that relate to demand management within the subbasin. a. Issue: The GSP indicates that the subbasin is expected to operate within its sustainable yield with the listed projects and management actions (PMAs) to ensure that undesirable results are avoided. The identified PMAs focus primarily on supply augmentation, conjunctive use, or infrastructure improvements. Given the cost and timing challenges of implementing supply augmentation projects, if undesirable results occur within the subbasin, it may be necessary to implement additional demand management projects to produce groundwater benefits. b. Recommendation: The Department recommends that the GSP include provisions or plans for demand management PMAs that could be implemented on a shorter timeframe if necessary to maintain basin sustainability.	Thank you for the recommendation. As part of the Yolo Subbasin GSP Preface, please find an acknowledgement of this deficiency and the YSGA's work to consider appropriate planning strategies as part of drought year cycles.

Comment #	Commenter	Representing	GSP Reference (Public Draft)	Remark	YSGA Response
47	Shaundra Cashdollar	CDFW	General Comment	(See full letter) In conclusion, though the draft GSP thoughtfully identifies environmental beneficial users of groundwater and provides detailed characterization of subbasin groundwater conditions, the GSP can further refine its management criteria and analyses in relationship to GDEs and ISW to better avoid potential impacts to environmental beneficial users of groundwater. The Department recommends that the Yolo Subbasin Groundwater Agency address the above comments before GSP submission to DWR to best prepare for the following regulatory criteria for plan evaluation: 1. The assumptions, criteria, findings, and objectives, including the sustainability goal, undesirable results, minimum thresholds, measurable objectives, and interim milestones are not reasonable and/or not supported by the best available information and best available science (23 CCR § 355.4(b)(1)). (See Comment #1, 2, 3) 2. The GSP does not identify reasonable measures and schedules to eliminate data gaps. (23 CCR § 355.4(b)(2)) (See Comment #4) 3. The interests of the beneficial uses and users of groundwater in the basin, and the land uses and property interests potentially affected by the use of groundwater in the basin, have not been considered. (23 CCR § 355.4(b)(4)) (See Comment #2, 3) 4. The projects and management actions are not feasible and/or not likely to prevent undesirable results and ensure that the basin is operated within its sustainable yield. (23 CCR § 355.4(b)(5)) (See Comment #5)	Thank you for the comment, please see the response to Comments 42a-46.
48	Ben King	Individual	Appendix A	The YSGA JPA should be updated to represent the current policies and objectives of its Member Agencies and the State of California. It should also be updated to reflect the changing dynamic in farmland ownership in the Yolo Subbasin from traditional family owned farmland to increasing institutional ownership focused on water related assets and infrastructure. While it is a good objective to balance the interest of the municipal Member agencies with the legacy rural Member agencies and stakeholders, the JPA as a whole should reconsider the tension of this balance in the context of the recent policy changes of the State of California and changing social policies of its Member agencies. Water and food production are central to most policy issues and concerns for the residents of the State of California and the Yolo Subbasin in particular.	Thank you for your comment. As part of the JPA re-opener that will be investigated in 2022, we will take your comments into consideration. We do acknowledge that the YSGA JPA structure will need to be modified in the future to more equitably distribute the true costs of groundwater sustainability. The governance structure can be strengthened to better represent areas that are currently underrepresented.
49	Ben King	Individual	Appendix A	In April of 2021, the DWR formally adopted a Human Right to Water (HRTW) Policy in its Departmental Administrative Manual and the SWRCB recently adopted a HRTW Resolution recognizing HRTW as a core value – should the JPA Recitals reflect this policy change? What are the positions and policies or the JPA Members regarding HRTW that should be included in the JPA Recitals and provisions generally ? What is the County of Yolo's policy regarding resilient supply to fresh water to all its residents and specifically those residents without access to Sacramento River water supply?	Thank you for your comment. The YSGA Board has not discussed the State Water Board's recent Human Right to Water Policy to-date. The County of Yolo has a groundwater ordinance that states the following "The groundwater underlying Yolo County has historically provided the people and lands of Yolo County with water for agricultural, domestic, municipal and other purposes. The Board recognizes that the principle developed in the case law of California that water may be appropriated from a groundwater basin if the groundwater supply is surplus and exceeds the reasonable and beneficial needs of overlying users. It is essential for the protection of the health, welfare, and safety of the residents of the County, and the public health of the State, that groundwater resource of Yolo County be protected from harm resulting from the extraction of groundwater for use on lands outside of the County, until such time as needed additional surface water supplies are obtained for use on lands on the County, or overdrafting is alleviated, to the satisfaction of the Board." (https://www.yolocounty.org/home/showdocument?id=1899).
50	Ben King	Individual	Appendix A	The SWRCB is currently drafting a Racial Equity Resolution and YSGA Members have updated there policies regarding Diversity, Equity and Inclusion - should these objective be included in the JPA Recitals? How does the JPA further the interest of DEI policy and objectives when it comes to HRTW concerns? Are there adverse racial outcomes just by the fact that some Yolo Subbasin residents have access to Sacramento River supplies while others have long term concerns regarding water supply and/or quality and if so how can the governance provisions of the JPA help mitigate these adverse racial outcomes?	Thank you for the comment. The YSGA Board has not discussed this to-date, but as part of the JPA re-opener, this may be considered and future policies may be developed.

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51	Ben King	Individual	Appendix A	The trend toward institutional ownership in farmland continues to evolve in the Yolo Subbasin whereby institutional capital managed for non-resident investors have been purchasing farmland and specifically water rich farmland in the Yolo Subbasin. What are the long term concerns for Member agencies regarding this trend and how do the Member Agencies balance their participation in the JPA with protecting their municipal sovereign interest versus the profit driven objectives of investors and specifically non-resident investors? Perhaps institutional investors should be encouraged to become signatories of the United Nations Principles for Responsible Investment Guidance for Investment in Farmland (see Responsible investment in farmland | Technical guide | PRI (unpri.org)). Should there be a residency requirement for each Board Member? Should the Environmental, Social and Governance requirements of the California State Pension Plan mangers be guidance for institutional investor Members of the YSGA JPA?	Thank you for the comment. The YSGA Board has not discussed this to-date, but as part of the JPA re-opener, this may be considered. We appreciate your thoughtful considerations to ensure there is limited conflict of interest and bias within the YSGA's governance.
52	Ben King	Individual	Appendix A	What are the indemnification protections of Member Agencies regarding law suits directed toward settlement contractor Member agencies. Currently there is litigation from Aqua Alliance regarding the use of groundwater substitution for water transfers and it is foreseeable that litigation regarding water transfers will continue. What are the legal and financial protections of Member agencies not involved in water transfers from this type of litigation? What are the protections from one Member suing another Member?	Thank you for the comment. We have raised this question with our legal counsel, and hope to be better prepared for this question or situation in the future.
53	Ben King	Individual	Appendix A	How should Management Areas be implemented and how does the implicit jurisdictional control given via a Management Area potentially conflict with the goals and objectives of individual Member agencies and specifically municipal Member agencies. Can municipal Member agencies achieve their DEI and/or HRTW objectives if they have ceded authority for such objectives to the establishment of a Management Area. How is the procedural due process rights inherent in Stakeholder participation infringed on by the imposition of a Management Area. Should Management Areas be used solely for Management Actions needed to achieve or maintain resilience or sustainability rather than just jurisdictional convenience of a particular Member or Members?	Thank you for the thoughtful comment. As part of GSP implementation, we intend to form Advisory Committees for the Management Areas and as part of this process we intend to consider these questions/thoughts, along with many other to ensure a fair, responsible, transparent governance is in place to ensure undesirable results are avoided and MA/Projects are implemented.
54	Frances Burke	Individual	General Comment	There needs to be a moratorium on any new wells drilled on historically non-irrigated land.	Thank you for your comment. We have received similar comments and recognize this will need to be addressed as part of the GSP implementation. We encourage you to continue to participate in this process and to provide your feedback in upcoming advisory committee, working group, and board meetings. This will be considered in our process for updating the GSP by 2027.
55	Susan O		General Comment	Consider moratorium on further groundwater extraction for development on what have been non-irrigated lands until there is an understanding to sustain groundwater in the Dunnigan Hills and other "special concern" areas. Thank you.	Thank you for your comment. We have received similar comments and recognize this will need to be addressed as part of the GSP implementation. We encourage you to continue to participate in this process and to provide your feedback in upcoming advisory committee, working group, and board meetings. This will be considered in our process for updating the GSP by 2027.

Comment #	Commenter	Representing	GSP Reference (Public Draft)	Remark	YSGA Response
56	Christopher Foe	Individual	General Comment	(See full letter) I remain skeptical about the predictive ability of the YSGA model because of shortcomings discussed below. The ongoing drought may provide a unique opportunity to assess the model's accuracy and increase stakeholder confidence in its ability to predict future water elevation levels. The model could be used to predict groundwater levels at all compliance stations this fall. Model predictions can be compared with field measurements made this fall to assess model accuracy and precision in each sub basin. If the analysis is done, the results and a statistical analysis should be posted online for stakeholder evaluation. A robust model could be of great utility to landowners. If strong statistical correlations are obtained between predicted and observed values, then the model can be used with precipitation information collected this rainy season to predict groundwater levels at the end of the 2022 irrigation season. This will help landowners decide whether they need to be lowering their pumps this winter and spring and/or drilling new wells to reduce the chance of experiencing a dry well next year.	The YSGA model has been extensively calibrated. Please see Section 3.1 of the Model documentation appendix. We have calibrated to historical stream flows, reservoir storage, water deliveries, applied water, and to groundwater elevations. This has been a major effort that improved upon earlier efforts. We capture deep droughts – 1976-77, late 80's, and recent droughts. Please see also Figure 12 of the Water Budget appendix which shows observed groundwater levels against modeled groundwater storage over 48 years. The YSGA model- like any model- can improve with more data, especially regarding lands and pumping. We expect to produce a future land use projection in the next GSP update. This will help in understanding more about the uncertainty related to future groundwater pumping.
57	Christopher Foe	Individual	General Comment	(See full letter) The report is remiss in not including sustainability goals for water quality. Abundant groundwater of a degraded quality is of limited value to stakeholders. The YSGA is to be commended for coordinating the collection of groundwater monitoring data with other agencies. However, the YSGA needs to develop, a priori, sustainable management goals to evaluate this data and determine whether water quality management plans are needed. This is particularly true for nitrate contamination. Available data suggest that current nitrate levels in some regions exceed the primary MCL and constitute an ongoing human health drinking water hazard. The water quality problem is likely to become significantly worse if not promptly addressed. At a minimum, the YSGA should insure that all rural domestic drinking water wells in sub basins of concern are tested to determine nitrate levels. In addition, all new domestic drinking water wells should be tested as part of the construction process. This should occur whether the landowner is part of the Regional Board's Irrigated Lands Regulation Program or not. Nitrate may be removed from drinking water by ion exchange, distillation or reverse osmosis. However, landowners must be educated about the hazard and how to protect themselves. This should be an immediate YSGA management action.	Thank you for the comment. The YSGA has added a monitoring network for water quality and SMCs for TDS. The MT for TDS is 1000 ppm and the MO is 750 ppm. We have also identified data gaps in the water quality monitoring section and plans to address those data gaps.
58	Christopher Foe	Individual	General Comment	(See full letter) The Sustainability Plan is silent about what happens when minimum thresholds/measurable objectives are exceeded. There should be an explicit commitment by the JPA to undertake immediate corrective action when this occurs. The purpose of the corrective action is to slow/reverse the development of negative groundwater conditions and spur implementation of longer term actions. At a minimum, potential actions should include an immediate moratorium on new well construction in threaten sub basins.	Thank you for your comment; this is an obvious deficiency in our articulation of applying the sustainable management criteria. The intent is for projects and management actions to be implemented prior to exceeding a minimum threshold. The YSGA intends to be proactive in managing the groundwater resources and there will be continual reporting that will ensure we are monitoring conditions and the proximity to or downward trend towards a minimum threshold.
59	Christopher Foe	Individual	p. 1-24	(See full letter) · The City of Davis and Woodland have percolation basins receiving storm runoff. These actions should be acknowledged, the amount of groundwater infiltration calculated, and in the management section, construction of additional percolation basins encouraged.	Added "Additionally, percolation basins receiving storm runoff exist in the Yolo Subbasin, notably in the Cities of Davis and Woodland." in section 1.5.3.2.
60	Christopher Foe	Individual	p. 2-69	(See full letter) · Please be consistent with units: TDS in figures 2-26 and 2-27 are in mg/l while on p 2-69 line 16 are in ppm. The different units result in the same numeric value but the general reader may not know that.	The units of all TDS descriptions have been reviewed and modified as necessary for consistency.

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61	Christopher Foe	Individual	p. 2-70	(See full letter) There is a similar problem with units for nitrate. The discussion appears to bounce around between concentrations reported as total nitrate and as N. For example Figure 2-29 are as total nitrate while figures 2-30 and 2-31 are as N. Sometimes in the text it is difficult to determine what the units being used are. Unlike with TDS, the different units result in different values. To eliminate confusion the text should use only one set of units. The most scientifically acceptable term is as N (example 10 mg-N/l).	The units of all nitrate descriptions have been reviewed and modified for consistency, and additional explanation of the nitrate units provided has been added to the text.
62	Christopher Foe	Individual	p. 2-70	(See full letter) Shallow groundwater nitrate contamination may be greater than pictured in the Nitrate Basin wide Condition section. The most recent figure is for the 2000-2016 time period (5 to 21 years ago) and shows wide spread concentrations greater than 5 mg-N/l in the Central, South and North basins. The 5 mg-N/l is often considered the leading edge of the nitrogen contamination plume. Monitoring data shows that nitrate concentrations in 50 percent of shallow Central Valley groundwater wells increased from 5 to 10 mg-N/l or greater in five years (in Levy et al 2021). About 75 percent of these wells had concentrations greater than 10 mg-N/l in ten years. The 10 mg-N/l concentration is the primary federal drinking water MCL for safe human consumption.	Future WQ monitoring will be conducted and reported annually to ensure that current data and standards are considered and potential linkages to groundwater management activities are identified. These updated reviews will be part of the Annual Report submitted to DWR, as described in the Water Quality Monitoring Network Protocols and Standards.
63	Christopher Foe	Individual	Table 2-13	(See full letter) What year was data in Table 2-13 collected?	Added "Data collected from SDWIS in September 2020". This comment is referring to now Table 2-14. Summary of Nitrate Prevalence Among Community Water Systems.
64	Christopher Foe	Individual	p. 2-71	(See full letter) A map of the location of current and historical dairies and horse boarding facilities would be useful to determine whether septic or animal facilities are the primary source of animal derived nitrogen.	Thank you for the comment. The Central Valley Dairy Representative Monitoring Network might be a useful resource in the future to map historic dairies. As of January 2021, there are no CVDRMP wells being monitored on dairies in the Yolo Subbasin.
65	Christopher Foe	Individual	p. 2-71	(See full letter) · The nitrate section should be expanded to include more on the sources, transport and fate of nitrate. The section identifies that fertilizer application in agriculture is the major source of nitrate. The document should continue and identify nitrogen application rates (lbs/acre/yr) by the major crop types grown in the basin (Figure 1-4). Landon et al 2009 found that nitrate concentration in shallow groundwater (<200 ft) on the eastside of the San Joaquin Basin was positively correlated with percent orchard and vineyard land use. There was no relationship with other crop types suggesting that these two land uses were a major source of groundwater nitrogen. The discussion should also include a section on the fate of nitrate. Groundwater contamination is very expensive and difficult to remediate. Nitrate is slowly converted to gaseous nitrogen in anaerobic environments and lost from the soil profile to the atmosphere. But this is a slow process with the result that nitrate tends to accumulate in groundwater. Finally, Levy et al 2021 has shown a positive correlation between groundwater drawdown during droughts and an increase in nitrate concentration. Apparently, nitrate is sufficiently mobile and soluble that it remains in solution and is concentrated as water levels are drawn down. Understanding nitrate cycling is essential for understanding and managing contamination.	The YSGA will rely on the CV-SALTS as it continues its work on nitrate management. As that program develops in Yolo County, the YSGA will coordinate and review data developed by CV-SALTS to ensure that nitrate concentrations in the Subbasin are not increased due to groundwater management activities.
66	Christopher Foe	Individual	p. 2-76	(See full letter) Figure 1-7 shows the distribution of domestic wells in the basin. Most of these wells likely draw water from the upper groundwater zone. Figure 1-7 should be overlaid on Figure 2-30 to identify the location of domestic drinking water wells at risk from elevated nitrate levels. An additional table should be included estimating how many domestic wells are likely contaminated with <2.5, 2.5-5.0, 5.0-7.5, 7.5-10.0 and >10.0 mg-N/l by sub basin. This information is essential for identifying the location and evaluating the magnitude of the human health nitrate contamination problem.	Figure 2-30 is from an older report (Ludhorff & Scalmanini, 2004 Groundwater Management Plan) and unfortunately, we do not have the ability to modify or manipulate the data. We appreciate your comment and agree this would be a beneficial analysis that will be completed in the future.

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67	Christopher Foe	Individual	Figure 2-56	(See full letter) · Figure 2-56 is meaningless and should be discarded or significantly amended. The upper graph is a valid projection of future urban water use. The bottom graph for agriculture is misleading and should not be presented. It apparently is based on 2016 land use consumption values and used to make projections through 2061. Agricultural land use is rapidly changing in the basin. Table 2-21`shows that deciduous and vine crops have increased by 11.7 and 5.6 percent per year between 2008 and 2016. I believe the rate at which new orchards are being planted has continued or increased since then. In contrast, table 2-56 shows that grain, field crops and pasture acreage have all decreased. Orchards and vineyards almost exclusively rely on groundwater while row and field crops use surface water. Has an agricultural water use sensitivity analysis been done? Such an analysis is important because the pie charts in Figure 2-56 demonstrate that agriculture uses more than 95 percent of the water in the basin. Changes in agricultural use, not urban use, will drive changes in the water budget. Similar comments apply to the remainder of the groundwater elevation and storage discussion[1]. [1] At this land use conversion rate the entire 640,000 acre basin would be planted in orchards within the next 15 years, well within the proposed 20 year implementation period. My projection for the magnitude of new orchard acreage is obviously flawed but is included to emphasize the present rate of change of land use in the basin and the danger of extrapolating 6 year old agricultural land use date through 2070.	We do not agree that Fig 2.56 is meaningless. It gives us a good sense of how climate alone could influence the Yolo subbasin, given recent land use. We know and agree that land use projections will be important to consider. We did not have the budget to implement a land use projection at this stage. We will certainly include a land use projection in the next GSP update. A sensitivity analysis is included in version 2 of the Model Documentation Appendix. It shows that the YSGA model is most sensitive to uncertainties In land use.
68	Christopher Foe	Individual	p. 3-3	(See full letter) · Please explain the rationale behind the determination that an undesirable result has occurred when the minimum threshold was exceeded in 51 percent of monitoring wells in two sub basins. A following section entitled “Criteria for establishing minimum thresholds” also does not explain the selection of the 51 percent value in two sub basins.	Added the following to section 3.3.1: "This 51% value was selected to allow for interim projects and management actions to take place within the subbasin. This value was selected and agreed to by the YSGA member entities and the YSGA Board of Directors."
69	Christopher Foe	Individual	p. 3-4	(See full letter) Several questions. First, is the period of exceedance a calendar or water year? Second, does this mean that both the fall and spring measurements need to be below the minimum threshold for two years or only one measurement in each of two consecutive years? Finally, is this calculated from static or sustained groundwater pumping level?	Revised section 3.3.2.1 to state: "A well violates the minimum threshold when the groundwater elevation exceeds the historic (pre-2016) minimum elevation in the period of record of each Representative Well in two consecutive fall measurements." Also added a sentence stating: "Minimum thresholds for groundwater levels and groundwater storage will be evaluated using static water levels."
70	Christopher Foe	Individual	p. 5-1	(See full letter) The groundwater pumping values for all scenarios are very precise. There is clearly great uncertainty about future changes in both climate and urban and agricultural land use. Ninety-five percent confidence limits around these values would strengthen the discussion and emphasize the need for high quality monitoring data and a wide range of management options.	The new section on sensitivity analysis in the Model Documentation appendix adds information on uncertainty to model parameters, surface water rights in certain areas and model parameters. The YSGA model is a process based model, not a statistical model. Through scenario analysis we can bracket the futures; however there is no straightforward analogy that can be drawn to the confidence limits of purely statistical models. The results across the scenarios are the way we evaluate the uncertainties. In the case of climate change, the different pumping values in Table 2-56 provide a range of uncertainty. Future modeling efforts will address land use uncertainty.
71	Christopher Foe	Individual	Table 5-1	(See full letter) Three possible additional management actions are: first, inject treated UC Davis surface water into an intermediate aquifer and use the stored water to augment surface water supplies for irrigating research plots. Second, encourage the Cities of Davis, Woodland, and Winters to divert all storm runoff into percolation ponds for groundwater recharge. Finally, multiple off-channel gravel pits exist along Cache Creek. Winter storm runoff could be diverted into the pits and used for groundwater recharge and/or release into Cache Creek for downstream use during the irrigation season.	Suggestion 1. Injecting treated water is also called ASR (Aquifer Storage and Recovery). The City of Woodland has begun installing a system of multiple ASR wells. The City of Davis opted to drill deeper wells and depend on native deep water of better water quality instead of rely on shallow groundwater. Planning documents from WDCWA and the City of Davis UWMP explain this decision making process.----------Suggestion 2. Please see the 2019 Yolo County Stormwater Resources Plan appendix F to the Sac Westside IRWMP for analysis of stormwater percolation ponds. https://www.westsideirwm.com/irwm-plan/ ----------Suggestion 3. Using gravel mining pits for recharge has been suggested many times over the years. Please see such documents as p 12 of http://www.ycfcwcd.org/documents/YCFCEnhancedCanalRechargeFeasibilityAugust2012.pdf and Section 6 of http://www.ycfcwcd.org/documents/TM-UsingYCIGSMforEvaluationofRegionalSurfaceWaterSupplyandCCGRRPProjects.pdf

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72	Christopher Foe	Individual	Table 5-1	(See full letter) All rural domestic drinking water wells should be tested for nitrate concentration. New wells should be tested as part of their construction. Landowners should be educated about the threat of drinking nitrate contaminated well water and instructed on how to treat it.	Currently, only public drinking water supplies are regulated for water quality. Privately used wells are not regulated. Many water quality issues exist, in addition to nitrate. Pleases see Appendix F of the 2012 Nitrate Fingerprinting Report, on regulation of water quality in private wells. http://www.ycfcwcd.org/documents/NitrateFingerPrintingandGroundwaterAgeDecember2012.pdf---------- Currently all new well construction permitted by the Yolo County Environmental Health Department is required to submit a one-time nitrate test for new wells. This is for monitoring purposes only. Nitrate fact sheets are provided in English and Spanish to well owners. Use of high nitrate water is still allowed in private wells.---------- The Irrigated Land Regulatory Program (ILRP) of the Central Valley Regional Water Quality Control Board has started to require testing and reporting of nitrate from private drinking water wells an irrigated parcels. So far this is for monitoring information only. Ongoing coordination with these programs and analysis of this data is included in the monitoring network improvement plan.
73	Annie Main	Good Humus	General Comment	(See full letter) The Hungry Hollow where we live and have been farming for the last 37 years has been historically a dry farmed region. This means that there have been no wells for YSGA to collect data on. Our area is now labeled a special concern region and SGMA is lacking historical groundwater data to compare with past use and future needs. The fringe areas, including our land, are among areas seeing accelerated water decline which is an indicator of unsustainable usage. Therefore more time is needed to collect data, to find wells to monitor so that more complete information can be collected to understand the usage and recharge levels. How can we find sustainability with new wells bring drilled that are changing the water usage with every new hole in the ground? There needs to be a 10 year moratorium on any new wells drilled on historically non-irrigated land. This will give time to collect data and to more fully understand the groundwater levels	Thank you for your comment. We have received similar comments and recognize this will need to be addressed as part of the GSP implementation. We encourage you to continue to participate in this process and to provide your feedback in upcoming advisory committee, working group, and board meetings. This will be considered in our process for updating the GSP by 2027.
74	Annie Main	Good Humus	General Comment	(See full letter) Access to water, groundwater and surface water is a community resource. How can this resource be shared equally, and not monopolized by any one person or corporation that has the enough money for a pipeline to take care of their personal needs? This water is community water; therefore it should be used for the entire community not serving a few that can afford to pay for a pipeline to their landholdings. Landowners that are dependent on a pipeline allow them the ability to develop more land, and during the summer months when water from this pipeline is not available, those land owners are going to use groundwater. Our Hungry Hollow our water is very good water, lacking salts and boron that is prevalent in Cache Creek water, therefore piping Cache Creek water into the Hungry Hollow will degrade the quality of water. Pipelines are not for the good of the entire community, they will advance land development, increase groundwater usage, and degrade water quality.	Thank you for your comment. We have received similar comments and recognize this will need to be addressed as part of the GSP implementation. We encourage you to continue to participate in this process and to provide your feedback in upcoming advisory committee, working group, and board meetings. This will be considered in our process for updating the GSP by 2027.

Comment #	Commenter	Representing	GSP Reference (Public Draft)	Remark	YSGA Response
75	Annie Main	Good Humus	General Comment	(See full letter) Generally the SGMA plan does not seem to include the inhabitants of the landscape, but more importantly it does not include the potential of our community to make a difference in water usage. I feel that if we are looking into the future of water as a diminishing resource, then our communities need to be involved and participating in the management of water usage in their daily lives. Agriculture is the main user of the groundwater and surface water, and can have the biggest effect of groundwater recharge, surface water usage and what sustainability will look like for the future. To understand sustainability is one part of the puzzle, but more importantly how will we achieve sustainability in our communities is another question. Our communities need to be involved in the process. In my mind this means that we need to be innovative, willing to learn, and to incorporate new farming practices that will enhance water storage in our orchards and fields. Our community needs to learn from other farmers, participate in research in collaboration with organizations working towards these goals. We need to work together, share information, actively doing trials, tests, and experimentation on different management practices to achieve reduction in water usage. The future of Agriculture in California can be protected by working today to adjust our management practices. Our communities need to work together; sacrifice equally making changes as how we live on the land, how to use our shared natural resources and learn how to store more of our water in the soils, and reduce our annual water extraction needs.	Information was added to the GSP to improve the characterization of domestic wells users in the Yolo Subbasin. A section on DACs and tribes was added. Additionally, a well impact analysis was added as an appendix to the GSP.
76	Annie Main		General Comment	We need to establish working groups that include our agricultural leaders in our communities to come together to initiate a proactive drought conservation management practices that have the goal of minimizing water usage and maximizing water retention in our soils, starting from the top of the watershed down into the valley floor. These working groups offer hands on opportunities, sharing results of these experimental practices among our agricultural community so that we can learn together what is working and what is not.	Yes, excellent idea and thank you for your thoughtful, productive comment. As part of GSP implementation and the establishment of Management Area Advisory Committees, we will take your thoughts into consideration so that the stakeholders and thought leaders in the community are at the table for developing creative and responsive solutions.
77	Katherine and George Spanos	Individual	General Comment	(See full letter) A 10-year moratorium on any new wells drilled for groundwater extraction on what have been historically non-irrigated land. This will give time to collect data and to more fully understand the groundwater levels and what is groundwater sustainability in the Dunnigan Hills and other “special concern” areas.	Thank you for your comment. We have received similar comments and recognize this will need to be addressed as part of the GSP implementation. We encourage you to continue to participate in this process and to provide your feedback in upcoming advisory committee, working group, and board meetings. This will be considered in our process for updating the GSP by 2027.
78	Katherine and George Spanos	Individual	General Comment	(See full letter) Additional input from the community. Establish working groups that include local community agricultural leaders to come together to initiate proactive drought conservation management practices that have the goal of minimizing water usage and maximizing water retention in our soils, starting from the top of the watershed down into the valley floor. These working groups can offer hands-on opportunities, sharing results of these experimental practices among our agricultural community so that we can learn together what is working and what is not, including monitoring the effects of different practices with regard to water usage and water recharge.	Yes, excellent idea and thank you for your thoughtful, productive comment. As part of GSP implementation and the establishment of Management Area Advisory Committees, we will take your thoughts into consideration so that the stakeholders and thought leaders in the community are at the table for developing creative and responsive solutions.

Comment #	Commenter	Representing	GSP Reference (Public Draft)	Remark	YSGA Response
79	Alison Main	Good Humus	General Comment	First and foremost, I want to thank you for the work that you are embarking upon, as it is vitally important to the future of our community. From my understanding of SGMA, we are forming a plan to begin the process of understanding and implementing a sustainable use and management of our finite groundwater resources. This is to be a 20 year process from the formation of the plan, to enforcement of said plan. As a resident of Hungry Hollow, and someone who dreams of building a future in agriculture here, I would like to bring the attention of your committee to our region. I have watched as our water levels drop at an unprecedented rate, especially in the last year. I have simultaneously watched as perennial investment agriculture has moved in, drilling wells without any thought to the health nor future of the aquifer. From my communication with members of your committee, it is clear that there is almost no historical data available to help us understand the water levels of the Dunnigan hills and surrounding area. Without the baseline understanding of the Dunnigan Hills aquifer and water sources, how can we possibly begin to understand how to manage or reach sustainability? Therefore, I believe we need to place a 15 year hold on all new wells being drilled on previously unirrigated land. This will enable SGMA to gather information and understand the aquifer and what resources we have to work with. A YSGA committee member mentioned that we would need 15-20 years to stabilize and understand the impact of the significant influx of ag wells being drilled into our little region. In short, I believe it to be crucial that we better understand the capabilities of our existing water sources before allowing the further drilling of any more new wells. Thank you for your time and consideration in these unprecedented times.	Thank you for your comment. We have received similar comments and recognize this will need to be addressed as part of the GSP implementation. We encourage you to continue to participate in this process and to provide your feedback in upcoming advisory committee, working group, and board meetings. This will be considered in our process for updating the GSP by 2027.
80	Ben King	Individual	1.2 (Model Documentation)	1.2 – typo Reference not found	Thank you for the comment , this has been resolved.
81	Ben King	Individual	13 (Model Documentation)	p 13 – typos	Thank you for the comment , this has been resolved.
82	Ben King	Individual	15 (Model Documentation)	p 15 – same typo	Thank you for the comment , this has been resolved.
83	Ben King	Individual	16 (Model Documentation)	p 16 – same	Thank you for the comment , this has been resolved.
84	Ben King	Individual	30 (Model Documentation)	p 30 -same	Thank you for the comment , this has been resolved.
85	Ben King	Individual	35 (Model Documentation)	p 35 same	Thank you for the comment , this has been resolved.
86	Ben King	Individual	37 (Model Documentation)	p 37 -same	Thank you for the comment , this has been resolved.
87	Ben King	Individual	44 (Model Documentation)	p 44 – Water Rights Restrictions – Header Format Typo	Thank you for the comment , this has been resolved.
88	Ben King	Individual	2.1.5.1.2.1 (Model Documentation)	2.1.5.1.2.1 - The CVP Critical Year assumptions should be updated to include the 2021 SWRB Curtailment Scenario. Worst Case assumptions are too optimistic vs the current 2021 Scenario	Thank you for the comment, please note that this comment is about 2021, but the section referred to is talking about the historical model which was built up to the 2018 Water Year for historical period. Model documentation was written in 2019-2020. Future GSP updates will likely include surface water availability scenarios that reflect recent surface water diversion restrictions such as those that occurred in 2021. For additional information, please see the preface to the GSP.
89	Ben King	Individual	1.5.1.2.4 (Model Documentation)	.1.5.1.2.3 The Term 91 diversions are subject to 100% restrictions by the current SWRCB curtailments	Thank you for the comment, see response to Comment 88.
90	Ben King	Individual	2.1.5.1.2.4 (Model Documentation)	2.1.5.1.2.4 - There is enough information to assume that these diversions are zero under the current SWRCB restrictions and should be reflected in the Model assumptions.	Thank you for the comment, see response to Comment 88.

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91	Ben King	Individual	2.1.5.4 (Model Documentation)	2.1.5.4 - There should be discussions about the impact of the Stanford Vina litigation regarding the priority of instream rights under the Bay Delta Plan for all the Settlement Contractor Reclamation Districts. There should also be a table setting out in basin and out of basin water transfers and a notation about how these water transfers are incorporated in the Model. Finally there should be a discussion on groundwater substitution pumping extraction which are used as a basis for water transfers under the jurisdiction of the Bureau of Reclamation.	Thank you for the comment, the modeling team did discuss including water transfers as a scenario feature but found little information available. Future updates could implement transfers as a reduction in surface water availability which would then result in additional groundwater pumping and/or field fallowing.
92	Ben King	Individual	Table 3.7 (Model Documentation)	The discussion regarding the fact that Dunnigan Water District only uses 2AF seems impossible on a recurring basis according to the Model's own WEAP and Actual ET in Table 3.7. Almonds use approximately 4 AF. Maybe Donita Hendrix is on to something regarding a special ET zone but perhaps water is being transferred via the Warren Act or groundwater is being used. This would seem to be a real concern about the current use of groundwater and the potential for unaccounted groundwater use in the Model assumptions. Don't understand how the Model construction would leave this issue unresolved and relied upon.	The historical estimates of 2AF/acre come from the work of Davids Engineering for Dunnigan Water District and are averages across all crops in DWD, not just almonds. The justification and citation are on p 61, to quote- "it is also stated in the District's Groundwater Management Plan (Davids Engineering Inc, 2007) that growers irrigate on average, 2 AF per acre, which is quite low compared to other regions in the county. This is confirmed by conversations with Donita Hendrix from the District who stated that growers under-irrigate and that not all land is cultivated each year…" Based on this information irrigation was constrained in the historical period by limiting surface water deliveries to the reported values provided by Dunnigan Water District and limiting groundwater pumping so that the average total applied water was about 2 AF/ac. In the future simulations, surface water deliveries are limited to the District's water right and groundwater is pumped to satisfy the remaining demand. The Model Documentation text has been edited to clarify this point.
93	Ben King	Individual	80 (Model Documentation)	p 80 same reference typo	Thank you for the comment , this has been resolved.
94	Ben King	Individual	81 (Model Documentation)	p 81 The discussion regarding the unexplained results and adjustments regarding lack of information in the Dunnigan and Yolo Zamora is concerning especially due to the subsidence observations. If the Model documentation states that there is " the lack of information in the region.." – this is definitely a great concern especially with subsidence concerns.	Thank you for the comment, the "lack of information" discussed on p 81 refers to the lack of information on the hydrogeology of the Dunnigan Hills and regions to the west of the Hills. Future modeling efforts should address this uncertainty. The discussion of the Dunnigan Water District and Yolo Zamora area refer to the model underprediction of water table elevations while using the irrigation efficiencies applied throughout the model domain. Research by David's Engineering (2007) indicate that irrigation efficiencies in this area are relatively high presumably due to limited surface water availability. After an adjustment to the model irrigation efficiencies, simulated heads were more realistic.
95	Ben King	Individual	86 (Model Documentation)	p 86 Dunnigan Hills - Model "consistently overestimates water table elevation in layer 1" Is this included in the appropriate sections of the GSP?	Thank you for pointing this out - we have incorporated a summary of the model's uncertainty, comparison to previous modeling, and calibration results in the main text of the GSP (Section 2.3.8).
96	Ben King	Individual	87 (Model Documentation)	p 87 North Yolo – Upwhelling from lower stratas is common in the Sacramento Valley – there is no reference to this phenomenon in the Model. Concern would be redox conditions and possible upward movement of high TDS and other natural occurring contaminants with low drawdowns during critically dry years.	The MODFLOW platform is capable of simulating upwelling, however, adjustment to the model layer structure and boundary conditions may be needed to capture this phenomena. The present uncertainty about the elevation of base of fresh water is addressed in the monitoring network improvement plan and the plan to address data gaps.
97	Ben King	Individual	89 (Model Documentation)	p 89 - Uncertainty should include possible change in geology due to movement of Dunnigan Fault and Willows Fault due to seismic activity. The effects of redox and potential vertically movement of TDS and arsenics especially on the eastern side of North Yolo.	Uncertainty about the base of fresh water is addressed in Section 2.11.
98	Ben King	Individual	90 (Model Documentation)	p 90 – As mentioned earlier there seems to be a missing Sensitivity section.	A section on Sensitivity analysis been added in the 2nd version of the Model Documentation appendix.
99	NGO Consortium (GLF)	NGO Consortium	General Comment	(See full letter) Describe and map the locations of DACs and provide the size of each DAC population. The DWR DAC mapping tool can be used for this purpose.	A description and map of DACs was added to the Section 1.5.2.
100	NGO Consortium (GLF)	NGO Consortium	General Comment	(See full letter) Provide a map of tribal lands and describe the tribal population within the subbasin.	A description of tribal lands was added to Section 1.5.2..
101	NGO Consortium (GLF)	NGO Consortium	General Comment	(See full letter) Include a map showing domestic well locations and average well depth across the subbasin.	Added Figure 1-9 showing average domestic well depth.
102	NGO Consortium (GLF)	NGO Consortium	General Comment	(See full letter) Identify the sources of drinking water for DAC members, including an estimate of how many people rely on groundwater (e.g., domestic wells, state small water systems, and public water systems).	Added Table 1-3 identifying DACs and source of drinking water.

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103	NGO Consortium (GLF)	NGO Consortium	Figure 2-47	(See full letter) Clarify in the GSP text that reaches marked as 'uncertain' on Figure 2-47 are retained as potential ISWs in the GSP.	Added a sentence to this effect in Section 2.2.6.1.
104	NGO Consortium (GLF)	NGO Consortium	General Comment	(See full letter) Include an inventory of the fauna and flora present within the subbasin's GDEs (see Attachment C of this letter for a list of freshwater species located in the Yolo subbasin). Note any threatened or endangered species.	The full inventory of species present in the Subbasin has been added as an appendix to the GSP.
105	NGO Consortium (GLF)	NGO Consortium	General Comment	(See full letter) We recommend a depth-to-groundwater threshold of 75 feet be used instead of the 50 feet threshold, when verifying whether valley oak polygons from the NC Dataset are connected to groundwater.	Changed depth to water cutoff for Valley oaks to 75', and updated maps based on this change.
106	NGO Consortium (GLF)	NGO Consortium	General Comment	(See full letter) Quantify and present all water use sector demands in the historical, current, and projected water budgets with individual line items for each water use sector, including managed wetlands. If this is identified as a current data gap, then include a description of how it will be addressed, including a timeline for completion.	Thank you for the comment, A new section has been added to the GSP (section 2.3.2.1 and 2.3.2.2) which details the water use of Natural Vegetation and Managed Wetlands land cover classes. This includes recommendations to set work with a technical advisory committee on Managed Wetlands, as part of the next GSP update, to assist in estimating future managed wetland area. The plan to fill data gaps has been supplemented with an additional table (Table 4-7).
107	NGO Consortium (GLF)	NGO Consortium	General Comment	(See full letter) In the historical, current, and projected water budgets, include an individual line item for native vegetation, instead of lumping it together with agricultural evapotranspiration.	Thank you for the comment, A new section has been added to the GSP (section 2.3.2.1 and 2.3.2.2)which details the water use of Natural Vegetation and Managed Wetlands land cover classes. This includes recommendations to set work with a technical advisory committee on Managed Wetlands, as part of the next GSP update, to assist in estimating future managed wetland area. The plan to fill data gaps has been supplemented with an additional table (Table 4-7).
108	NGO Consortium (GLF)	NGO Consortium	General Comment	(See full letter) Include a stand-alone, detailed and robust Stakeholder Communication and Engagement Plan that describes active and targeted outreach to engage DACs, domestic well owners, environmental stakeholders, and tribal stakeholders during the remainder of the GSP development process and throughout the GSP implementation phase. Refer to Attachment B for specific recommendations on how to actively engage stakeholders during all phases of the GSP process.	The stakeholder communication and engagement plan has been updated and attached as an appendix to the GSP.
109	NGO Consortium (GLF)	NGO Consortium	General Comment	(See full letter) Describe efforts to consult and engage with DACs and domestic well owners within the subbasin.	The Stakeholder Communication and Engagement Plan has been attached as an Appendix to this GSP. Unfortunately, due to the threat of COVID-19 there were not many opportunities for in-person workshops or formal engagement events. We hosted a few virtual workshops and targeted the rural areas of the County where DACs and domestic well owners are located via mailing postcards; however, we recognize that not all people located in a DAC have access to a phone or internet for a virtual meeting. In addition to GSP development outreach meetings, there have been updates at the Yolo County Board of Supervisors meetings. As part of our Management Area Advisory Committees, we intend to conduct more on-the-ground outreach and engage a more diverse set of stakeholders.
110	NGO Consortium (GLF)	NGO Consortium	General Comment	(See full letter) Utilize DWR's tribal engagement guidance to comprehensively address all tribes and tribal interests in the subbasin within the GSP.	Thank you for the comment. The Stakeholder Communication and Engagement Plan has been attached as an Appendix to this GSP. The YSGA works very closely with the Yocha Dehe Environmental Department, and the Yocha Dehe Wintun Nation is a member of the YSGA JPA. Yocha Dehe Wintun Nation provides the YSGA with the appropriate guidance for comprehensively addressing the Tribe's interested within the GSP. Additionally, language in the GSP has been updated to better reflect this dynamic.
111	NGO Consortium (GLF)	NGO Consortium	General Comment	(See full letter) Describe efforts to consult and engage with environmental stakeholders within the subbasin.	The Stakeholder Communication and Engagement Plan has been attached as an Appendix to this GSP. The YSGA had various meetings with environmental stakeholders to discuss the development of the Yolo Subbasin GSP, including The Nature Conservancy, Audubon, Yolo County Resources Conservation District, California Department of Fish and Wildlife, The Yolo Habitat Conservancy, and the Yolo Basin Foundation.
112	NGO Consortium (GLF)	NGO Consortium	General Comment	(See full letter) Describe direct and indirect impacts on DACs, drinking water users, and tribes when describing undesirable results for chronic lowering of groundwater levels.	A general statement is provided in section 3.3.1.2 relative to all users and uses in the Subbasin. Additionally, the goals of the YSGA is to maintain groundwater levels at levels experienced from 2001 to 2011, thereby avoiding any additional impacts to users and uses.
113	NGO Consortium (GLF)	NGO Consortium	General Comment	(See full letter) Consider and evaluate the impacts of selected minimum thresholds and measurable objectives on DACs, drinking water users, and tribes within the subbasin. Further describe the impact of passing the minimum threshold for these users. For example, provide the number of domestic wells that would be de-watered at the minimum threshold.	Thank you for your comment. A well impact analysis has been added as an Appendix to the GSP. This includes domestic, municipal, and agricultural wells.

Comment #	Commenter	Representing	GSP Reference (Public Draft)	Remark	YSGA Response
114	NGO Consortium (GLF)	NGO Consortium	General Comment	(See full letter) Establish SMC for the identified COCs in the subbasin that may be impacted or exacerbated by groundwater use and/or management. Ensure they align with drinking water standards. Also, evaluate the cumulative or indirect impacts of proposed criteria 11 for degraded water quality on DACs, drinking water users, and tribes.	The YSGA will rely on other water quality monitoring and regulatory entities to collect data, establish standards and enforce regulations for the protection of water quality for all users in the Subbasin. The YSGA will annually review water quality data to determine if water quality is effected by groundwater management activities.
115	NGO Consortium (GLF)	NGO Consortium	General Comment	(See full letter) Describe direct and indirect impacts on DACs, drinking water users, and tribes when defining undesirable results for degraded water quality. For specific guidance on how to consider these users, refer to "Guide to Protecting Water Quality Under the Sustainable Groundwater Management Act."	A general statement is provided in section 3 relative to all users and uses in the Subbasin. Additionally, the goals of the YSGA is to maintain groundwater quality at current levels, thereby avoiding any additional impacts to users and uses. The YSGA will be coordinating with other entities with specific jurisdiction over water quality monitoring and regulation.
116	NGO Consortium (GLF)	NGO Consortium	General Comment	(See full letter) When defining undesirable results for chronic lowering of groundwater levels, provide specifics on what biological responses (e.g., extent of habitat, growth, recruitment rates) would best characterize a significant and unreasonable impact to GDEs. Undesirable results to environmental users occur when 'significant and unreasonable' effects on beneficial users are caused by one of the sustainability indicators (i.e., chronic lowering of groundwater levels, degraded water quality, or depletion of interconnected surface water). Thus, potential impacts on environmental beneficial uses and users need to be considered when defining undesirable results in the subbasin. Defining undesirable results is the crucial first step before the minimum thresholds can be determined.	The YSGA has considered the presence and impact of sustainable management criteria on GDEs. The YSGA has also established SMC to protect existing conditions of groundwater levels and interconnected surface waters, which in turn support existing levels of habitats and GDEs. The YSGA will also continue to evaluate the presence of GDE's in the Subbasin and the effects of groundwater conditions on those habitats. Clarification statements were added to Section 3.6.2.1.
117	NGO Consortium (GLF)	NGO Consortium	General Comment	(See full letter) When establishing SMC for the basin, consider that the SGMA statute [Water Code §10727.4(l)] specifically calls out that GSPs shall include "impacts on groundwater dependent ecosystems".	See response to Comment 116.
118	NGO Consortium (GLF)	NGO Consortium	General Comment	(See full letter) When defining undesirable results for depletion of interconnected surface water, include a description of potential impacts on instream habitats within ISWs when minimum thresholds in the subbasin are reached. The GSP should confirm that 15 minimum thresholds for ISWs avoid adverse impacts to environmental beneficial users of interconnected surface waters as these environmental users could be left unprotected by the GSP. These recommendations apply especially to environmental beneficial users that are already protected under pre-existing state or federal law.	See response to Comment 116
119	NGO Consortium (GLF)	NGO Consortium	General Comment	(See full letter) Incorporate climate change into surface water flow inputs for the projected water budget.	Climate change impacts on river flows and reservoir operations are explicitly modeled for the Cache Creek watershed in climate change scenarios, since climate-driven hydrology is simulated from the headwaters in Clear Lake down through Yolo county. Cache creek supplies approximately half of the irrigation water in Yolo County. For the other boundary flows: • Sacramento head flow, Sacramento weir, Knights Landing Ridge cut diversions into the Bypass, and head flows in American and Feather: Historical flows are repeated. It was determined that this is sufficient for the future scenarios. These flows are not constraining in the model, they are largely included for surface water/groundwater interactions. Sacramento river flows are very large relative to volumes withdrawn for beneficial use in the Yolo sub-basin; hence the uses within the Yolo subbasin are not expected to be sensitive to climate change impacts on Sac river flows themselves. Rather, CVP allocations and Term 91 curtailments will impact water uses and users more – and these are modeled by the YSGA model in all scenarios including climate scenarios based on results from the CalSIM model runs provided by DWR. • Putah Creek head flow: Historical flows are repeated. The Putah Creek Accord (signed in 2000) came online part way through the historical simulation period (WY 1971-WY 2018). We assessed whether there would have been sufficient water in the creek from the start of data available (1970) to meet the Accord in all years, even before the Accord was in place. When simulated historical flows from 1970-2018 in Putah Creek at I80 were compared with the Putah Creek Accord for the entire time period, the Accord is only violated 3 days out of 576 days of flows. With Monticello Dam providing a large volume of storage and the Accord ensuring current and future environmental flows downstream, we assessed that repeating the historical flows for the future runs was reasonable. • Section 2.1.4 of the model documentation has been edited for clarity.

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120	NGO Consortium (GLF)	NGO Consortium	Section 2.3.7	(See full letter) Calculate sustainable yield based on the projected water budget with climate change incorporated.	The Water Budget Chapter includes more detail on the calculation of Sustainable Yield. The GSP has been modified to include this detail in Section 2.3.7. An additional analysis of the future model scenarios that supports the sustainable yield estimate has also been added.
121	NGO Consortium (GLF)	NGO Consortium	Section 5	(See full letter) Incorporate climate change scenarios into projects and management actions.	As we implement and enhance the Yolo Subbasin GSP, we intend to enhance the climate and land use change scenarios that are applied in the Yolo Subbasin model. These modeled scenarios will be helpful in investigating the appropriate management actions for the Subbasin. As part of project feasibility investigations, the appropriate modeling will occur to determine how the project will assist under certain climate and land use change scenarios, to evaluate the potential benefits and, to properly rank projects.
122	NGO Consortium (GLF)	NGO Consortium	Section 4	(See full letter) Establish a monitoring network for the groundwater quality condition indicator.	Section 4.6 was added to show monitoring network information. Table 4-2 now shows the locations of monitoring network sites, and Table 4-3 gives additional information about these sites.
123A	NGO Consortium (GLF)	NGO Consortium	Section 4	(See full letter) Provide maps that overlay current and proposed monitoring well locations with the locations of DACs, domestic wells, tribes, GDEs, and ISWs to clearly identify potentially impacted areas.	Figure 4-2 has been added to the GSP showing the representative monitoring network overlaid with key beneficial users.
123B	NGO Consortium (GLF)	NGO Consortium	Section 4	(See full letter) Increase the number of RMWs in the shallow aquifer across the subbasin as needed to adequately monitor all groundwater condition indicators. Prioritize proximity to DACs, domestic wells, tribes, and GDEs when identifying new RMWs.	Added sentence regarding intention to prioritize proximity to DACs, domestic wells, tribes, and GDEs when filling data gaps (Section 4.11.2).
124	NGO Consortium (GLF)	NGO Consortium	Section 4	(See full letter) Further describe the biological monitoring that can be used to assess the potential for significant and unreasonable impacts to GDEs or ISWs due to groundwater conditions in the subbasin.	Table 4-5 has been added to the GSP with specific data gap improvement actions and timelines.
125	NGO Consortium (GLF)	NGO Consortium	Table 5-1	(See full letter) For DACs and domestic well owners, include a drinking water well impact mitigation program to proactively monitor and protect drinking water wells through GSP implementation. Refer to Attachment B for specific recommendations on how to implement a drinking water well mitigation program. The GSP includes a brief discussion of a domestic well Impact mitigation program in Table 5-1, but very few details are provided.	Thank you for the comment. As part of the 2021 Drought, the YSGA has formed an Ad-Hoc Drought Contingency Planning Committee that is considering planning strategies the YSGA and County can work on collaboratively during drought years. The Domestic Well Impact Mitigation Program (Management Action #7) is being considered as a strategy that needs further development. We appreciate you providing a link to the Self-Help Enterprises, Leadership Counsel for Justice and Accountability, and the Community Water Center's Framework for a Drinking Water Well Impact Mitigation Program; that document was paramount to us including the Management Action in the Yolo Subbasin GSP.
126	NGO Consortium (GLF)	NGO Consortium	General Comment	(See full letter) For DACs and domestic well owners, include a discussion of whether potential impacts to water quality from projects and management actions could occur and how the GSA plans to mitigate such impacts.	See response to comment 114.
127	NGO Consortium (GLF)	NGO Consortium	General Comment	(See full letter) Recharge ponds, reservoirs, and facilities for managed aquifer recharge can be designed as multiple-benefit projects to include elements that act functionally as wetlands and provide a benefit for wildlife and aquatic species. The GSP mentions creation of seasonal wetlands in Table 5-1 under the 'Groundwater Recharge and Managed Aquifer Recharge Projects'. For further guidance on how to integrate multi-benefit recharge projects into your GSP, refer to the "Multi-Benefit Recharge Project Methodology Guidance Document."	Added sentence in Table 5-1 under the Increased Groundwater Recharge and Managed Aquifer Recharge Projects.
128	NGO Consortium (GLF)	NGO Consortium	General Comment	(See full letter) Develop management actions that incorporate climate and water delivery uncertainties to address future water demand and prevent future undesirable results.	This is an excellent suggestion. We intend to expand our analyses of the impact of climate and reduced surface water supplies to the Subbasin to better define management actions for ensuring sustainability. Over the past year, we have investigated potential reductions in surface water supplies within the North Yolo Management Area and how that may impact the operational needs of the beneficial users. We intend to continue to develop these investigations to ensure our management actions are assisting in preventing future undesirable results.

Comment #	Commenter	Representing	GSP Reference (Public Draft)	Remark	YSGA Response
129	Ben King	Individual	Ap.p.endix E (now Ap.p.endix H)	This Appendix is an example where the YSGA can work with the DWR and SWRCB to protect HRTW and DEI rights and policies and also to give stakeholders access to material concurrent information to protect and advocate for these rights. As you know the Yolo Subbasin is the only priority subbasin in the Sacramento Valley under the CV Salts priority system due to the prevailing Boron contamination issues – if this is the case how do stakeholders and the State protect the HRTW and related DEI concerns without some type of contemporaneous public disclosure around long term contamination trends and groundwater heads from the various observed vertical aquifer stratas?	Thank you for the comment. This appendix is mainly intended to illustrate the SMC values at the representative wells. The YSGA GSP has been updated since this comment was submitted. We have acknowledged HRTW in section 1.5.3.1.7 and 2.2.4.6. Water quality and groundwater level data will be provided to the public in the annual reports published by the YSGA.
130	Ben King	Individual	Ap.p.endix E (now Ap.p.endix H)	An easy first step would be to include water level and groundwater quality observations from all multi-completion wells so as to have a continuing data set of both water levels and water quality for all the multi-completion wells. To the extent possible deep wells not included but easily obtainable should be included in the appendix and water level and water quality data should be included and updated.	This is outside the scope of this appendix, but the YSGA will consider expanding water quality monitoring in the Yolo Subbasin in the future. Some of these multi-completion wells have been measured for water quality in the past by DWR, so there may be some historic data to utilize.
131	Ben King	Individual	Ap.p.endix E (now Ap.p.endix H)	Regarding the North Yolo area – the multi-completion well data is more critical because of the known fact that upwelling is common in the Sacramento Valley. This is mentioned in the GSP but not highlighted. Recent USGS publications by Susan Thiros and Laura Bexfield highlight the issues of redox and the potential for freshwater aquifer degradation due to over pumping and especially the potential adverse outcomes from redox when previously anoxic groundwater is exposed to the atmosphere due to over pumping. As you know I believe this is a reason for the presence of arsenic within the scope of the Sutter Buttes Rampart which would include portions of the eastern and northeastern part of subbasin. Again – head gradients from the multi-completion intakes for the same wells should be included and water quality observation trends should be included in the Appendix.	Multi-completion wells are an important source of information that should be utilized. In this version of the GSP, we have water levels for some multi-completion wells in the subbasin. The data from multi-completion wells will continue to be measured and recorded by DWR and stored in the Water Data Library. The YSGA can update the representative monitoring network in the annual reports. The YSGA will review multi-completion well data and determine if those wells should be included as representative monitoring wells.
132	Ben King	Individual	Ap.p.endix E (now Ap.p.endix H)	Regarding the Dunnigan Hills Area – it is glaringly obvious that this disclosure is insufficient disclosure for HRTW and DEI interested stakeholders and stakeholders in general. The three wells are at the very bottom of the Management Area with no representation for approximately 80 percent of the Management Area. Of particular concern should be the area west of the public supply system for Dunnigan and all the domestic wells west of I-5 immediately south of the Colusa County boundary. There are probably 200 to 300 housing units around the western rest stop including 100 to 200 housing units in the mobile home park on the west side of I-5 and north of the rest stop.	Thank you for the comment. Yes, you are correct, we acknowledge that the Dunnigan Hills are a data gap, and we have poor historical data measurements in this area. The YSGA has developed a plan to address data gaps, section 4.11.2. The 200 to 300 housing units that you refer to are in the North Yolo Management Area. We acknowledge that water quality in domestic wells is a data gap. As a result of comments like this, we added an SMC for TDS in the Yolo Subbasin.
133	Carol Scianna	Individual	Figure 2-24	The City of Winters is not included on this map.	Thank you for bringing this to our attention. This Figure has been corrected to display the correct boundary for the City of Winters.
134	Claire Main	Good Humus	General Comment	(See full letter) There needs to be a 10 year moratorium on any new wells drilled on historically non-irrigated land. This will give time to collect data and to more fully understand the groundwater levels.	Thank you for your comment. We have received similar comments and recognize this will need to be addressed as part of the GSP implementation. We encourage you to continue to participate in this process and to provide your feedback in upcoming advisory committee, working group, and board meetings. This will be considered in our process for updating the GSP by 2027.
135	Claire Main	Good Humus	General Comment	(See full letter) Pipelines are not for the good of the entire community, they will advance land development, increase groundwater usage, and degrade water quality. They are also not a long-term solution to our issues.	Thank you for your comment. We understand your perspective, but we believe that extending surface water deliveries can realize a positive benefit to the community and reduce the reliance on groundwater.
136	Claire Main	Good Humus	General Comment	(See full letter) We need to establish working groups that include our agricultural leaders in our communities to come together to initiate a proactive drought conservation management practices that have the goal of minimizing water usage and maximizing water retention in our soils, starting from the top of the watershed down into the valley floor.	Yes, excellent idea and thank you for your thoughtful, productive comment. As part of GSP implementation and the establishment of Management Area Advisory Committees, we will take your thoughts into consideration so that the stakeholders and thought leaders in the community are at the table for developing creative and responsive solutions.
137	Claire Main	Good Humus	General Comment	(See full letter) These working groups offer hands on opportunities, sharing results of these experimental practices among our agricultural community so that we can learn together what is working and what is not.	Yes, excellent idea and thank you for your thoughtful, productive comment. As part of GSP implementation and the establishment of Management Area Advisory Committees, we will take your thoughts into consideration so that the stakeholders and thought leaders in the community are at the table for developing creative and responsive solutions.

Comment #	Commenter	Representing	GSP Reference (Public Draft)	Remark	YSGA Response
138	Ben King	Individual	Ap.p.endix F (Now Ap.p.endix J)	Overall a great list representing a lot of work by a lot of stakeholders. The YSGA was very open to PMA submittals and made the submission process easy.	Thank you for the feedback.
139	Ben King	Individual	Ap.p.endix F (Now Ap.p.endix J)	Going Forward – can you provide a link where public stakeholders can review each PMA Submittal. For example, could you provide the public information regarding the O'Halloran off-stream reservoir site Project 73 – what public access is there for the documentation and communications for this Project?	Projects will be made available to the public on our website in addition to all necessary components of the Brown Act. Added under section 5.1.3 "All projects funded or considered for implementation by the YSGA will be posted under a 'Projects' page on the yologroundwater.org website."
140	Ben King	Individual	Ap.p.endix F (Now Ap.p.endix J)	Since many of these Projects are being worked on by consultants that have legacy relationships with Project proponents it is important that submissions and communications regarding these projects remain in the public domain. Especially if the Project has HTRW and DEI consequences. How does the requirements for transparency impact the breadth and ease of access regarding potential Projects impact how the YSGA should make this information available to the public? Many of these Projects will rely on public funds and the disclosure should be fully open and transparent.	Added "The YSGA is committed to an open and transparent process in identifying and implementing projects and management actions. "
141	Ben King	Individual	Ap.p.endix F (Now Ap.p.endix J)	There is a material omission in the list of Projects and that is the proposed Sites Project. The YSGA should incorporate the Sites project into this list and specifically include the portion of the Sites Project that concerns the pipeline interconnect proposed south of Dunnigan that will transport Sites water to the Colusa Basin Drain and ultimately to the Sacramento River either via the Colusa Basin Drain and/or the companion proposed pipeline from the Colusa Basin Drain directly east to the Sacramento River. Yolo County departments may and HRTW and DEI focused stakeholders in particular may benefit from this inclusion. Perhaps there should be considerations about whether some of this Sacramento River water could be used for domestic water and public supply uses to equalize the access of Sacramento River water to a wider resident population with rural Yolo County. As it stands now Davis has access to fresh water from the Sacramento River but the residents in northern Yolo County many which are poor and/or people of color do not. These HRTW and DEI consideration are part of the rational proposed Project No. 26 which would envision using the stored water at Sites for sustainable and resilient fresh water supply for the residents on the west side of I-5 from Tehama to Yolo Counties.	This comment addresses very important issues of DEI and HRTW. As the commenter states, Project 26 explicitly address drinking water from Sites, focusing on rural areas of northern Yolo County, so there appears to be no omission of the Site project from the list. The Sites project is also included as a part of Project 10. The use of Sites for a drinking water source could be very impactful, whether it is used for recharging the aquifer for use in drinking water wells or treated in a surface water treatment plant.
143	William Vanderwaal	Individual	p. 3-17	MT & MO for North Yolo Mgmt. Area was set higher because the Colusa GSA had wildly higher MT/MO's in the original draft (6-7 inches subsidence per year). Colusa GSA has recently revised its MT/MO to more conservative and reasonable levels. I recommend revising the North Yolo MA MT/MO for Subsidence to match the Colusa GSA, which are: 0.5 ft over 5 years (MT) and 0.25 ft over 5 years (MO), which will also match MT/MO's for Subsidence in the majority of GSA's within the central Sacramento River Valley (Butte Co., Sutter Co., Glenn Co. Tehama Co.).	Table 3-2 and Table 3-3 have updated MTs and MOs for subsidence for the North Yolo MA.

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144	James Strong	Deseret Farms of California	p. 3-15	(See full letter) The draft GSP lacks specific sustainable management criteria for degraded water quality in the Subbasin. The Sustainable Groundwater Management Act (SGMA) requires a GSP to include, among other things, descriptions of sustainable management criteria (SMC) for each applicable sustainability indicator, as identified by SMGA. (Cal. Code Regs., tit. 23, § 354.22 et seq.) Notably, the draft GSP expressly provides that "[t]he YSGA has not established specific sustainable management criteria for water quality in the Subbasin. . . ." (Pg. 3-15, Lines 2 – 3.) Instead, YSGA plans to rely on "current and future water quality standards established for drinking water and agricultural water uses by State and county regulatory agencies." (Pg. 3-15, Lines 2 – 4.) To avoid a finding of "incomplete" by DWR, YSGA must address this matter and develop a SMC for degraded water quality. Further, while YSGA is developing this missing component of its GSP, we assume that it will rely on this existing language within its draft GSP. That means that, in the meantime, YSGA will rely on water quality standards established by State and county regulatory agencies. In doing so, we recommend that YSGA impose State regulatory water quality standards on agricultural water supplies and county regulatory water quality standards on public water supplies. Agricultural groundwater users within the Subbasin require regulatory certainty. Therefore, if YSGA were to upend the current structure of water quality regulations, it would risk placing these agricultural groundwater users in violation of standards that they would otherwise be in compliance with and create an inaccurate portrayal of noncompliance within the Subbasin.	Thank you for the comment. The SMC language for water quality has been revised based on your comment and others like it.
145	James Strong	Deseret Farms of California	p. 3-11	(See full letter) The draft GSP should revise the Measurable Objectives and Minimum Thresholds for Chronic Lowering of Groundwater Levels SMC and the Reduction of Groundwater Storage SMC. The Measurable Objectives (MO) and Minimum Thresholds (MT) for the Chronic Lowering of Groundwater SMC go beyond what is required to achieve YSGA's sustainability goal for the Subbasin. As expressly provided in the draft GSP, "the Yolo Subbasin is a relatively stable basin, with groundwater levels maintaining a relatively consistent long-term average elevation or depth to groundwater." (Pg. 3-4, Lines 4 – 6.) Nonetheless, YSGA relies on overly aggressive MOs and MTs that will ultimately inhibit landowners' ability to achieve these goals. Therefore, we recommend that the MOs and MTs for the Chronic Lowering of Groundwater SMC be lowered to allow for greater operational flexibility. Further, the methodology used to establish the MOs for the Chronic Lowering of Groundwater SMC and the Reduction of Groundwater Storage SMC should be revised to provide clarity. Specifically, regarding both SMCs, the draft GSP provides: Measurable objective is equal to the average fall (Sep-Dec) groundwater elevation for the water period of 2000 to 2011 at each Representative well. Performance of the measurable objective will be measure as the five (5) year running average of the minimum fall (Sep-Dec) groundwater elevation. It is unclear how YSGA will rely on and apply both "the water period of 2000 to 2011" and "the five (5) year running average." Therefore, additional clarity is needed to understand the interplay between these two seemingly contradictory sets of data. Further, the draft GSP does not provide any background or basis as to how these two time periods were established. To that end, we recommend either that the GSP: (A) expand the "water period of 2000 to 2011" to the "water period of 2000 to 2018;" or (B) expand the "five (5) year running average" to a "ten (10) year running average." Either option would incorporate a larger amount of data that would likely provide landowners the additional support necessary achieve the purpose of the MOs.	Thank you for your comment. The MOs and MTs for groundwater levels and storage were established through an extensive stakeholder process. The period of 2001 to 2011 represents a stable period in the groundwater basin that stakeholders wanted to "typically" manage to and that would be protective of groundwater users and support current level of groundwater production and the economies supported by that level of groundwater use. The MO is a single value (GW elevation) at each representative well that cannot be realistically managed to on an annual basis, therefore, we identified a reasonable period of 5-years to calculate a rolling average value for the MO. In this way there is increased flexibility to manage short-term fluctuations in groundwater levels and provide opportunity for recovery as has historically been experienced. The reasonableness of the 5-year period is also weighed against the potential acceptance by DWR and the State Board, it is likely that periods longer than 5 years will not be generally acceptable.

Comment #	Commenter	Representing	GSP Reference (Public Draft)	Remark	YSGA Response
146	Annie Main	Good Humus	General Comment	(See full letter) Special Concerns Areas need more data collection. The Hungry Hollow where we live and have been farming for the last 37 years has been historically a dry farmed region. This means that there have been no wells for YSGA to collect data on. Our area is now labeled a special concern region and SGMA is lacking historical groundwater data to compare with past use and future needs. The fringe areas, including our land, are among areas seeing accelerated water decline which is an indicator of unsustainable usage. Therefore more time is needed to collect data, to find wells to monitor so that more complete information can be collected to understand the usage and recharge levels. How can we find sustainability with new wells bring drilled that are changing the water usage with every new hole in the ground? There needs to be a 10 year moratorium on any new wells drilled on historically non-irrigated land. This will give time to collect data and to more fully understand the groundwater levels.	Thank you for your comment. We have received similar comments and recognize this will need to be addressed as part of GSP implementation. We agree that additional data needs to be collected to provide us with a baseline in the "data gaps" of the region. We encourage you to continue to participate in this process and to provide your feedback in upcoming advisory committee, working group, and board meetings. This will be considered in our process for updating the GSP by 2027.
147	Annie Main	Good Humus	General Comment	(See full letter) Moving Surface Water via Pipelines. Access to water, groundwater and surface water is a community resource. How can this resource be shared equally, and not monopolized by any one person or corporation that has the enough money for a pipeline to take care of their personal needs? This water is community water; therefore it should be used for the entire community not serving a few that can afford to pay for a pipeline to their landholdings. Landowners that are dependent on a pipeline allow them the ability to develop more land, and during the summer months when water from this pipeline is not available, those land owners are going to use groundwater. Our Hungry Hollow water is very good water, lacking salts and boron that is prevalent in Cache Creek water, therefore piping Cache Creek water into the Hungry Hollow will degrade the quality of water. Pipelines are not for the good of the entire community, they will advance land development, increase groundwater usage, and degrade water quality.	Thank you for your comment. We understand your perspective, but we believe that extending surface water deliveries can realize a positive benefit to the community and reduce the reliance on groundwater.
148	Annie Main	Good Humus	General Comment	(See full letter) How will we achieve sustainability? Generally the SGMA plan does not seem to include the inhabitants of the landscape, but more importantly it does not include the potential of our community to make a difference in water usage. I feel that if we are looking into the future of water as a diminishing resource, then our communities need to be involved and participating in the management of water usage in their daily lives. Agriculture is the main user of the groundwater and surface water, and can have the biggest effect of groundwater recharge, surface water usage and what sustainability will look like for the future. To understand sustainability is one part of the puzzle, but more importantly how will we achieve sustainability in our communities is another question. Our communities need to be involved in the process. In my mind this means that we need to be innovative, willing to learn, and to incorporate new farming practices that will enhance water storage in our orchards and fields. Our community needs to learn from other farmers, participate in research in collaboration with organizations working towards these goals. We need to work together, share information, actively doing trials, tests, and experimentation on different management practices to achieve reduction in water usage. The future of Agriculture in California can be protected by working today to adjust our management practices. Our communities need to work together; sacrifice equally making changes as how we live on the land, how to use our shared natural resources and learn how to store more of our water in the soils, and reduce our annual water extraction needs.	Yes, excellent idea and thank you for your thoughtful, productive comment. As part of GSP implementation and the establishment of Management Area Advisory Committees, we will take your thoughts into consideration so that the stakeholders and thought leaders in the community are at the table for developing creative and responsive solutions. We hope that you will also continue to participate in the discussion and help us to determine the appropriate solution for ensuring sustainability.

Comment #	Commenter	Representing	GSP Reference (Public Draft)	Remark	YSGA Response
149	Annie Main	Good Humus	General Comment	(See full letter) We need to establish working groups that include our agricultural leaders in our communities to come together to initiate a proactive drought conservation management practices that have the goal of minimizing water usage and maximizing water retention in our soils, starting from the top of the watershed down into the valley floor. These working groups offer hands on opportunities, sharing results of these experimental practices among our agricultural community so that we can learn together what is working and what is not. These management practices need to be monitored as to the effects that they make, the differences of water usage and water recharge with these practices.	Yes, excellent idea and thank you for your thoughtful, productive comment. As part of GSP implementation and the establishment of Management Area Advisory Committees, we will take your thoughts into consideration so that the stakeholders and thought leaders in the community are at the table for developing creative and responsive solutions.
150	Ricardo Amon & Judy Corbett	Individual	General Comment	See Letter	Thank you for submitting this thoughtful comment. We appreciate your thoughts on the regenerative agricultural practices that can be implemented in the Yolo Subbasin to slow and spread water so that it can effectively sink in and recharge the groundwater.
151	Ben King	Individual	Water Budget (now Ap.p.endix F)	– There should be discussion regarding the current prohibition of Sacramento River curtailments by the SWRCB and how this surface water deficit will impact the assumptions. With the Stanford Vina lawsuit, it is clear that the instream protections and the Public Trust doctrine will govern water allocations. Discussions regarding Voluntary Settlement agreements elsewhere in the GSP are speculative especially in context of the recent actions taken by the SWRCB.	Future modeling scenarios will include surface water constraints based on the experience of the 2021 water year.
152	Ben King	Individual	Water Budget (now Ap.p.endix F)	Discussion regarding 100 pct curtailments in the current SWRCB scenario should be analyzed. Also -some discussion regarding the potential for increased supply for Northern Yolo County from the Sites Reservoir should be discussed.	Future modeling scenarios will include surface water constraints based on the experience of the 2021 water year.
153	Ben King	Individual	Water Budget (now Ap.p.endix F)	Discussion regarding the impact on groundwater storage and recharge from updated BFW modeling done consistent with the work done by the DWR and presented by Springhorn at the US Geological Society in 2013 (reference to previous email regarding BFW Assumptions). Discussion should also include discussion on the impact of higher standards for the determination of fresh water rather than the assumed EC levels in Olmstead and Davis in 1961. The definition for Groundwater Overdraft assumes that there is fungibility in water quality. The Budget assumptions should not allow substandard water quality extractions to offset conforming water quality pumping and surface water allocations. Think of a water bank as a FDIC insured account – deposits and withdrawals have to be done in legal tender – otherwise there will be an incentive to pump for quantity rather than quality and sell fresh surface water downstream.	The MODFLOW platform is capable of simulating upwelling, however, adjustment to the model layer structure and boundary conditions may be needed to capture this phenomena. The present uncertainty about the elevation of base of fresh water is addressed in the monitoring network improvement plan and the plan to address data gaps.
154	Ben King	Individual	Water Budget (now Ap.p.endix F)	The Groundwater Storage in North Yolo is probably less than assumed when the elevated TDS levels of lower stratas are disregarded. This is probably the case in eastern and north eastern Yolo County since this area is within the scope of the impact of the Sutter Buttes Rampart and the body of connate sea water present around the Buttes and southward down the Valley floor from the Sutter Buttes. See the discussion of upwelling salt water brines cause by over pumping in the Sutter- Yuba Investigations. Groundwater contamination from over pumping goes back to the 1930s in the area around Robbins. It is likely that this is occurring or has the potential to occur in the Township 12 N Range.	The MODFLOW platform is capable of simulating upwelling, however, adjustment to the model layer structure and boundary conditions may be needed to capture this phenomena. The present uncertainty about the elevation of base of fresh water is addressed in the monitoring network improvement plan and the plan to address data gaps.
155	Ben King	Individual	Water Budget (now Ap.p.endix F)	- The Uncertainties discussed should reference the data gaps and lack of understanding referenced in the YSGA Model. Particularly the uncertainty regarding the use of only 2AF in the Dunnigan Hills on p 61 of the Model Appendix and the uncertainties on ps 80 and 81 regarding Dunnigan Hills and the Yolo Zamora area	Please see the response to comment 92.
156	Ben King	Individual	Water Budget (now Ap.p.endix F)	How will Sustainable Yield be affected by updated BFW Assumptions.	The MODFLOW platform is capable of simulating upwelling, however, adjustment to the model layer structure and boundary conditions may be needed to capture this phenomena. The present uncertainty about the elevation of base of fresh water is addressed in the monitoring network improvement plan and the plan to address data gaps.

Comment #	Commenter	Representing	GSP Reference (Public Draft)	Remark	YSGA Response
157	Ben King	Individual	Water Budget (now Ap.p.endix F)	Future scenarios Assumptions – how would the scenario like the current SWRCB Scenario affect Dunnigan Hills. What are the risks and opportunities from potential supply from the potential construction of Sites. Better understanding of the data uncertainties highlighted on p 61 of the Model Documentation.	Future modeling scenarios will include surface water constraints based on the experience of the 2021 water year.
158	Ben King	Individual	Water Budget (now Ap.p.endix F)	1. How would revised BFW contours affect assumed water storage for North Yolo? The future assumption that Dunnigan Water District remains at a full water right and that all other water rights remain the same is not reasonable given the outcome of the Stanford Vinal litigation and the recent zero diversion curtailment by the SWRCB. Potential restrictions due to lateral movement and upwelling of high TDS and arsenic, boron and other potential natural contaminants should be considered in the Budget for North Yolo.	The MODFLOW platform is capable of simulating upwelling, however, adjustment to the model layer structure and boundary conditions may be needed to capture this phenomena. The present uncertainty about the elevation of base of fresh water is addressed in the monitoring network improvement plan and the plan to address data gaps.
159	Ben King	Individual	General Comment	Please accept this version of my general comments regarding the BFW assumptions in the Water Budget and HCM. I had previously confused Olmstead and Davis, 1961 with the tectonic work of Harwood and Helley. The reliance on Olmstead and Davis which completed 60 years ago will not give an accurate accounting of water storage for the water budget and does not represent empirical BFW observations especially when the contemporary water quality standards are considered. It is unfortunate that this GSP does not include the updated BFW modeling but there should be discussion around the reasonableness on relying on the extremely dated work by Olmstead and Davis. As you can see in the Springhorn attachment the DWR has updated the work done by Berkstresser in 1973. Springhorn , Hightower, Bedegrew and Bonds from the DWR presented a poster board with updated BFW contours at the Geological Society of America in May 2013. Does the GSP incorporate the work done by Berkstresser in addition to Olmstead and Davis?	The MODFLOW platform is capable of simulating upwelling, however, adjustment to the model layer structure and boundary conditions may be needed to capture this phenomena. The present uncertainty about the elevation of base of fresh water is addressed in the monitoring network improvement plan and the plan to address data gaps.
160	Linda Bell	Individual	General Comment	Are Historic Water Cycles Still Valid Predictors of Future Climate Cycles? (CCR 354.18 c) 3) A)) states that “Projected hydrology shall utilize 50 years of historical precipitation, evaporation, and streamflow information as the baseline condition for estimating future hydrology.”. Though past weather patterns are still part of climate studies, recent climate and hydrology research sees a future with more extremes of precipitation and temperature....(Letter continues)	Excellent question. It is important to note that the 2030 and 2070 centered model scenarios are not repeating historical climate patterns. The distribution of wet and dry years is centered on the precipitation and ET scenarios in 2030 and 2070. These datasets represent the best available science provided by the Department. Climate change models always use historical data to calibrate and downscale to, it is reasonable to assume that they will start showing more frequently occurring droughts as time moves forward. We are hoping to improve our climate change assumptions and modeling in future GSP updates, and we appreciate you bringing credible sources of data/information to our attention for consideration in our planning process.
161	Linda Bell	Individual	General Comment	(See full letter) Can The Choice of a Specific Time Span Influence Predictions? The fact that the 48 year historic baseline (1971-2018) of the Plan’s water budget starts just before the Indian Valley Reservoir comes on line is very important. Indian Valley Reservoir is operated to meet current year demand, not to maximize carryover storage; so its releases are important to the flow of Cache Creek. “Since completion of the Indian Valley Reservoir in 1975, the District’s water resources became less vulnerable to the dry years that periodically limit water resources in Yolo County.” “The conjunctive water management benefits associated with the Indian Valley Reservoir, and other District operations are directly evident in long-term hydrography for representative wells that show recovered groundwater levels after the reservoir came on line in 1977 to 1978.” (Borcalli, 2000) and (Ludhorff & Scalmanini, 2004) (Letter continues)....	Thank you for your comment. The 48 year baseline was initially 1970 - 2009 in earlier modeling studies based on the availability of data and the fact that the time period contained a series of droughts and wet periods. More recently researchers at UC Davis extended the period to 2015. During the development of the GSP, the modeling team extended the simulation to 2018 in order to assess model performance following the intense drought years of 2014 and 2015. Regarding the criteria thresholds, this is our first draft or effort in establishing criteria and we intend to adaptively manage the process and Subbasin to ensure the criteria are set at the appropriate levels and will ensure future sustainability. We appreciate and encourage your continued participation in this process.

Comment #	Commenter	Representing	GSP Reference (Public Draft)	Remark	YSGA Response
162	Linda Bell	Individual	General Comment	(See full letter) "Each Agency may define one or more management areas within a basin if the Agency has determined that creation of management areas will facilitate implementation of the Plan. Management areas may define different minimum thresholds and be operated to different measurable objectives than the basin at large, provided that undesirable results are defined consistently throughout the basin. A basin that includes one or more management areas shall describe: (a) The reason for the creation of each management area." (CCR 354.20 (a)) The Agency established six management areas. Though these management areas are used throughout the basin description to show the distribution of hydrologic soils; their formal description in Section 2.3 is unable to give a concise reason for their delineation. It states that "Management areas were developed based on prior investigations, which delineated somewhat different subbasin areas, and have been adapted to the purpose of this GSP." The description continues on, but with no clear summation of the various changes. (Letter continues)...	Thank you for your comment. We apologize for any confusion. The Management Areas developed in the Yolo Subbasin GSP are primarily consistent with the hydrogeologic distinctions of the Subbasin and were considered appropriate delineations for establishing the sustainable management criteria (minimum thresholds, measurable objectives, etc.). In forming the YSGA Advisory Committees, we are intending for the on-the-ground stakeholders and groundwater experts to assist us in the implementation of the plan and to provide the YSGA better detail and information on the internal needs of these smaller hydrogeologic units (than the Management Areas). A Management Area or smaller unit is more than welcome to develop and present to the YSGA for consideration sustainable management criteria that they feel is more appropriate to their region. The GSP is meant to provide sustainability for the Subbasin as a whole based on the intent of the legislation.
163	Linda Bell	Individual	General Comment	(See full letter) Bulletin 118 "Non-Basin Areas" DWR's Bulletin 118 creates a regulatory gap by defining only alluvial basins and not fractured, hard-rock and volcanic aquifers (which it labels "non-basin areas"). The western edge of the Central Yolo Management Area forms the border with the "non-basin" Capay Hills and Coast Range. The Hungry Hollow area borders the Capay Hills and Winters borders the Coast Range. Both of these areas are designated as Areas of Concern by the GSP. Groundwater in fractured hard-rock aquifers are very vulnerable to overdraft since their pore spaces are smaller than alluvial aquifers. The predictability of a well's yield can also vary depending on their location in the aquifer.(Letter continues)....	Thank you for your comment. We have received similar comments and recognize this will need to be addressed as part of the GSP implementation. We agree that areas of special concern should be separate management units - we intend to work with the stakeholders to promote the development of coalitions or subcommittees that will help us to think through creative and nuanced solutions for ensuring sustainability within these areas. We encourage you to continue to participate in this process and to provide your feedback in upcoming advisory committee, working group, and board meetings. This will be considered in our process for updating the GSP by 2027.
164	Linda Bell	Individual	General Comment	(See full letter) Land Use data for the Draft Water Budget Model was held constant from 2016 to 2018, since data after 2016 was not available when the model was programed. This means that part of the increase in water demand created by new residential and agricultural land use is missing from the water budget. This loss is especially critical in the areas of the Dunnigan Hills and Hungry Hollow where new agricultural development, especially perennial crops, such as orchards, has been especially strong. Both of these areas have not been adequately studied to assess this impact on groundwater. The Water budget needs to be re-calculated with the new numbers on both residential and agricultural land use.	Thank you for the comment; the YSGA TAC will work to develop a future land use projection to be included in the 5-year update to the model - see P2 in Table 5-1.
165	Linda Bell	Individual	General Comment	(See full letter) The Minimum Thresholds for Chronic Lowering of Groundwater Levels and Groundwater Storage in the North Yolo Management Area, which is here proposed as a measure to compensate for Voluntary Agreements; is an interesting combination of farmer and environmental beneficiaries issues. The threshold is described as: "Exceedance of the historic elevation in the period of record of each Representative Well plus 20 percent of the depth between the historic maximum and historic minimum elevation for the period of record of the Representative Well in two consecutive years." The explanation is that "The minimum thresholds for the North Yolo management area are set lower than historic conditions recognizing that water districts, such as 108, in this area may experience reductions in surface water deliveries from the Sacramento River as the Voluntary Agreements with the State Water Resource Board are implemented. " (Letter continues)...	Thank you for the comment. Minimum thresholds were developed in a collaborative process by the Working Group, taking into account all beneficial uses of groundwater, coordinated with neighboring subbasins, and approved by the Board of Directors. Groundwater elevations will be monitored and evaluated relative these thresholds to adaptively manage the Subbasin and ensure sustainability into the future.

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166	Linda Bell	Individual	General Comment	(See full letter) The Assumption that the Yolo Subbasin is a relatively stable basin where groundwater levels will rebound after drought, or heavy groundwater use, is a response that the Agency gives to all the situations where minimum thresholds are set at historic, or lower than historic, levels. The argument is that: “In the Yolo Subbasin, groundwater storage changes are positive in wet years and negative in dry year, with no significant trend (decline or increase) over the past 50 years.” (Appendix C, p 1) Though this kind of a cycle has occurred in the past,…. is a “stable” cycle of drought-and-flood, or large declines and increases, a pattern that we want to accept by declaring historic minimum groundwater elevations sustainable conditions? The Sustainable Groundwater Management Act was written in 2014 because of the repercussions of such a cycle. It would seem that the setting of minimum threshold levels at historic lows over consecutive years is perpetuating, not improving, the sustainability of the Yolo Subbasin. I would like the Agency to explain why setting minimum thresholds at such low levels is a sustainable management practice.	Thank you for your comment. As noted in the GSP, we consider this to be a stable pattern for the Yolo Subbasin as a whole, with historic low groundwater elevations recovering to historic high groundwater elevations. We realize this is not the case on a smaller scale or in more localized "hot spots" of the Subbasin. As part of developing the GSP, we wanted to the document to be based on the empirical data from our robust groundwater monitoring network and did not want to overcomplicate things with expensive modeling. This is considered our first take at this process and may be consider a "low bar" at this time, but is something that we hope to observe and adaptively manage to moving forward. Please continue to participate in our meetings and provide your valuable perspective.
167	Linda Bell	Individual	Section 2.2.3	(See full letter) The Plan, in Section 2.2.3 (p 2-54) decides to not set a minimum threshold for Saltwater Intrusion because “Seawater intrusion, as observed in California’s coastal aquifers, will not likely occur within the Yolo Subbasin because the ocean is over 50 miles away, farther if measured along the waterways. The southern portion of the Yolo Subbasin is located within the Sacramento-San Joaquin Delta and has been subject to salinity intrusions during the early part of the last century, but not since 1944 and 1990 (DWR 1995) and probably not thereafter due to the state management of flows through the Delta to prohibit salinity intrusion.” Even if the southern portion of the Yolo Subbasin is outside of direct seawater contact, the Yolo Basin could be indirectly affected. The Basin’s Sacramento River water supplies could be cut to: 1) provide for the immediate flows needed to push back salt water intrusions in the lower Delta, or 2) to retain reservoir water for a future need to curtail salt water intrusions. In either case, there would be indirect effects. The Plan needs to explain how it would replace these surface water supplies in such a situation. The September 21st 2021 Water Resources Control Board Meeting was talking about just such a condition; so the Plan should explain how it would replace these water resources.	Thank you for the comment, Section 2.2.3 was expanded upon in response to this comment and other similar comments that were received.
168	Linda Bell	Individual	General Comment	(See full letter) SGMA requires coordination with Land Use Planning Agencies. CA Water Code 10727.4 states that “…a groundwater sustainability plan shall include, where appropriate and in collaboration with the appropriate local agencies, all the following:… (k) Processes to review land use plans and efforts to coordinate with land use planning agencies to assess activities that potentially create risks to groundwater quality or quantity..” Table 1-3 (p 1-21) shows which member agencies, and affiliated members, implement water resources programs, but it does not present a working relationship with planning departments and permitting agencies. Management Action 2 is titled: “Continue coordination efforts with other management and monitoring entities.”, but there are still no details as to the success of these efforts. The SGA Board has recently been negotiating the form of a group which would interface with the Board of Supervisors, but the role of the representatives is still being decided. There is a hesitancy to take any direct actions in the land planning and well permitting processes.	Thank you for pointing out this deficiency. We have added some additional language to the GSP to articulate the recent coordination efforts that have occurred with the YSGA and the Yolo County Board of Supervisors and staff related to the drought and ways to improve the well permitting process.

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169	Linda Bell	Individual	Section 5	(See full letter) Projects and Management Actions (354.44 (a)) states: "Each Plan shall include a description of the projects and management actions the Agency has determined will achieve the sustainability goal for the basin, including projects and management actions to respond to changing conditions in the basin." One set of projects, numbers 56 through 59, looks at the Capay watershed and the community as an integrated whole. Together they work to improve the hydrological state of the watershed; improve farming practices to increase water infiltration and water holding capacity; develop a restoration plan for the native vegetation communities of the Capay Valley; and establish an equipment and knowledge hub for the human community. Copay is a unique location, but the ideas could be scaled to other areas. Together these projects do plan for a changing climate.	Sentences have been added to Projects 56 and 59 recognizing that similar projects can be expanded to the entire Subbasin.
170	Linda Bell	Individual	General Comment	(See full letter) In summary, I feel like the beginning (Basin Setting) and end sections (Appendices) of the Draft plan were very helpful for understanding the Plan, but the summation of this information in the middle sections, such as the Sustainable Management Criteria, were not as well thought through.	Thank you for your comment. We recognize that the Sustainable Management Criteria is currently written to fit within the State's SGMA process; the language and framework for thinking through the issue of sustainability is defined based on the necessary components of the SGMA regulations and may not completely make sense in an application sense. As we implement the Yolo Subbasin GSP, we intend to better articulate and document the realities of applying these minimum thresholds and measurable objectives to avoid undesirable results. This is the first plan that has comprehensively examined groundwater sustainability for the entire County and we are working with the resources that are available to us at this time. We will continue to strive for improvement as we move forward in monitoring and managing our valuable water resources.
171	William Vanderwaal	DWD	Section 5	Boards in program. This would be voluntary or financially incentivized to have landowners keep the spill boards in on their rice fields in the winter to hold rainfall on their fields. Even though they tend to be low infiltration due to higher clay content, there could still be recharge benefits out of this sort of program. The alternative (board not in) has the water run off the fields into drains and into the river losing the chance to recharge the aquifer.	The Boards In Program was added to Table 5-1.
172	Beverly Schmidkunz Boido	Individual	General Comment	*Accountability of our groundwater usage a moratorium on further groundwater extraction for development on what have been historically non-irrigated lands until there is an understanding of groundwater sustainability in the Dunnigan hills and other "special concern" areas. **Accountability by our community- To move forward in the change of climate we suggest an active informative educational process to help agricultural landowners and urban dwellers how to go into the future on how we each can participate in decreasing water usage together.	Thank you for your comment. We have received similar comments and recognize this will need to be addressed as part of the GSP implementation. We encourage you to continue to participate in this process and to provide your feedback in upcoming advisory committee, working group, and board meetings. This will be considered in our process for updating the GSP by 2027.
173	Gwyn-Mohr Tully	City of West Sacramento	Figure 1-3	(See full letter) Figure 1-3 on p 1-13 indicates that the City is not a "groundwater dependent community." The City has diversified its water supply portfolio and part of that portfolio remains groundwater. Thus, although we are not "wholly dependent" I think the City considers groundwater a part of its usable water asset portfolio in much the same way as the City of Davis and City of Woodland (both integrated with surface supplies delivered from WDCWA) that are depicted as groundwater dependent communities.	A footnote was added to Figure 1-3 denoting this distinction.
174	Gwyn-Mohr Tully	City of West Sacramento	Figure 1-4	(See full letter) Figure 1-4 shows a distribution of grain and hay crops throughout the City of West Sacramento's service area. Although this may have been true in the past, much of the area depicted in this graphic is fully developed and devoid of agricultural production.	This map is based on 2016 land use data from DWR. The 2018 data from DWR also appears to show this as agricultural land. Looking at aerial imagery, it appears some of this land may have been fallowed, recently. Land use classifications will be updated when new data sets are released by DWR.
175	Gwyn-Mohr Tully	City of West Sacramento	Figure 1-6 through 1-8	(See full letter) Figures 1-6 through 1-8 show a wide distribution of various agricultural, domestic, and municipal wells within the City of West Sacramento. We would appreciate a citation to this data source (or sources) to ensure that it stays up to date with the City's well management activities.	The source of this data is DWR's Well Completion Report database, https://data.cnra.ca.gov/dataset/well-completion-reports. It is cited in the figures and in text in Section 1.5.2.
176	Gwyn-Mohr Tully	City of West Sacramento	p. 1-31	(See full letter) The City would like its 2020 update to its General Plan Housing Element noted in the statement about the City's General Plan.	Added "The City of West Sacramento adopted the 2021-2029 Housing Element Update on July 14, 2021"
177	Gwyn-Mohr Tully	City of West Sacramento	p. 2-20	(See full letter) There appear to be a couple typographical errors on this p and on p 2-32 the word "southwestern" is misspelled.	Several typos on this page were fixed.

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178	Gwyn-Mohr Tully	City of West Sacramento	Figure 2-14	(See full letter) 1. Figure 2-14 on p 2-37 does not appear to show the City's point of diversion for Permit 18150.	Confirmed the point of diversion for Permit 18150 is shown on the map, about 2.5 mi south of the Port of Sacramento. The location matches what is shown in eWRIMS.
179	Gwyn-Mohr Tully	City of West Sacramento	Figure 2-24	(See full letter) Figure 2-24 on p 2-63 should list the City as a Public Water System in the legend and the figure should include a spatial recognition of the City's service area.	Thank you for bringing this to our attention. The City of West Sacramento has been added to this figure.
180	Gwyn-Mohr Tully	City of West Sacramento	Table 2-12 through 2-15	(See full letter) Tables 2-12 through 2-15 do not show the City as a Public Water System or show the water quality information that would apply to the City in those tables.	Thank you for the comment, based on the SDWIS database, and communication with the State Water Board, we modified some language in the GSP. We modified Table 2-11 and added the following sentence in Section 2.2.4.4: "The City of West Sacramento is a public water system, No. CA5710003, that was not considered in this table. Information about the City's water system and water use can be found in its recently adopted 2020 Urban Water Management Plan. " The City of West Sacramento was not initially included because water quality data is not currently measured since their wells are not actively used for drinking water supply.
181	Gwyn-Mohr Tully	City of West Sacramento	p. 2-203	(See full letter) p 1-203 cites The Nature Conservancy's water model. The City notes the following disclaimer that TNC shows at the identified link that should be incorporated into the text as it indicates that there is some uncertainty with what could be concluded from the information. The link states: "This map categorizes the rivers and streams in the Central Valley on the likelihood that they are ISW, using groundwater depth as a proxy to determine if the surface water is hydraulically connected to groundwater." (highlight added). Perhaps this would be well-suited for a footnote since The Nature Conservancy notes that the output is a "likelihood" rather than something more definitive.	A caveat was added to this section clarifying that the methodology contains uncertainty, "This approach categorizes the water bodies using an estimate of stream bed elevation and groundwater depth as a proxy to determine if the water body is hydraulically connected, and therefore represents a likelihood that contains some uncertainty. A representation of that uncertainty is shown in the yellow areas on Figure 2-47. For the purposes of this GSP, reaches categorized as "uncertain" are considered connected to groundwater to ensure a conservative approach. "
182	Gwyn-Mohr Tully	City of West Sacramento	p. 2-104	(See full letter) There seems to be some speculation related to groundwater substitution transfers in this section. These transfers are highly controversial for a number of reasons and we think that adding language about the interconnectivity of surface water and groundwater in this instance is misplaced. The DWR Water Transfer Whitepaper is not law but is instead policy generated by DWR staff that has not yet been formerly ratified or challenged. We would encourage the Agency to simply delete this text and provide more generalized language about hydraulic connectivity between surface water and groundwater.	Thank you for the comment. We revised this section to remove any speculation and stay within the scope of groundwater/surface water interconnection.
183	Gwyn-Mohr Tully	City of West Sacramento	p. 2-109	(See full letter) There appears to be a typo in lines 13 and 14.	Fixed
184	Gwyn-Mohr Tully	City of West Sacramento	General Comment	(See full letter) One source of groundwater recharge certainly applies to sources of water that are applied to land through irrigation (and other overland-spreading activities). Additional methods of groundwater recharge may need to be added to the characterization of recharge for groundwater basins even if the discussion is merely qualitative. Examples may include diversion of flood flows through the Yolo bypass, water regularly moving through the drain in the Yolo Bypass, water moving in the deep water ship channel, application of irrigation water above the ET amounts to crops, and application of irrigation water in urban landscapes	Thanks for the comment. We agree that there are other groundwater recharge opportunities such as those you've mentioned. We updated the groundwater recharge management action accordingly.
185	Gwyn-Mohr Tully	City of West Sacramento	p. 2-130	(See full letter) Section 2.2.9 on p 2-130 should include a brief discussion about the conversion of agricultural acreage to urban acreage. This is a particularly important component in the City's service area because significant water conservation has been achieved in the City's service area on a per acre basis when land is converted from agricultural production to urban landscapes. Much of that conserved water benefits the Yolo Subbasin groundwater conditions in the South Yolo Management Area.	Added the following language to the GSP: "Another important change in land use is the conversion of agricultural areas to urban areas"
186	Gwyn-Mohr Tully	City of West Sacramento	Figure 2-56	(See full letter) Figure 2-56 on p 2-132 shows future use over 65,000 but the number in the side table in the figure says 50,270. We are unclear on the data correlation in this table and suggest it could be explained in words if the data shown is correct.	The table on the right is the average annual urban demand, the graph on the left starts with urban demand around 40,000 AF and ends around 65,000 AF - with the average being 50,270 AF annually. Added the following language: "Figure 2-56 shows the average annual urban demand for the future scenarios as 50,270 AF/year. In the future scenarios, the urban demand rise steadily, resulting in modeled urban demand that is higher at the end of the future period than at the beginning."
187	Gwyn-Mohr Tully	City of West Sacramento	Table 2-22	(See full letter) Table 2-22 on p 2-134 needs a units characterization.	The water year index and water year type sources are identified on p 2-131. Added a footnote to Table 2-22 with the following language: Note: additional information on the Water Year Index for the Sacramento Valley can be viewed in DWR's Sustainable Groundwater Management Act Water Year Type Dataset Development Report (DWR, 2021)."

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188	Gwyn-Mohr Tully	City of West Sacramento	p. 2-139	(See full letter) p 2-139 identifies 346 TAF as the sustainable yield of the entire Yolo Subbasin. We recognize that components of this figure are aggregated among the various management areas.	Thank you for the comment.
189	Gwyn-Mohr Tully	City of West Sacramento	p. 2-146	(See full letter) Section 2.3.5 on p 2-146 should recognize that the City's water use history in a little more detail. We recommend the following language be added after the first sentence on line 16: "The City historically delivered groundwater to its customers as the exclusive source of water for many years before building its surface water diversion and treatment facilities. The City continues to preserve and use groundwater in its service area for various purposes and is looking to improve its groundwater system to provide necessary system redundancy to ensure safe and reliable water supplies for all of the City's residents and businesses." We would also ask that the last sentence with the word "dependency" in it be deleted that starts on line 16. Also, the word "city" should be capitalized in the first sentence on line 16.	Added and changed language in section 2.3.5 to reflect the comment submitted.
190	Gwyn-Mohr Tully	City of West Sacramento	p. 4-7	(See full letter) There is a typographical error in the Table legend.	Thank you for the comment, this typo has been fixed.
191	Gwyn-Mohr Tully	City of West Sacramento	p. 5-20	(See full letter) p 5-20, P 68 and P 69 in the table are projects for the City of West Sacramento. We would prefer that P 68 be titled "West Sacramento Well Improvements that may include Aquifer Storage and Recovery."	Changed title of this project
192	Gwyn-Mohr Tully	City of West Sacramento	Ap.p.endix p. 47	(See full letter) Appendix p 47 PDF has the same figure as shown in Figure 2-56 on p 2-132 that may require more explanation.	The table on the right is the average annual urban demand, the graph on the left starts with urban demand around 40,000 AF and ends around 65,000 AF - with the average being 50,270 AF annually. Added the following language: "Figure 2-56 shows the average annual urban demand for the future scenarios as 50,270 AF/year. In the future scenarios, the urban demand rise steadily, resulting in modeled urban demand that is higher at the end of the future period than at the beginning."
193	Gwyn-Mohr Tully	City of West Sacramento	Model Documentation p. 44	(See full letter) 1.Section 2.1.5.2.2 of the Appendix (p 209 of Appendix PDF) should probably be modified in a few ways. a.The characterization of the NDWA contract should be modified and redact the word "unlimited" and add "highly reliable" instead. The rest of that sentence after the comment should be deleted. b.The sentence that states "This is not implemented into the model at this time" is somewhat concerning. The City's ability to use groundwater should be in the model and we are not sure what this sentence is conveying. In addition, the notations in Figures 1-6 through 1-8 indicate that well water is being used within the City which should be incorporated into the model. c.The City sends its wastewater to SRCSD not the City of Sacramento as noted in the sentence starting with "Although." d. The table depicting "Sources of Information" for the City of West Sacramento. A few things here: the City's CVP Contract is number 0-07-20-W0187-P rather than what is depicted in that table. Also, the City is in the final stages of updating its 2020 UWMP and has updated its Housing Element in 2020 for its General Plan (the GP is cited elsewhere (p 1-31) in the GSP so should be cited in this table). If a reference could be made that these data will be modified based upon future updates to planning documents, that would be helpful.	a.) The text has been changed. b.) The model does use groundwater if all surface supplies are exhausted. The text has been clarified to reflect this. c.) The correct name for the treatment plant has been used in the text. d.) The contract 14-06-200-1779A-R-1 is the RD 900 contract. A reference for contract 0-07-20-W0187 has been added. A link for the general plan has been added to the sources table. Text has been added stating future model updates will reflect updated planning documents.

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194	Jeff Main	Good Humus	General Comment	(See full letter) First, it is clear that the speed and power of the financial investment and development groups to alter existing landscape and community resource norms in our area has far outstripped the speed with which we are reacting to the changes that are introduced. The continuous purchase and reconfiguring of hill ground in Western Yolo County combined with the indiscriminate extraction of a diminishing community water resource without regard for the needs of the local community has avalanched in the midst of a historic drought that demands rather, greater care and preservation efforts from all of us. It is essential that we use all the powers of our elected public officials and governmental bodies to re-establish the rights of all to a reasonable share of a sustained essential resource.	Thank you for your thoughtful comment. We look forward to working with you and other Hungry Hollow area community members, along with the County Board of Supervisors and staff to appropriately address your concerns and the mutual desire of preserving groundwater resources and ensuring sustainability into the future.
195	Jeff Main	Good Humus	General Comment	(See full letter) Second, it should be noted that there is a likely geologic delineation between the aquifers to the north of Rd 16A in Hungry Hollow and the aquifers to the south. This delineation should show clearly in the difference between the water qualities of these two regions. If there is indeed a delineation it should be acknowledged as a goal of the YSGA to protect the higher quality waters to the north from the introduction of lower quality water from sources to the south.	Thank you for your comment. This is helpful information to assist us in learning more about the subsurface hydrogeology of the region. We will consider this information as we expand the monitoring network and document any anecdotal/observed data. It seems that there could be a simple water quality sampling and analysis in the future to confirm.
196	Jeff Main	Good Humus	General Comment	(See full letter) Finally, I would hope that in addition to concerns about the mingling of waters of differing quality, that the idea of allowing additional development of land through the pumping of water from the Cache Creek Canals will be carefully studied for its potential for increasing groundwater pumping and resulting overdraft during periods of greatest concern.	Thank you for the thoughtful comment. Future degradation of water quality will be considered and avoided in the implementation of GSP projects. In addition, the YSGA will consider whether future development of unirrigated land should continue/be allowed in regions where there may not be a sustainable groundwater supply.
197	Paul Muller	Full Belly Farm	General Comment	(See full letter) See Letter	Thank you for your thoughtful, productive comments. As part of GSP implementation and the establishment of Management Area Advisory Committees, we will take your thoughts into consideration so that the stakeholders and thought leaders in the community are at the table for developing creative and responsive solutions.
198	Allen Barnes & Kim Ohlson	Good Humus	General Comment	(See full letter) We would like to provide feedback on the Public Draft of the Groundwater Sustainability Plan (GSP) as it relates to Hungry Hollow and other special concern areas on the west side of the valley from Winters to Zamora. We strongly support the position taken by Good Humus Produce and others that there should be a 10-year moratorium on any new wells drilled on historically non-irrigated land. This time would allow a thorough and much-needed study of the effect of new deep water wells on the water table in the Hungry Hollow area, as well as other potentially affected areas. (Letter continues)...	Thank you for your comment. We have received similar comments and recognize this will need to be addressed as part of the GSP implementation. We encourage you to continue to participate in this process and to provide your feedback in upcoming advisory committee, working group, and board meetings. We also believe it will require a nuanced, creative solution. This will be considered in GSP implementation and will be expanded on textually in the 2027 GSP Update.
199	Ben King	Individual	p. 1-23	p 1-23 There should be a discussion of the recent adoption of a Human Right to Water (HRTW) Policy in the Department Administrative Manual which outlines how the HRTW should be included in DRW decision making, program activities and public engagement. Since the HTRW legislation predates SGMA but is now an emerging issue it is important for the GSP to highlight the adoption by the DRW and highlight the HTRW commitment for public engagement purposes. It should probably be noted that the SWRCB has also recognized HRTW as a core value and is in the process of drafting a Racial Equity Resolution as it relates to Diversity, Equity and Inclusion (DEI) issues relating to water policy in the State of California.	A paragraph discussing this policy has been added to Section 1.5.
200	Ben King	Individual	p. 1-31	Are there HTRW policies and directives for the municipal Members that should be highlighted? Are there DEI policy directives that relate to water use and equity for the municipal Members that should be highlighted for future stakeholder engagement. Also please note the typo reference source at bottom of p.	We did not find any mentions of human right to water with the City of Davis, City of Woodland, or City of West Sacramento online. The reference typo was also addressed.
201	Ben King	Individual	p. 2-1	2-1 line 27 (Figure ?)	The reference to Figure 2-1 has been fixed.

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202	Ben King	Individual	General Comment	As mentioned in previous emails - the Olmstead and Davis, 1961 is not most recent or reliable BFW vertical depths both because they are not observed empirically and because the water quality parameters are much too high compared to current water quality standards. See the email regarding the Springhorn BFW presentation to the US Geological Society in 2013. Once updated the BFW assumptions will most likely materially change the Water Budget assumptions for the northern Yolo County Management Areas	A reference to recent and upcoming studies, as well as utilizing AEM surveys was added in section 4.11.2.4 to address BFW gaps and data gaps related to the HCM.
203	Ben King	Individual	p. 2-15	This section should include a discussion about the unique Geomorphology of the Sutter Buttes and the presence of the Willows Fault to the north and east of the northeast corner of the Yolo Subbasin. See the work of Springhorn (2008) and Curtin (1971). Springhorn recommended in his "Future Work" section that the presence of arsenic near the footprint of the Sutter Buttes Rampart be studied. Note that it likely that arsenic is desorbing from the metal oxide volcanic material of the Sutter Buttes and has contaminated the public water supply for Grimes and the well for the Meridian elementary school. Both of these sites have arsenic observations of approximately 28 u/gL and are located just north of the Yolo Subbasin. Figure 2-7 should note the location of the western spur of the Willows Fault that runs southerly from Colusa southward toward Grimes and the Sutter Buttes since it is source of connate sea water that upwells in to the fresh water aquifer as the Sacrament Valley floor descends to lower elevations from the south façade of the ancient volcanic structure of the Sutter Buttes.	Language was added to Section 4.11.1.5, Hydrogeologic Conceptual Model Data Gaps, referencing the review of upcoming and recent studies, in addition to AEM surveys that may be useful in improving aquifer characteristics in the Yolo Subbasin
204	Ben King	Individual	p. 2-32	What is the rationale for the statement "Diversions from Sacramento River water are not considered importation …" The Sacramento Water from the Tehama Colusa Canal comes from the pumping plant in Tehama County and/or the GCID interconnect in Colusa County and make its way at unnatural elevations on the west side of the Sacramento Valley. The flows are impacted by the use of the Warren Act and CVP contracts which should be discussed. Just to be clear the Sacramento River water delivered via the Tehama Colusa Canal is all the result of politics and money and has and will continue to have material impacts on the hydrology, environment and economy of the Yolo Subbasin.	The previous paragraph on p 2-31 identifies Tehama Colusa Canal water as imported to the County. To avoid confusion, the sentence referred to in the comments was changed to, "Diversions from Sacramento River are not considered importation where the Sacramento River flows along the eastern boundary of the Subbasin."
205	Ben King	Individual	Section 2.1.10	Perhaps there should be some general summary of the various water rights and them reference to the sections of the Model Documentation Appendix where the specific water rights for each Management Area is covered in detail.	A sentence referring to the Model Documentation Appendix was added in this section.
206	Ben King	Individual	Section 2.1.11	Data gaps to be considered are the likely update of BFW based on DWR work highlighted by Springhorn in his 2013 posterboard at the US Geological Society, the Future Work section of Springhorn's 2008 Master's Thesis regarding the presence of arsenic within the scope of the Sutter Buttes Rampart on the north east and eastern portion of the Yolo Subbasin. The presence of redox conditions that are likely aggravated by lowered groundwater levels due to over pumping as highlighted in the recent USGS publications of Laura Bexfield and Susan Thiros et al. The presence of upwelling in the Sacramento Valley as widely observed by the DWR and others. In addition there are distinct data gaps that were highlighted in the YSGA Model particularly pertaining to water use in the Dunnigan Hills and other issues in the Dunnigan Zamora area.	Please see the response to comment 96. The BFW is identified in the HCM data gaps (Section 2.1.11), and the plan to address data gaps (Section 4.11.2). Data gaps such as the Dunnigan Hills area are identified in Section 4.11.
207	Ben King	Individual	Section 2.1.12	Add Springhorn (DWR) BFW work, Springhorn 2008 Paper regarding the Sutter Buttes , Curtin 1971 Paper regarding stratigraphy and water quality south of the Sutter Buttes and Susan Thiros and Laura Bexfield where arsenic,TDS and redox is discussed. Reference excerpts attached.	A reference to recent and upcoming studies, as well as utilizing AEM surveys was added in section 4.11.2.4 to address bfw gaps and data gaps related to the HCM. Additionally, this was added as a data gap in the Basin Setting Chapter.

Comment #	Commenter	Representing	GSP Reference (Public Draft)	Remark	YSGA Response
208	Ben King	Individual	Section 2.2.1	2.2.1.3 It is wrong to say that water gradient is upward only in discharge areas. Upwhelling is common across the Sacramento Valley floor. Most recently this was observed at a new DWR multi-completion well on Hahn Road just west of I-5 which is not a discharge area. The interrelationship between upwelling and redox conditions has potential material adverse outcomes due to over pumping and potentially from the head gradient from the potential Sites Reservoir which will be as high as 500 feet above sea level and 700 to 800 feet from public supply and domestic wells at lower elevations of the west side of the Sacramento Valley. This potential for degradation of the fresh water aquifer has HTRW and DEI related outcomes also.	You are correct, there is upward movement of groundwater elsewhere in the subbasin. This is addressed in the final sentence of Section 2.2.1.3 "The vertical gradient is downward from the shallow zone to the upper intermediate zone, somewhat upward between the lower and upper intermediate zones, and upward from the deep zone to the intermediate zone." Also changed "which would be" to "like areas found".
209	Ben King	Individual	Tabel 2-8	Table 2-8 p 2-53. This table represents the empirical evidence of the upwelling phenomenon. It is important not to just characterize this a something that is only observed in discharge areas because that is not empirically substantiated. Upwhelling is a common occurrence which has the potential to permanently degrade the fresh water aquifer if it is not managed. Too deep of wells focused on quantity rather than quality, over pumping causing aggravated redox conditions and the potential for upward and lateral movement or desorption of naturally occurring contaminants such as arsenic are all serious concerns and have HTRW consequences.	The following sentence was added to the first paragraph in Section 2.2.1.3: "Upward movement of groundwater can occur from the deep aquifer to the intermediate aquifer, and intermediate to shallow"
210	Ben King	Individual	Section 2.2.2	Change in Storage Calculations – these calculations will most likely be materially reduced by new updated BFW levels from the DWR as discussed.	Please see the response to comment 96.
211	Ben King	Individual	Section 2.2.4	2.2.4 p 2-56. The DWR's and SWRCB new adoption of HTRW and Racial Equity policies should be discussed in this section . The efforts of NCWA are good but at this point the effort is in early stages and there is no indication that there is a strong representation for domestic water systems. Most NCWA stakeholders are Settlement Contractors with a focus on a collaborative use of surface water while protecting the economic interest of surface water rights.	Thank you for your comment. It is not clear to us what the water quality implications will be of DWR's participation in the California Capitol Collaborative on Race & Equity, or how the State Water Board's water quality programs will be revised based on implementation of AB 685 (HRTW). As we learn more about the connection between these policies and on-the-ground water quality monitoring programs, we will discern whether the water quality section should be updated to reflect the nexus. We will also continue to participate in NCWA's meetings relating to this topic.
212	Ben King	Individual	Section 2.2.4	CV Salts only has one priority subbasin in the Sacramento Valley and it is the Yolo Subbasin. CV Salts focuses on point of source contaminants and does not adequately focus on naturally occurring contaminants and does not prioritize most of the Sacramento Valley in it focus.	Added the following to Section 2.2.4.1: "CV-SALTS has historically been a point source program."
213	Ben King	Individual	Section 2.2.4	The discussion of all the various State and Federal water quality reporting jurisdiction highlights the difficulty in stakeholders getting a clear understanding of water quality trends and potential issues. There should be some consolidated accessible reporting link where this data can be easily obtained and monitored by stakeholders	Thank you for the comment. We have modified the water quality section in response to your comments and other like them. Updates on water quality constituents of concern will be included and released to the public in the annual reports provided to DWR.
214	Ben King	Individual	Tabel 2-10	Table 2-10 – the TDS standard for domestic and agricultural purposes should be included on Table 2-10	Added TDS Standard to Table 2-10.
215	Ben King	Individual	Section 2.2.4	There should be discussion and identification of the domestic wells north and west of the Cal American Water Supply system near Dunnigan. There are 200 to 300 households in houses and trailer parks which I do not believe are included. There are HTRW and DEI protections needed for these residents.	A well impact analysis has been added as an appendix to the GSP, the wells you are referring to are located in 12 N 01W.
216	Ben King	Individual	Figure 2-25	Figure 2-25 p 2-66 – Water quality samples for deep multi-completion wells in the eastern and north eastern corner of the Subbasin should be included. Arsenic levels in the shallow public supply system for Grimes , the elementary school in Meridian is approximately 28 ug/L which is probably the result of desorption in lower aquifers with elevated pH levels. Curtin observed EC levels as high as 10,000 near Oswald Road T 12 N across the River in the Sutter Basin so it is likely that deep aquifers on the eastern portion of the Yolo Basin also have high EC and TDS levels.	Thank you for the comment, the water quality section of the GSP has been expanded. Water quality samples taken by other entities in deep multi-completion wells will be evaluated. In the future, the YSGA may consider developing a monitoring program for these wells.
217	Ben King	Individual	p. 2-80	p 2-80 – The observations north and east of the Yolo Subbasin should be noted as discussed above and reference should be made to Springhorn's Future Work in his 2008 Paper and the predictive arsenic outcomes in Thiros USGS Paper based of expected arsenic desorption in the high pH water south of the Sutter Buttes as discussed previously.	A reference to recent and upcoming studies, as well as utilizing AEM surveys was added in Section 4.11.2.4 to address data gaps related to BFW and the HCM. Additionally, this was added as a data gap in the Basin Setting Chapter.

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218	Ben King	Individual	p. 2-89	There is a Figure reference mission on p 2-89	This missing figures reference has been updated.
219	Ben King	Individual	Section 2.2.4	There should be a discussion regarding Non-Point Source natural occurring contaminants and that CV Salts is a point source regime. Discussion should include the recent findings of Thiros USGS publications and the potential for lateral and vertical movement of this contaminants due to movement via faults and upward due to upwelling and over pumping especially in redox conditions.	Added the following to section 2.2.4.1: "CV-SALTS has historically been a point source program."
220	Ben King	Individual	p. 2-128	p 2-128 See Model and Water Budget Comments in previous emails	Please see the response to comment 96.
221	Ben King	Individual	p. 2-137 & 2-139	p 2-137 and 2-139 See previous comments regarding BFW vertical levels and impact on Groundwater Storage calculations and Sustainable Yield	Please see the response to comment 96.
222	Ben King	Individual	Section 3.2	Section 3-2 Criteria for Sustainable Management Criteria – HTRW and DEI concerns and objectives should be included in the Criteria. Domestic Water use is a historical priority use and HTRW and DEI raises this priority to a Human Right and protected interest group.	Thank you for your comment. The GSP has been revised to better recognize HRTW and DEI concerns in text, such as domestic wells, DACs, and tribal lands. A well impact analysis has been added as an Appendix to the GSP, providing additional consideration of the impact of the SMC's on domestic well owners. As stated in text, SMCs have been designed to protect all beneficial users of groundwater, including domestic users.
223	Ben King	Individual	Section 3.2	Section 3-2. The YSGA MUST establish specific sustainable management criteria for water quality as part of this GSP. The HTRW is a recognized Human Right and without standards there cannot be any certainty that this Human Right will be protected. Without standards and without the benefit of revised BFW modeling from the DWR as discussed there is significant risk that domestic water supply systems and aquifers could become permanently degraded. The reliance of CV Salts and the other regulatory programs do not provide an easy access for stakeholders to understand and monitor these risk to fresh water supplies. From a DEI perspective the proposed SMC approach just highlights the two tier access to fresh Sacramento River water supply where Davis residents have access and those in rural areas like Dunnigan and domestic well users generally do not .	Thank you for your comment. The monitoring network and SMC's for water quality have been revised based on your comments and others like them.
224	Ben King	Individual	p. 3-15	p 3-15 Potential Causes – To reiterate – Redox – Upwhelling – over pumping – lateral movement via faults and combinations thereof.	Thank you for your comment. We acknowledge that groundwater quality is impacted by a large variety of processes and continued WQ monitoring will provide more clarity on the causes of WQ changes. New insights will be incorporated into future revisions to the GSP.
225	Ben King	Individual	Section 4.4 & 4.6	Section 4-4 and 4-6 – Monitoring for Groundwater Levels and Water Quality. The Monitoring Network that includes multi-completion wells should report data regarding groundwater head and groundwater quality observations for TDS, Arsenic and Boron across the Subbasin Network to track trends in upwelling and the potential water quality trends due to lateral and vertical movement and redox conditions. Monitoring trends in upwelling and water quality is very important to understand and protect fresh groundwater aquifers. If Sites is built the potential for additional movement of TDS and arsenic is heightened due the head gradient between the top of the reservoir and the Valley floor. Events such as an earthquake could change the potential risk of this materially and this data set would easily catch any changes in long run trends if this set of multi-completion data is monitored and reported.	Thank you for the comment, the water quality section of the GSP has been expanded. Water quality samples taken by other entities in deep multi-completion wells will be evaluated and published in the annual reports.
226	Ben King	Individual	Section 4.6	The reliance on the various reporting databases in section 4.6 and the protocols in 4.9 are cumbersome and leads to the lack of information. Personally I know this since I have tried to access this information. The protection of the HTRW will best be met by the YSGA consolidating this data and making the consolidated data publicly available in a way that a disadvantages stakeholder can access since poor people of color usually have access to the worse quality supply systems. Without the YSGA involved in this process it will not be in a position to protect the HRTW and protect DEI interests.	Thank you for the comment. Water quality updates will be provided to the public on an annual basis in the GSP Annual reports published by the YSGA. The GSP text has been revised to make this clear.
227	Ben King	Individual	Section 4.11.1	4.11.1 The YSGA should participate in a multi-basin study to follow up on the Future Work section of Springhorn's 2008 paper to understand arsenic contamination issues around and south of the Sutter Buttes. This is included in the Management Action proposals.	Thank you for the input. As the commenter points out, this is already included in the Projects and Management Actions Table as P-27.

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228	Ben King	Individual	Section 5	Section 5 - The proposed Sites Project should be included and discussed. Specifically the plans for the interconnect pipelines from the Tehama Colusa Canal to the Colusa Basin Drain and the proposed companion pipeline from the Colusa Basin Drain to the Sacramento River. Since this project is in the initial study stage now is the time for stakeholders to become aware of the project and the risks and opportunities this massive project will bring to the Yolo subbasin. As discussed, this is a great opportunity to guarantee a fresh water supply for the residents northern Yolo County and much of the West Side of the Sacramento Valley if the Sites Project was combined with a water filtration system. Now is the time for the municipal Members of the YSGA to think about what this project would mean for Yolo County and its residents. From a HTRW and DEI perspective it would guarantee the HRTW to much of Yolo County without access to fresh water from the Sacramento River and would bring Equity to poor and people of color to places like the outskirts of Dunnigan.	Please see the response to Comment #141
229	Samantha Arthur	Audubon	Section 1	(See full letter) Identification of managed wetlands: While the GSP notes “managed and native wetlands” within the descriptive paragraph of beneficial users in the introductory section (see GSP p. 1-32), the accompanying land use figures do not show any managed wetlands (see GSP Figure 1-4). The Yolo Bypass Wildlife Area includes significant acres of managed wetlands that should be more clearly identified in land use maps and reflected in the acreage used in the water budget.	Figure 1-4 is based on DWR's Statewide Crop Mapping Dataset from 2016. The figure was revised to show Managed Wetlands when "Crop2016" = "Managed Wetland". The water budget will be revised in the 5-year update to better reflect managed wetland acreage.
230	Samantha Arthur	Audubon	Water Budget (now Ap.p.endix F)	(See full letter) Water budget: Managed wetlands appear to be missing from the water budgets detailed in Appendix C. As represented in various tables in Appendix C (e.g., GSP Appendix C Table 11 and Table 41), the GSP appears to assume zero acres of managed wetlands in 2016 and less than 500 acres in prior years, as well as zero acres for the Yolo Bypass area for 1989 through 2016. Furthermore, there is no recognition of potentially expanded future acres of managed wetlands under proposals being considered by EcoRestore, the Putah Creek Preserve, and the Yolo Bypass Wildlife Area.	Please see the new section on Native vegetation and Managed Wetlands; and response to comment #106.
231	Samantha Arthur	Audubon	p. 4-46 and 4-29	(See full letter) Identification of data gaps: Audubon appreciates that the representation and characterization of managed wetlands is recognized as a data gap (see GSP p. 4-26 and 4-29).	Thank you for the comment.
232	Samantha Arthur	Audubon	Section 5	(See full letter) Consideration of managed wetlands: While the GSP indicates long-term sustainability, it does include some projects and management actions. Including managed wetlands in the projects and management actions can help achieve multiple benefits, providing both recharge and wildlife habitat. Furthermore, any consideration of projects that may redirect water for recharge should assure that existing native and managed wetlands are not adversely impacted.	Included a sentence about TNC's Multi-benefit recharge project document in Section 5.
233	Samantha Arthur	Audubon	p. 1-13	(See full letter) The basin also includes significant acres of managed wetlands, which should be a different designation than “native vegetation” as these lands are actively managed for migratory bird habitat. The identification and representation of managed wetlands needs further improvement to reflect known managed wetland areas.	Added sentence to Section 1.5.2 acknowledging managed wetland acreage in the Subbasin.
234	Samantha Arthur	Audubon	p. 1-16	(See full letter) Managed wetlands should be listed as a unique land use.	Updated Figure 1-4 to show Managed wetlands as a separate category, based on DWR's "Crop2016" designation.
235	Samantha Arthur	Audubon	p. 2-120	(See full letter) When viewed in combination with Figure 1-4 (Land Use), it appears that managed wetlands are being potentially mischaracterized or missing altogether. In Figure 1-4, much of the Yolo Bypass is designated as “riparian vegetation” while Figure 2-51 indicates some of this same land is “iGDE.” In both figures, known managed wetlands at the Yolo Bypass Wildlife Area are not identified. These managed wetlands are different than riparian vegetation and groundwater dependent ecosystems because they apply surface or groundwater to flood migratory bird habitat from fall to spring.	Updated Figure 1-4 to show Managed wetlands as a separate category, based on DWR's "Crop2016" designation. Updated figure 2-51 to show managed wetlands separately from GDEs.

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236	Samantha Arthur	Audubon	p. 2-130	(See full letter) The GSP indicates that future baseline land use holds constant the land use acres represented for the 2016 baseline and "relies on the historical land use datasets in Table 2-21." However, as represented in Table 2-21, there are zero acres of managed wetlands represented in 2016. Thus, the GSP is projecting the future condition to have zero acres of managed wetlands, which is inaccurate.	Please see the new section on Native vegetation and Managed Wetlands; and response to comment #106. We did add some acres for managed wetlands from 2018 land use data; however we acknowledge that overall managed wetlands need more focus before the next GSP update.
237	Samantha Arthur	Audubon	p. 2-131	(See full letter) This table indicates zero managed wetlands in 2016 and less than 500 acres of managed wetlands in any prior year. This is incorrect as there are managed wetland acres in the Yolo Bypass Wildlife Area and other locations in the subbasin. Furthermore, as commented previously, this 2016 condition is used to represent the future baseline condition. Managed wetland acres may increase above current conditions, as a result of on-going efforts in the Yolo Bypass and the Putah Creek watershed. The information in Appendix C, Table 25 (p 69) indicates the acres in Table 2-21 are all from the subarea named "Central Yolo Subregion" and zero acres of managed wetlands are included in the subarea named "South Yolo MA" (see Appendix C, Table 41, p 101). Figure 4 in Appendix C indicates the South Yolo MA is the area generally covering the Yolo Bypass, including the Yolo Bypass Wildlife Area, so managed wetland acres should be represented in this management area.	Please see the new section on Native vegetation and Managed Wetlands; and response to comment #106. We did add some acres for managed wetlands from 2018 land use data; however we acknowledge that overall managed wetlands need more focus before the next GSP update.
238	Samantha Arthur	Audubon	p. 2-146	(See full letter) The description of the South Yolo Management Area should include discussion of managed wetlands associated with the Yolo Bypass Wildlife Area and other public and private wetland easements. This is a significant and important habitat area for migratory birds, fisheries (e.g. as planned by EcoRestore), and other important native species. Many of the lands within the Yolo Bypass actively apply surface or groundwater to create and maintain important habitat and wildlife food sources.	Added acknowledgement of YBWA and other managed wetlands in the South Yolo Management Area.
239	Samantha Arthur	Audubon	p. 4-26	(See full letter) Audubon appreciates that the YGSA recognizes the significant data gap regarding properly identifying and incorporating managed wetlands into the GSP. Audubon is developing a dataset of the spatial extent of managed wetlands in the Central Valley, which we will share for inclusion in future GSP updates. We recommend current acreage estimates in the Yolo Bypass Wildlife Area be used initially to include a more accurate estimate of managed wetland acres in the GSP for submission to DWR in January 2022.	Included acreage estimate of managed wetlands based on 2016 DWR Crop Mapping in Section 4.11.1, and included Audubon's planned managed wetlands dataset in Section 4.11.2
240	Samantha Arthur	Audubon	p. 4-29	(See full letter) Same comment as provided for Section 4.11.1.	Included acreage estimate of managed wetlands based on 2016 DWR Crop Mapping in Section 4.11.1, and included Audubon's planned managed wetlands dataset in Section 4.11.2
241	Samantha Arthur	Audubon	p. 5-5	(See full letter) Managed wetlands provide opportunities for multi-benefit recharge and should be part of discussions about Managed Aquifer Recharge programs.	Added sentence to Table 5-1 identifying managed wetlands as an existing source of multi-benefit recharge, and a future source of information sharing and recharge projects.
242	Samantha Arthur	Audubon	p. 5-8	(See full letter) Audubon appreciates the inclusion of managed wetlands specifically as a model-improvement need under this designated project.	Thank you for the comment.
243	Samantha Arthur	Audubon	Water Budget (now Ap.p.endix F)	(See full letter) As represented in the comments specific to the GSP, Audubon has several concerns with the water budgets developed and documented within Appendix C. These range from under-represented managed wetland land use acres to questions about how the water needs and water sources for the few acres of managed wetlands included were derived. Appendix C indicates use of crop coefficients and CIMIS data (e.g. Table 6, p 23) to estimate water needs. However, managed wetlands have unique crop coefficients and the water sources – both surface and groundwater – may be unique for given managed wetland areas. These crop coefficients will need refinement for managed wetlands and should be identified as a data gap for further improvement.	Please see the new section on Native vegetation and Managed Wetlands; and response to comment #106. We did add some acres for managed wetlands from 2018 land use data; however we acknowledge that overall managed wetlands need more focus before the next GSP update.
244	Barbara Gemmill-Herren	Capay Valley Regeneration/ Capay Valley Vision	General Comment	(See full letter) Overarching comment: Increase attention given to community input.	Thank you for your comment. We have done our best to be responsive to community input as part of the GSP development process. Unfortunately, in your May 2021 comments we misunderstood your desire for us to include or integrate our responses to your comments into the Yolo Subbasin GSP. Now that the intention is clearer as outlined in your 43-p comment letter, we have done our best to incorporate your suggestions within the plan as we have felt it to be appropriate. We appreciate your participation in this process and the time you have invested in improving the Yolo Subbasin GSP.

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245	Barbara Gemmill-Herren	Capay Valley Regeneration/ Capay Valley Vision	General Comment	(See full letter) Overarching comment: The plan needs for (sic) dispute resolution process	Agreed. Thank you for your comment. As part of the GSP implementation process and Management Area Advisory Committees, we intend to develop a dispute resolution process to resolve conflicts and avoid litigation related to groundwater.
246	Barbara Gemmill-Herren	Capay Valley Regeneration/ Capay Valley Vision	General Comment	(See full letter) Overarching comment: More clarity needed around the responsibility for sustainably managing the Subbasin's groundwater	Thank you for the comment. We recognize this to be a deficiency in the plan and our process to-date. We had hoped to have more work completed at the Management Area-level by the time of submitting the Yolo Subbasin GSP; however, that is not our current reality. We have done our best to develop the first cut of what sustainable management criteria may be appropriate for the Yolo Subbasin. This will be an adaptive management process and we will continually improve the plan as we learn more about what sustainability means for the Subbasin. As part of implementing the plan, we intend to create advisory committees in each of the Management Areas for the local water managers and entities, along with landowners and other stakeholders, to discuss and define the framework for local responsibility. We know you will be a big asset to that process in the Capay Valley.
247	Barbara Gemmill-Herren	Capay Valley Regeneration/ Capay Valley Vision	General Comment	(See full letter) Overarching comment: Changes between the first published drafts and the current final draft in wells included for measuring trends in groundwater level show that more robust analysis should be done for choice and number of monitor wells used to measure minimum thresholds	The old Figure 2-20 the comment refers to is a hydrograph consisting of 113 wells only within the YCFCWCD Service Area, and is available here for reference: https://www.yologroundwater.org/groundwater-levels-in-yolo-county. The figure was not used for the selection of representative wells, or for the determination of sustainable management criteria, and is only intended to represent historical groundwater conditions. Between drafts, the figure was remade using the representative wells presented in Chapter 4 (At the time, there were 64 representative wells; there are now 62 due to lack of future monitoring access). This gives a picture of groundwater levels within the entire Subbasin, rather than only the YCFCWCD Service Area, which covers only Capay and Central Yolo MAs. The Figures should not be considered to represent the same area. The number and selection of wells used in this Figure has changed in order to accommodate an even spatial density throughout the Subbasin. An explanation of the wells used to make this Figure has been added to the text. The criteria and justification for choice of representative wells used to establish SMC's is presented in Chapter 4. The YSGA will continue to monitor all monitoring wells in the Subbasin, not only representative wells. In addition, the groundwater data for the YSGA's entire network is publicly accessible for the non-technical user at sgma.yologroundwater.org - WRID access is not necessary for the average user. The hydrographs of the representative wells have been reviewed for anomalies in the preparation of the final GSP.
248	Barbara Gemmill-Herren	Capay Valley Regeneration/ Capay Valley Vision	General Comment	(See full letter) Overarching comment: Potential future scenarios for groundwater sustainability need to account more robustly for climate change variability	The current analysis uses the climate change scenarios provided by the Department of Water Resources. The analysis includes scenarios covering a range of conditions including the "dry-extreme warming" scenario. Future versions of the model could include other scenarios as they become available. The DWR climate change model uses the best available data and science. DWR's process for creating the climate change datasets was extensive and occurred over many years. DWR will release new climate change models as they deem appropriate when new data and methods necessitate new models. We are hoping to update the YSGA model in the future (5-year updates) with updated land use, additional projects, and climate change data – as available. When the next iteration of climate projections is available, the YSGA will be informed, and can convey that information to interested parties. This is included in the 'Projects and Management Actions' Chapter of our GSP.
249	Barbara Gemmill-Herren	Capay Valley Regeneration/ Capay Valley Vision	General Comment	(See full letter) Overarching comment: Projects are very comprehensive and appreciated – the report could provide more direction for the primary directions for implementation	Thank you for the comment. As part of GSP implementation, the YSGA will guide project proponents and beneficiaries to develop projects in more detail so they are prepared for state and federal grant solicitations.
250	Barbara Gemmill-Herren	Capay Valley Regeneration/ Capay Valley Vision	p. 1-11	(See full letter) for Capay Valley, who then is the "responsible" entity for implementing the plan? How does this entity exercise this responsibility?	The Capay Valley Management Area members are the responsible entities for implementing the GSP in the Capay Valley: Rumsey Water Users Association, Yolo County, Yolo County Farm Bureau, YCFC&WCD, and the YSGA Environmental Representative. Once the GSP is adopted, the framework for creating Management Area Advisory Committees will be developed. These Committees will include members of the public that reside in each Management Area and desire to be part of the process.
251	Barbara Gemmill-Herren	Capay Valley Regeneration/ Capay Valley Vision	Figure 1-3	(See full letter) seems that communities in the Capay Valley are all groundwater dependent, at least for domestic water. Other areas are also, although they may not have a situation similar to Davis, for example, where a centralized water agency supplies groundwater to all homes. The title should be along the lines of "Public Water Service Areas Dependent on Groundwater" so it does not seem out of sync with p 17	The title of Figure 1-3 has been revised to "Groundwater Dependent Public Water Systems".

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252	Barbara Gemmill-Herren	Capay Valley Regeneration/ Capay Valley Vision	p. 1-26	(See full letter) SAGBI –It would be informative to add that the rating depends on current soil conditions, but these can be changed by human action. Suggest: Characteristics used to rate ground surface areas for SAGBI should be able to be improved for recharge by human action.	Added sentence to this effect in Section 2.1.5.
253	Barbara Gemmill-Herren	Capay Valley Regeneration/ Capay Valley Vision	Seciton 1.5	(See full letter) (Comment a) We did not find information on population, economic sectors, dependence on water use and resources in section 1.5 'Description of Plan Area'	While a full economic review is out of the scope of the GSP, Sections 1.5.2.1, Disadvantaged Communities, and Section 1.5.2.2, Tribal Lands were added to give additional context for dependence of water use within the Yolo Subbasin.
254	Barbara Gemmill-Herren	Capay Valley Regeneration/ Capay Valley Vision	Figure 2-1	(See full letter) (Comment b) Physical Subbasin Boundaries – this section is very clear and very much appreciated. It would be good to include this map (adjacent subbasins) and information in the plan; the map sent in the response document is not in the current draft.	Figure 2-1 shows the adjacent Subbasins.
255	Barbara Gemmill-Herren	Capay Valley Regeneration/ Capay Valley Vision	p. 205	(See full letter) (Comment c) Could the text provide definitions of "aquifer" and "aquitard," in addition to why we care about aquifer locations for the GSP? It would help us non-technical people interpret the rest of the section better….We did not find these definitions in the current draft	An aquifer is a body of rock or sediment that is sufficiently porous and permeable to store, transmit, and yield significant quantities of groundwater to wells and springs. An aquitard is a confining bed or formation composed of rock or sediment that retards but does not prevent the flow of water to or from an adjacent aquifer. It does not readily yield water to wells or springs but stores groundwater. These definitions have been added to the text.
256	Barbara Gemmill-Herren	Capay Valley Regeneration/ Capay Valley Vision	p. 2-7	(See full letter) (Comment d) Our conclusion, suggestion was that we think a very shallow well category is needed – this was not taken up.	Added the sentences "In the Capay Valley, more information about the aquifer conditions is needed. There are many wells in this area with total depths of less than 100'. For additional information, please refer to the Plan to Address Data Gaps (Section 4.11.2)."
257	Barbara Gemmill-Herren	Capay Valley Regeneration/ Capay Valley Vision	p. 2-7	(See full letter) (Comment e) Why would the deeper well have higher discharge? And, does it really mean "deeper" or with the greatest change in depth to water (presumably h0-h denotes this. And the real question here for readers, is what is the implication of the intermediate wells having lower specific capacity. This response implies that it is nearly tautological that the intermediate zone wells will have lower specific capacity than the shallow zone wells because they are deeper, so what is the point of even mentioning it.	Thank you for the comment, the previous textual response may not have adequately addressed your question. Specific yield is related to the amount of water that a well can produce. Saturated sands and gravels will produce more water than clays, and thus have higher specific capacities. Section 2.1.1.4 states that in the western alluvial plain, there are areas where the intermediate zone produces less water (per unit volume) than the shallow zone. Please see section 2.1.1.6 for a technical definition of specific yield.
258	Barbara Gemmill-Herren	Capay Valley Regeneration/ Capay Valley Vision	Tabel 2-1	(See full letter) (Comment f) This table seems to imply that the capacity of major aquifers in the subbasin have been identified. Is this correct? But then, there is only information on transmissivity for Capay Valley, not Storage Coefficient. Why is this?...Not sure we totally understand the response, except that the values have been modeled.	The title of Table 2-2 has been revised. The values used by the YSGA model for Capay Valley come from Table 2-2, not Table 2-1 - added this clarification to the text.
259	Barbara Gemmill-Herren	Capay Valley Regeneration/ Capay Valley Vision	p. 2-9	(See full letter) (Comment h) Aquifer Properties is full of interesting information but what specifically does it portend for sustainable groundwater management? A summary at the end of such sections would be very helpful….We did not see this suggestion taken up	A sentence has been added to the beginning of Section 2.1.1.6 explaining how aquifer parameters are used. Specific parameters are explained in bullet points within this section.
260	Barbara Gemmill-Herren	Capay Valley Regeneration/ Capay Valley Vision	Section 2.1.3.4	(See full letter) (Comment i) RE: Introductory paragraph: Interesting explanation, but we don't ask only for ourselves, our suggestion was that it would help the non-technical reader to have this in the report. We didn't see it there.	Added brief explanation of how geology affects the aquifer to the beginning of Section 2.1.5.
261	Barbara Gemmill-Herren	Capay Valley Regeneration/ Capay Valley Vision	p. 2-29	(See full letter) (Comment l) Indeed, Figure 1-9 appear to show pretty good coverage in the Valley proper-just not in the far upland hills, which is logical. Could this not be noted, and reference to the map made here in Chapter 2? Also, It would be informative to add that the rating depends on current soil conditions, but these can be changed by human action.	Added reference to Figure 1-9 in this section, and added sentence to this effect in text. "The index is based on large-scale current soil conditions; local site conditions can be changed by human action. "
262	Barbara Gemmill-Herren	Capay Valley Regeneration/ Capay Valley Vision	Table 2-6	(See full letter) (Comment m) This makes sense, but we don't ask just for ourselves; this explanation would help others to understand. A further comment: There is a strange ordering to this table, From Excellent to good etc. to very poor, and then the last two rows are summaries of groupings of rows above, but this is not clear…they should be set off or placed appropriately to show this. It is important for Capay Valley, as it shows the highest potential for recharge in all the subbasin.	Added a brief explanation of this difference in text, and modified formatting of Table 2-6. "In contrast, the NRCS dataset in Table 2-5 has full coverage of the Capay Valley MA and illustrates a fairly high runoff potential in the area. "

Comment #	Commenter	Representing	GSP Reference (Public Draft)	Remark	YSGA Response
263	Barbara Gemmill-Herren	Capay Valley Regeneration/ Capay Valley Vision	p. 2-30	(See full letter) (Comment n) It seems our question- “Is it correct to conclude from the following quotes that slowing Cache Creek could likely have recharge benefits into the subbasin beyond the Capay Valley Management Area?” would need more analysis, and is likely to be small…nonetheless, Still not certain about if Capay recharge would help the Yolo Subbasin generally recharge to the shallow zone occurs from infiltration along Cache and Putah Creeks. Aquifers and bodies are probably weakly connected to sand bodies surrounding major streams. Additional recharge likely occurs by deep percolation of precipitation and irrigation. The shallow zone is probably unconfined. Etc.	Thank you for the comment. Additional investigation of the hydrogeology of the Capay Valley is a planned project.
264	Barbara Gemmill-Herren	Capay Valley Regeneration/ Capay Valley Vision	p. 2-32	(See full letter) Our question: Water rights – does this apply only to rights for surface water?	Yes, this only refers to surface water.
265	Barbara Gemmill-Herren	Capay Valley Regeneration/ Capay Valley Vision	p. 2-32	(See full letter) Our comment: Data gaps about aquifer connectivity – Excellent. More data on interdependence (and lack of it) of aquifers is very welcome!	Thank you for the comment.
266	Barbara Gemmill-Herren	Capay Valley Regeneration/ Capay Valley Vision	p. 2-34	(See full letter) (Comment r) These tables, giving numbers and depths of groundwater monitoring wells over time in the CASGEM and WRID networks, have been removed from the draft- yet they were among the most interesting to us and the question above still remains- we’d like to see these numbers and understand better what they mean in terms of overall groundwater monitoring networks in place. Perhaps this is found in later chapters, but it would be most useful here.	The previous draft tables summarizing the number and depth of monitoring wells over time were based on erroneous data and dramatically under represented the total number of monitoring wells in the network. For this reason the tables were removed. Unfortunately, budget and timeline did not allow the tables to be re-created. However, the entire monitoring database is available for free on-line, where well depth and chronological extent of any area in the Yolo Subbasin can be explored.
267	Barbara Gemmill-Herren	Capay Valley Regeneration/ Capay Valley Vision	p. 2-42	(See full letter) Our comment: All bullet points say “depth to groundwater increased.” These references need to include information on relative to what. The language in line 31 “Depths to groundwater recovered between 1978 and 1984” shows an effective way to describe what is happening. Possibly this section could say throughout, after depths to groundwater fell….	A sentence has been added to the noted section prior to the bullet points explaining the meaning of depth to water.
268	Barbara Gemmill-Herren	Capay Valley Regeneration/ Capay Valley Vision	Figure 2-15 to 2-19	(See full letter) (Comment s) Not sure this was resolved. Sources of data for tables were given as: Figure 2-15SGMA data viewer Figure 2-16SGMA data viewer Figure 2-17no source given Figure 2-18SGMA data viewer Figure 2-19SGMA data viewer Your explanation above helps to understand data sources and what you mean by SGMA data, but we don’t ask just for ourselves, this would be helpful for all readers. Figures 2-17 and 2-20 gives no source,- yet the data for Figure 2-20 is critical to the whole plan. More general comment (seeking greater understanding) is that we think The data are unlikely to be the same. Does this mean that the wells are all the same, but there are differences among the CASGEM, WRID, etc., in how recent the data for each well is? If this is so, then all the sets of wells should have the same number of wells, but I don’t think they do. Once this is clear, there may be more questions.	A link to the SGMA Data viewer was added to the description of Figures 2-15, 2-16, 2-17, 2-18, and 2-19. The following was added to Section 2.2.1.2: "All of the data utilized to create Figure 2-20 is within the WRID. Most of these measurements are also stored within the SGMA Data Viewer and the Water Data Library." Regarding Figure 2-20, the following text was added to the GSP: The 64 wells shown in Figure 2-20 are the 62 representative wells for groundwater levels that are described in Section 4.4 and two additional wells with long-term data that cannot be monitored in the future (SWN 09N02E35E001M and 11N02W26A001M)."

Comment #	Commenter	Representing	GSP Reference (Public Draft)	Remark	YSGA Response
269	Barbara Gemmill-Herren	Capay Valley Regeneration/ Capay Valley Vision	Figure 2-20	(See full letter) (Comment t) Our original concern with the original Figure 2-20 graph was that we saw it as documenting that "the average groundwater level is on a declining trajectory from 2006 until today if you focus on the peaks in groundwater level. Nothing since 2006 has topped the groundwater level of that year – not even 2019 which was a very wet year that followed a very wet year in 2017. Further, the lows in 2014-15 are lower than the lows in 1991-92, even though more dry and critical years preceded 1991-92 than preceded 2014-15. The NEW figure 2-20 and text does not answer these questions, but instead, with less wells, attenuates these perceived trends. We'd like to know why the data was changed from 113 to 64, where the data comes from, and what were the criteria that changed to reduce the number of wells. It may be normal to throw out outliers, but in general, more data leads to more statistically reliable results…and the whole plan hinges on this data. Note that few if any non-technical people will consult the WRID database, the plan should not require that to understand what is proposed. The explanation provided in the 26 May 2021 response still refers to "more than 100 wells". We appreciate the note about scale, but remain convinced that we need to look at any downward heading trends in our subbasin; Tulare and San Joaquin did not do this	The old figure 2-20 the comment refers to is a hydrograph consisting of 113 wells only within the YCFCWCD Service Area. Between drafts, the figure was remade using the representative wells presented in Chapter 4 (At the time, there were 64 representative wells; there are now 62 due to lack of future monitoring access). This gives a picture of groundwater levels within the entire Subbasin, rather than only the YCFCWCD Service Area, which covers only Capay and Central Yolo MAs. The Figures should not be considered to represent the same area. The number and selection of wells has changed in order to accommodate an even spatial density of representative wells. An explanation of the wells used to make this Figure has been added to the text. In addition, groundwater data is publicly accessible for the non-technical user at sgma.yologroundwater.org - WRID access is not necessary for the average user. Any trends in the data will continue to be evaluated for each well in the annual reports to be published by the YSGA.
270	Barbara Gemmill-Herren	Capay Valley Regeneration/ Capay Valley Vision	p. 2-50	(See full letter) (Comment u) Future years are expected to be variable and possibly more extreme which will require vigilant attention to hydrologic conditions and a flexible management plan for surface water and groundwater. We noted that this observation is relevant in light of our later comments on climate change, and how climate change is addressed in the plan, and scenarios...Not sure this has been addressed	Figure 2-20 displays the average historical depth to water in the 62 representative wells and two additional wells. This graph does not incorporate future scenarios into it. The bars on the back of the graph do show the historic water year types. Section 2.3 explains the consideration of various climate scenarios within the plan, representing the best available science from DWR. We agree that flexible management and consideration of climate change are vital for ensuring sustainability. See response to Comment 248.
271	Barbara Gemmill-Herren	Capay Valley Regeneration/ Capay Valley Vision	Section 2.2.1.3	(See full letter) Our comment: The value of this information is not clear. Intuitively, vertical gradients should be significant to a GSP, but the hydrographs and text do not give a good sense of what this actually tells us about groundwater sustainability.	Text states, " Groundwater pumping can alter these natural gradients seasonally and over time as groundwater is withdrawn from the Subbasin."
272	Barbara Gemmill-Herren	Capay Valley Regeneration/ Capay Valley Vision	Figure 2-23	(See full letter) (Comment w) Thank you for the explanation; we feel this is a trend that merits a close watch, and the explanation would be helpful within the plan, not just to us.	Added the total storage estimate and % loss estimates, as well as a caveat about spatial scale and model uncertainty, to the text in Section 2.2.2.1.
273	Barbara Gemmill-Herren	Capay Valley Regeneration/ Capay Valley Vision	p. 2-56	(See full letter) (Comment x) We did not see that this suggestion was taken up; we understand the YSGA is not going to undertake this monitoring itself, but will it not report on as done by different agencies, and make trends available to the public in one place?	A table was added to Section 2.2.4 summarizing the existing water quality databases. In addition, Chapter 4 provides additional detail on how the data will be reported in the annual reports submitted by the YSGA.
274	Barbara Gemmill-Herren	Capay Valley Regeneration/ Capay Valley Vision	p. 2-56	(See full letter) (Comment y) Typo corrected; not sure the questions have been answered (though sentence on domestic wells was added). The explanation in the response would be helpful in the draft plan itself.	The Water Quality section of this GSP has been revised based on comments received, including this one.
275	Barbara Gemmill-Herren	Capay Valley Regeneration/ Capay Valley Vision	p. 2-65	(See full letter) (Comment bb) Should the fact that many rural residents use private wells since no water system is available be mentioned under Water Quality Evaluation as well as the steps were taken to address private wells – or the rationale for not addressing them? Water quality in such wells, used for domestic purposes, is an important issue.	Added text acknowledging domestic wells in this section. Water quality in domestic wells is included as a data gap in Section 4.

Comment #	Commenter	Representing	GSP Reference (Public Draft)	Remark	YSGA Response
276	Barbara Gemmill-Herren	Capay Valley Regeneration/ Capay Valley Vision	p. 2-65	(See full letter) An additional sentence would be helpful after “To better represent the groundwater quality of the principal aquifers, community water system water quality was evaluated” explaining why the community water system quality best represents the groundwater quality of principle aquifers. The rationale that the public water systems wells are deeper so give a more representative picture seems confusing given information later that in general, the deeper aquifers show lower concentrations of contaminants.(Comment cc) Suggestion was not taken up, question was not answered.	The paragraph has been rephrased and supplemented to include domestic wells. Community water systems were used in the evaluation because they have the most reliable data sets.
277	Barbara Gemmill-Herren	Capay Valley Regeneration/ Capay Valley Vision	p. 2-62 to 2-91	(See full letter) (Comment dd) Data: Much of the data seemed quite old, including the 2004 data. Given that contamination would seemingly be in constant flux, conditions could be quite different today than even from 2014 or 2016, to the degree that 2004 data would be irrelevant except possibly to display trends. Then because of the statement on P87 that “At the time of this evaluation, data in the WRID after 2004 were not easily accessible” I thought maybe there was not much data after the 2004 study. However, P94 states “Water quality data used was collected between 2010 and 2020.” Maybe these statements apply to different constituents, but then it would help to make this clearer in the text. Some of the maps (e.g.: 2-31) are labeled “2000-2016” leaving open the question of when the data really was collected. Finally, though, we had the impression from your discussion in a Working Group Meeting that an entity – maybe the Northern California Water Association – had provided fairly up to the minute data on contaminants. Did we misunderstand this? (Comment dd) Not changed from before as far as we can tell…	The water quality section has been revised for clarity. An updated review of water quality data will be provided in the annual reports and 5-year updates to the GSP.
278	Barbara Gemmill-Herren	Capay Valley Regeneration/ Capay Valley Vision	p. 2-85	(See full letter) Section 2.2.4.5 was very helpful at understanding what you concluded about water quality in the Subbasin. It would be even better if placed at the beginning of the quality evaluation section as it would provide a context for what readers were reading and clues as to assessing the information in the rest of the section. (Comment ee) Not changed from before as far as we can tell…	A sentence was added to the beginning of Section 2.2.4 stating: "A summary of groundwater quality findings for community water systems is included in Section 2.2.4.5." Thank you for the comment, we believe that whole summary is better suited at the end of this section.
279	Barbara Gemmill-Herren	Capay Valley Regeneration/ Capay Valley Vision	p. 2-69	(See full letter) (Comment gg) Not changed from before as far as we can tell… As mentioned in the comments when this was a draft chapter this section is titled “Salinity – Public Water Systems when it is primarily about agricultural water. Further comment here on final draft: p.2-69:11 “Extreme climatic conditions have the potential to introduce brackish waters into the subbasin again…, depending on future sea level rise and mitigation. However, further chemical analysis must be performed to robustly identify potential seawater intrusion.” P2-54 should reference this information also. As it is, it gives the impression that sea intrusion is no risk at all. And, will this testing and analysis be done?	The section is now titled "Salinity - Basinwide conditions". The following sentence was added to 2.2.1.8.1: "Currently, the Basin has some areas with elevated salinity as indicated by either Electrical Conductivity (EC) or Total Dissolved Solids (TDS). Salinity in deeper groundwater zones is generally lower than in the shallow and intermediate zone. " More details about the conditions for seawater intrusion have been added to the Seawater Intrusion section and the referenced paragraph.

Comment #	Commenter	Representing	GSP Reference (Public Draft)	Remark	YSGA Response
280	Barbara Gemmill-Herren	Capay Valley Regeneration/ Capay Valley Vision	p. 2-69	(See full letter) Land Subsidence: this section is definitely the most technical of all the sections. My sense was that organizing it by data source put an unrealistic expectation on the non-technical reader to be able to evaluate the validity of each of the methods and keep the many various results in one's head to try to come to some conclusion about the severity of subsidence in the Subbasin. I think a summary paragraph after the intro paragraph would help if it said something along the lines of: This data suggests that subsidence is not generally a problem in the Subbasin. The different methodologies show a range of subsidence in the Valley between X and Y. The difference between the top and bottom of the range seems likely to have arisen because in the differences in methodologies, however even the top of the range does not indicate a subsidence rate likely to be unsustainable. Nonetheless, there are X areas where subsidence is of concern: A, B and C. [You could then possibly use a table to show the data of concern for each site]. We must continue to collect data on these areas. Etc.… whatever you folks think. Such a paragraph would provide a guide for the reader to help sort through the rest of section and decide if the rest supports the conclusion.(Comment hh) Suggestion was not taken up.	A brief summary paragraph has been added to this section.
281	Barbara Gemmill-Herren	Capay Valley Regeneration/ Capay Valley Vision	p. 2-127	(See full letter) (Comment ii) Thank you for this explanation; since our projects will focus on root zone water, it would be good to explain this within the plan. If we are to work to increase the soil sponge we will need to figure out how changes can be reflected in the model.	Added clarification within text that the root zone storage is modeled in the land surface budget, and inflow from the root zone is modeled as deep percolation in the groundwater budget
282	Barbara Gemmill-Herren	Capay Valley Regeneration/ Capay Valley Vision	p. 2-127	(See full letter) (Comment kk) Indeed, we think it is absolutely critical to include future land use trends in the model	Thank you for the comment; future land use trends will be included in the 5-year update of the model.
283	Barbara Gemmill-Herren	Capay Valley Regeneration/ Capay Valley Vision	p. 2-130	(See full letter) (Comment kk) The report needs to present justification for choosing to use higher cumulative and average precipitation for all the scenarios (except for the future baseline which is based on the same rainfall as the historical data. Readers need to know what climate change models are you used and why you selected those specific ones as well as which models you considered and rejected? Why is there not one scenario with lower cumulative or average precipitation, even for the so-called "dry extreme weather" scenario. For a genuine sensitivity analysis to assess risk of reaching unsustainable conditions, shouldn't the plan include least one scenario with drier weather than historical (and also increasing demands from tree crops?)	Please see Section 2.1.4 of the Model Documentation appendix, which describes the source of the climate projections provided by DWR, and its processing, in detail. If the climate projections are updated, we may be able to get drier projections to run for the next GSP update. Also please note Table 9 of the Water Budget appendix. Although these climate projections are wetter, reference ET is higher because of warming. The differences in reference ET are larger than the differences in precipitation compared to the historical climate. The climate change models that the YSGA model uses come from DWR. The DWR climate change model uses the best available data and science. Please refer to the DWR Climate Change Resource Guide. DWR's process for creating the climate change datasets was extensive and occurred over many years. DWR will release new climate change models as they deem appropriate when new data and methods necessitate new models. We are hoping to update the YSGA model in the future (5-year updates) with updated land use, additional projects, and climate change data – as available. When the next iteration of climate projections is available, the YSGA will be informed, and can convey that information to interested parties. This is included in the 'Projects and Management Actions' Chapter of our GSP.
284	Barbara Gemmill-Herren	Capay Valley Regeneration/ Capay Valley Vision	p. 2-131	(See full letter) (Comment mm) Some explanation provided in section 2.2.9, that "An important feature of land use changes in the Subbasin is an increasing acreage of perennials crops (deciduous, subtropical, and vines), which have partly replaced field crops, and brought previously uncultivated area into production in some regions." And the response above is helpful, it would be good to have this mentioned in the plan. (but second question not yet answered)	Added clarification to text that individual crops within each land use category are modeled, and pointed to Model Documentation Appendix for more information.
285	Barbara Gemmill-Herren	Capay Valley Regeneration/ Capay Valley Vision	p. 2-130	(See full letter) (Comment nn) Not sure; is it not still true that higher precipitation is predicted for all future scenarios? The confusion could be reduced by the adding a sentence (in italics) as follows: …Subbasin is higher in all climate projections, compared to that in the 'Historical' scenario." The Future Baseline is not a climate projection in that it keeps climate the same and varies only …..	Added paragraph to Section 2.2.8 Model Overview explaining what is and is not a climate change scenario.

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286	Barbara Gemmill-Herren	Capay Valley Regeneration/ Capay Valley Vision	p. 2-134	(See full letter) (Comment pp) Thank you for this; it would be good to indicate this definition/reference in the chapter	Added this definition to the text in Section 2.2.8 Model Overview.
287	Barbara Gemmill-Herren	Capay Valley Regeneration/ Capay Valley Vision	p. 2-134	(See full letter) (Comment qq) Thank you for this explanation; it would be helpful to include this in the current plan.	This explanation has been added to the text in Section 2.3.4 Land Surface Water Budget and 2.3.5 Groundwater Budget
288	Barbara Gemmill-Herren	Capay Valley Regeneration/ Capay Valley Vision	p. 2-138	(See full letter) (Comment rr)This key claim in the discussion of groundwater storage "The groundwater storage trace implies that the climate signal has dominated over this historical period at the Basin-wide level" really calls out that the plan needs much more discussion of and justification for the climate change assumed in the plan. The plan demonstrates at length that the recharge potential for the Subbasin is uncompromised – that declines in groundwater follow directly from droughts and that groundwater returns to high levels when rain is good. Thus, it is not recharge potential, but climate that determines groundwater levels. Since this is so, great care needs to go into selecting the climate change scenarios used, as well as realistically assessing the risks that climate change poses for the Subbasin.	Please see response to comment 248
289	Barbara Gemmill-Herren	Capay Valley Regeneration/ Capay Valley Vision	p. 2-123	(See full letter) (Comment ss) This explanation would be helpful within the plan.	Explanation of the climate scenarios is available in Section 2.2.8 Model Overview. Added text to plan, "These decadal changes represent the historical scenario; the groundwater storage predicted in future scenarios is based on future climate signals and is presented in Figure 2-60. "
290	Barbara Gemmill-Herren	Capay Valley Regeneration/ Capay Valley Vision	p. 2-138	(See full letter) (Comment tt) Now Figures 2-59-60 The axis has not been changed, and this explanation would be very helpful in the plan.	Figure 2-58 has been amended to show future scenarios in the future. An additional paragraph and table in Section 2.3.1 were inserted to explain what the inputs to the model are. The figure and table the comment refers to are both model outputs.
291	Barbara Gemmill-Herren	Capay Valley Regeneration/ Capay Valley Vision	p. 2-139	(See full letter) (Comment uu) This is very helpful- but we did not ask for ourselves alone, this would be good to explain in the plan. Also what is TAF? It does not seem to be defined…we can guess total acre feet, but this should be clear.	Additional explanation and justification was added to Section 2.2.13. TAF stands for thousand acre-feet. We made sure this is clear in the first appearance of the acronym as well as the sustainable yield section.
291	Barbara Gemmill-Herren	Capay Valley Regeneration/ Capay Valley Vision	General Comment	(See full letter) We have copied below the relevant definitions and criteria, as the apply to the Capay Valley Management Area. We understand that the basin-wide "undesirable results" relate to the subbasin as a whole. But the measurable objective, and the minimum thresholds are specific to each management area. We have had questions previously about the monitoring wells chosen for Capay Valley and as we note in the overarching comment 4, there is a great sensitivity in the results for measurable objectives and minimum thresholds according to the number and selection of wells included in the plan. We need to be convinced that these provide representative average picture in our management area; we ask that analysis is undertaken, and shared with the public show that the number and wells chosen have the best likelihood of revealing the true mean for groundwater levels each year for the Subbasin and the management areas.	Thank you for your comment. In reviewing the data, we believe the wells selected as representative wells in the Capay Valley share the same characteristics of all the wells in the Capay Valley, which includes total depth and screened intervals. The spatial coverage of representative wells in the Capay Valley Management Area covers the entire extent of the Valley and provides adequate coverage. Additionally, we have revised the text in the Capay Valley Management Area Section 2.4.3 to acknowledge the shallow wells in the area. Well construction information was also included in the well impact analysis - See Appendix I. We look forward to scheduling a meeting with you to discuss this in more detail.
293	Sara O'Connell	Individual	General Comment	Overall, I ask that the plan better address the need for accountability for our groundwater usage and community accountability. In particular, I recommend pausing permits on new extraction for development on historically non-irrigated lands until there is more complete analysis on the Dunnigan Hills and other "special concern" areas. I also support improving community outreach for increased awareness on groundwater sustainability across all community members -- in rural and more developed areas.	Thank you for your comment. Once the Final GSP is submitted to the DWR, the YGA will create the framework and approach for implementing the plan. A big part of this process, will be the development of Advisory Committees for Management Areas, which will allow for local entities and stakeholders to consider the appropriate implementation strategy for sustainable groundwater management within the Management Area. During the formation of the Advisory Committees, we expect a more thorough consideration and development of local accountability practices. Local projects will be considered for implementation, and the Advisory Committees will think through strategies that may be necessary for dispute resolution. We recognize the areas of special concern may need their own subcommittees to these advisory committees and we will work with the landowners and stakeholders in those areas of special concern to ensure their a focused effort in avoiding localized overdraft and ensuring long-term sustainability.

Comment #	Commenter	Representing	GSP Reference (Public Draft)	Remark	YSGA Response
294	Lia Kollen	Yolo DEH	Table 2-11	•The GSP proposes to set an undesirable effect for total dissolved solids. A drinking water standard is given (Table 2-11) but this is considered a recommendation for aesthetic affects rather than health effects. Perhaps a footnote could be provided to identify that this standard isn't equivalent to those that are regulated for public health, such as nitrate and arsenic.	A footnote was added to this effect
295	Lia Kollen	Yolo DEH	Section 1.5.3.3, 1.5.3.4	"California Well Standards" can be more specifically defined as California Department of Water Resource's Bulletins 74-81 and 74-90 (Section 1.5.3.3, 1.5.3.4).	A parenthetical was added further defining this term.
296	Lia Kollen	Yolo DEH	Figure 1-8	A quantitative rather than qualitative map can be produced for current municipal wells (Sec 1.5.2, Fig. 1.8). The well locations for municipal wells are available through SWRCB's Geotracker map. Additionally, YCEH has recorded and can provide GPS coordinates for all wells utilized by the small public water systems that we permit (water systems with less than 200 service connections).	Thank you for the comment, we will coordinate with YCEH to update this map in a future version of the GSP.
297	Lia Kollen	Yolo DEH	Figure 1-4	In Fig. 1-4, one of the colors in the index is not labeled	Fixed
298	Lia Kollen	Yolo DEH	Section 1.2.3.4	•The "Water Well Requirements for Building Project" handout would not be the best reference for Sec. 1.5.3.4(H), as the main purpose of this handout is to describe our drinking water source policy to building permittees. It would be better to reference the California Department of Water Resource's Bulletin 74-81 and 74-90 for our requirements for well construction.	This reference was changed accordingly
299	Lia Kollen	Yolo DEH	Section 2.2.3.4	•The water quality data maps do not include the Clarksburg management area. Arsenic in this area may be an important data gap (Sec 2.2.3.4. & Fig 2.35). We have seen elevated arsenic levels in wells in the Clarksburg management area from required public water system water sampling.	Thank you for the comment. As the plan states, water quality data for constituents other than nitrate and TDS will be updated in annual report submissions for the entire Subbasin. We will continue coordination with YDEH on arsenic issues in this area and other water quality concerns throughout the Subbasin.
300	Lia Kollen	Yolo DEH	Section 2.2.4.5.2	•In Section 2.2.4.5.2 it is noted that "nitrate is not considered a concern for community water systems, which most likely have deeper wells and annular seals". I would not consider this accurate as stated, as there are community water systems in Yolo County that have to contend with elevated nitrate levels in their wells (e.g. North Davis Meadows).	The sentence has been rephrased in response to this comment.

Letter to the Yolo Subbasin Groundwater Agency (YSGA), with comments about the 2021, Draft Groundwater Sustainability Plan (GSP)[1], for the Sustainable Groundwater Management Act (SGMA)

Comments Submitted to: YSGA via email at: info@yolosga.org
From: Ricardo Amon ricardoamon@sbcglobal.net and Judy Corbett, judycorbett@sbcglobal.net

October 27, 2021

Dear Colleagues, we appreciate your efforts creating the YSGA and delivering the draft GSP report. We would also like to thank you for conducting webinars to inform the public. These webinars are an important way for people to express their worry about groundwater depletion in rural household water wells. Rural residents are facing competition to their aquifers mostly from year-round pumping, from deeper wells used to irrigate nut orchards. It was uncomfortable to hear people struggle, having to use savings to drill deeper wells, and then spend more on power to pump from deeper depths.

Context:

Residents in Yolo County have seen large growth in almond and pistachio orchards populating the agricultural landscape. Land that was previously planted with tomatoes, in a 3-year rotation with corn and winter wheat, is now developed to grow nut trees; drilling deeper wells with bigger pumps to generate the power to extract, filter, and pressurize water for irrigation. These pumps are operated nearly all summer, in order to meet crop evapotranspiration requirements.

We have collected data regarding agricultural land use changes, from annual rotational systems to perennial plantation systems. We have conducted interviews with stakeholders about increasing agricultural land prices, agricultural land speculation and landowners advocating to lease their land, preferably, for nut tree orchards. We know that Wall Street investment houses identified almond production as an attractive investment option, creating LLC's to develop and manage nut orchards, many hiring agricultural management companies. Other speculators have developed nut orchards to "flip" them within four to five years.

This behavior has led to a significant increase in almond acreage planted between 2010 to 2020, as shown in table 1.

Table 1. Yolo County Almond Bering and non-Bearing Acreage 2010 - 2020[2]

Year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Acres	14,551	16,609	17,741	23,166	27,832	30,211	33,555	40,400	45,100	43,600	48,600
% Change		1.14	1.07	1.31	1.20	1.09	1.11	1.20	1.12	0.97	1.11

Between 2010 and 2020, there has been a 334% growth rate in almond acreage. Figure 1, provides the results of an eight-year forecast, showing a potential increase in almond acreage to almost 80,000 acres, by 2028, an additional 165% increase.

[1] Yolo Groundwater Sustainability Plan - Yolo Subbasin Groundwater Agency
[2] Yolo County Agricultural Commissioner, Crop Statistics.

In 2020, there were almost 350,000 acres of agricultural land planted in Yolo County, including 30,700 acres in tomatoes and 146,970 acres with field crops. This is the type of land that has been previously converted to nut orchards, providing available land to continue to grow the almond crop in Yolo county.

The question remains if there is enough water to feed this crop and maintain aquifer sustainability?

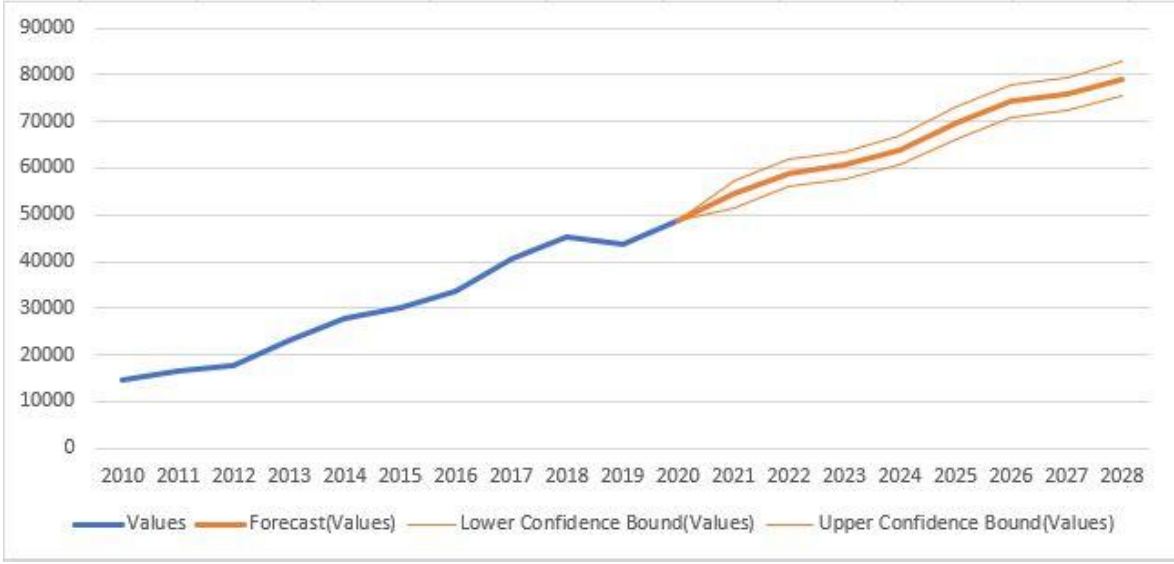

Figure 1. Almond Acreage in Yolo County 2010-2020

Back in 2018, almonds displaced tomatoes as the highest revenue crop in Yolo County, and "almonds are likely to hold that top spot for the foreseeable future," according to Agricultural Commissioner John Young, as reported by *The Davis Enterprise* in 2019[3]. Almond production is forging a path to higher economic returns for investors and higher reassessed values for county tax revenues. These revenues will not materialize until after the almond orchards produce a mature crop, within five years from planting. Before that stage of growth, almond industry investors will either decide to invest in Yolo-based almond processing and storage infrastructure, or truck almonds and hulls to out-of-county processing facilities, watching the almond harvest earn processing revenues and taxes in other counties.

In 2019*, The Davis Enterprise* also mentions that members of the Yolo Board of Supervisors spoke about their conversations with almond industry processors, who expressed that "there are challenges facing processors in Yolo County" because "the local air quality control district won't allow them to burn waste products at their plants." Adding that "Colusa County will let them hull it up there and they can burn it up there, so they said", ending their comments with a warning that "We're not going to build any more plants in Yolo County unless you guys work with us." [4] The Yolo County Board of Supervisors' dilemma to attract new almond processing facilities will be to create favorable economic conditions without compromising environmental air quality standards, to build the facilities that could be processing 50 to 80 thousand acres of bearing almonds, within the next five to ten years.

Unfortunately, long-term air quality has already being compromised by the dust particulates that will be generated during almond harvesting, and the drift from dormant tree spraying practices. There are

[3] Davis Enterprise July 25, 2019. 636999922327970000 (yolocounty.org)
[4] Davis Enterprise July 25, 2019. 636999922327970000 (yolocounty.org)

many stories about San Joaquin Valley communities negatively impacted by almond harvest dust particulate emissions. Measurements by the SJV Air District have shown that "average levels of PM10 increased during August and September, with the Fall dust problem getting worse, and increased almond acreage has to be most of the cause."[5]

The other topic discussed at the Yolo County Board of Supervisors' meeting was water. The Agricultural Commissioner identified the expansion of perennial crops and the expected increase in water demand, as a "water system that is virtually unchanged, other than adding all the wells and drip lines." Mr. Young provided a roadmap of understanding by recognizing that, "there's a change in the way we use water. We're not in a place where we have a problem today, but if the trend continues without us recognizing potential problems, I think we get in trouble." His recommendation was for "the county to study all the acreage in use, how it is irrigated, how much water is coming in and how much is going out, so we really have an idea of the sustainability." [6]

Some Recommendations:

We support Mr. Young's recommendation. A research study could be designed to understand potential consequences to groundwater aquifers, derived from changes to agricultural land use patterns. We recognize that the GSP speaks of the fact that this subject was not addressed in this draft, but it has been identified as a future to-do project. We recommend this study to be a priority.

The study should also conduct an aquifer-specific data collection and analysis effort, to understand the environmental impact from nut crops already planted in the Dunnigan Hills. Because nuts are a year-round water consumer, these orchards are 100% dependent on groundwater to grow almond and pistachio trees. If there is any preliminary indication of negative consequences to the aquifer, there could be a reduction of new well permits, or a moratorium could be established to limit unsustainable groundwater demand.

These almond and pistachio orchards are economically possible because of current market prices paid (per pound produced), that cover water pumping costs to generate a profit. Our concerns about the Yolo Subbasin, are founded on the deep impact the agricultural industry has had on groundwater aquifers in the San Joaquin Valley (SJV), with massive overdrafts and land subsidence consequences.

Some of these consequences are derived from the significant increase in nut tree plantations. A 2019, UC Davis research paper points out, "the Central Valley has undergone a shift to perennial (tree and vine) crops in recent decades, which has increased water demand amid a series of severe droughts and emerging regulations on groundwater pumping." The study is specific to "the expansion of perennial crops in the Tulare Lake Basin," where "perennial crop acreage has nearly tripled over this period, and currently accounts for roughly 60% of planted area and 80% of annual revenue." [7]

A concerning conclusion from this study recognizes that "these trends show little relationship with water availability and have been driven primarily by market demand."[8] Similar to what is happening in the Dunnigan Hills, a rainfed land area used for grazing and winter wheat, with limited access to

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[5] Dust and Almonds: Clearing the Air - November 2014 - Community Alliance (fresnoalliance.com)

[6] Davis Enterprise July 25, 2019. 636999922327970000 (yolocounty.org)

[7] Water shortage risks from perennial crop expansion in California's Central Valley
Natalie K Mall and Jonathan D Herman, Published 15 October 2019 • © 2019 The Author(s). Published by IOP

[8] Et al, Mall and Herman, 2019.

developed surface water. Other accounts relate that there are SJV farming interests acquiring marginal lands within targeted groundwater basins and drilling wells to establish groundwater pumping records for their "historical use"[9], hoping to transfer pumping rights to better land when their GSP's start to enforce conservation practices.

Another result from the UC Davis study, suggests "that under a range of plausible future regulations on groundwater pumping, ranging from 10% to 50% of the water supplies may fail to consistently meet demands, increasing losses by up to 30% of annual revenues.[10] The YSGA could learn more about these results and be aware that the "datasets developed" by the UC Davis work can support "the development of dynamic models under uncertain climate and regulatory changes." These models may help our region "understand the combined impacts of water supply shortages and intensifying irrigation demand."[11] Hopefully, this will help us avoid repeating mistakes so many SJV communities now regret.

Another concern is that although new tax revenues from the nut industry are always welcomed, they create a conflict of interest with local elected officials entrusted with the stewardship of natural resources. SJV residents may wish they had been given more say in the management of their land, water, and air resources.

The next recommendation for the GSP, is to consider the magnitude of the nut industry's-driven economic development currently emerging in the Yolo Subbasin. The main attraction is the opportunity to tap shallow groundwater aquifers. There are new LLC's representing farmer interests and investors buying land to establish their future almond and pistachio orchards in the Northern Sacramento Valley region. With land available, more surface water and shallower groundwater tables, the migration of nut tree plantations from South to North is underway; and with it, the hardening of groundwater demand for the Yolo Subbasin.

Another recommendation is for the GSP to reflect a more concerning reality about the future of the basin, rather than the one offered based on past performance. There is nothing static in the new landscape to assume that past performance, based on annual crop rotations, will behave the same way under a year-round water demand nut plantation production system.

There is a desire to say that "Yolo is in good shape". A Yolo County tomato farmer recently spoke to the Arkansas Online report, to say "In Yolo County, we have relatively stable groundwater and replenishment of the aquifer. It's like having money in the bank, so we're pumping water out of the ground like a withdrawal."[12]

The bank account, however, was built using the annual crop rotational farming system, offering the flexibility of fallowing row crop land under water scarcity conditions, mostly because the price to be paid for the commodity would not cover the groundwater pumping costs. Under the nut tree plantation

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[9] Mark Arax, The Dreamt Land, 2019.

[10] Water shortage risks from perennial crop expansion in California's Central Valley
Natalie K Mall and Jonathan D Herman, Published 15 October 2019 • © 2019 The Author(s). Published by IOP Publishing Ltd Environmental Research Letters, Volume 14, Number 10

[11] Water shortage risks from perennial crop expansion in California's Central Valley
Natalie K Mall and Jonathan D Herman, Published 15 October 2019 • © 2019 The Author(s). Published by IOP

[12] Tomato growers in pinch (arkansasonline.com)

system, the costs of groundwater pumping are covered with the prices paid per pound, encouraging farmers and management companies to continuously pump water to maximize production. This change in water use dynamics diminishes the flexibility to manage groundwater resources under water scarcity conditions, hardening the demand for water to ensure the sustainability of nut plantations.

Remarks:

There is a long-term responsibility to ensure the health of the aquifers. The growth and development of agricultural interests cannot be ahead of community interests, concerning natural resources and the health of the environment. Rural residents should not be spending money drilling deeper wells in order to catch up with lower water tables. The impact on our rural residents is a new reality. Even during drought conditions, the overdraft is a result of year-round pumping from nut orchards. The groundwater bank is not working for shallow residential wells, as deeper water extraction goes unchecked.

Concerns:

It is very concerning to witness the negative impact that industrial agriculture is having on the land, water, and people in the San Joaquin Valley. We want to avoid repeating these same mistakes, driven by profits and tax collections. We should read Mark Arax, as he has documented the politics of special interests to gain wealth from exploiting California's natural resources. He provides historical context to older-day California's agricultural wheat barons and cotton kings, and for the contemporary almond aristocrats.

It is heartbreaking knowing that water contamination is now added to the list of poor living conditions for farm workers and rural residents. Exposed to contaminated water, another burden "where families now can't cook, clean and shower with their well water, if there is access to well water."[13] Closer to home, *The Sacramento Bee's* recent drought report, details the extent to which rural residents are losing their well water sources, creating emergency-like conditions to procure clean water for people.[14] Since August 2021, Glenn County has imposed a six-month moratorium in the permitting of new agricultural wells.[15] The SJV experience is moving North, with the almond migration and the resulting hardening of demand, adding pressure on groundwater resources under drought conditions.

Requests for Information and Final Suggestions:

Please provide information about the regulatory instruments that are available for YSGA, to enforce land use policies that may be detrimental to the sustainability of the aquifers? Does the YSGA have the authority to impose a moratorium in new well permits for the Dunnigan Hills?

We suggest documenting the situation of people dealing with overdraft issues, providing financial and technical support if possible. Please study the broader social and environmental implications of current agricultural landscape changes. Please become a leader for the community, understanding that water is more than a commodity.

[13] Mark Arax, The Dreamt Land, 2019.
[14] Dry Wells, Drastic cutbacks. For Many Californians, drought hardships have already arrived. Sacramento Bee, October 3, 2021.
[15] Glenn County passes six-month moratorium on new well permits - Water Education Foundation

Audubon | CALIFORNIA

October 27, 2021

Yolo Subbasin Groundwater Agency
34274 CA-16
Woodland, CA 95695

Sent via email to: info@yolosga.org.

Re: Comments on the Draft Groundwater Sustainability Plan for the Yolo Subbasin Groundwater Agency

To Yolo Subbasin Groundwater Agency,

Audubon California appreciates the opportunity to provide public comment on the draft Groundwater Sustainability Plan (GSP) for the Yolo Subbasin Groundwater Agency (YSGA). Audubon California is a statewide nonprofit organization with a mission to protect birds and the places they need. Our organization has a long history of solutions-focused work in the Central Valley in collaboration with state and federal agencies, water districts, non-profits, and landowners. Audubon is reviewing draft GSPs as a stakeholder for the environment with a particular focus on managed wetlands. We are commenting on draft GSPs to provide technical assistance to Groundwater Sustainability Agencies (GSAs) to improve their GSPs prior to the deadline to submit final GSPs to the Department of Water Resources in January 2022. Audubon would also like to identify areas of opportunity to partner with landowners and GSAs to provide groundwater and wildlife habitat benefits in the implementation of the Sustainable Groundwater Management Act (SGMA).

Over 90 percent of historic wetlands in the Central Valley have been replaced with agriculture or urban development. Disconnected from natural water sources as a consequence of surface water diversions and groundwater over-pumping, wetland landowners must utilize surface water deliveries or pump groundwater to provide flooded habitat. But managed wetlands provide outsized public trust benefits for their minor water use.

The remaining wetlands in the Central Valley are a critical component of the Pacific Flyway, supporting millions of migratory waterfowl, hundreds of thousands of shorebirds, and state listed species like the Tricolored Blackbird. Central Valley managed wetlands are part of California's commitment to national and international Pacific Flyway agreements and provide significant public trust benefits, including habitat for migratory birds, recharge of overdrafted aquifers, carbon sequestration, and recreation opportunities for birders, hunters, and disadvantaged communities.

Managed wetlands require specific consideration in GSPs under SGMA statute and regulations, as detailed below. GSAs are required to identify managed wetlands as beneficial users of groundwater and as land uses and property interests and should recognize this land use consistent with other active users of surface and groundwater. The overall basin water budget must include managed wetlands as a specific water use sector and the GSP is required to consider the effects of the GSP on managed wetlands as a beneficial user or land use.

When GSPs fail to adequately consider the water needs and recharge contributions of managed wetlands, projects and management actions may ignore managed wetlands, their need for protection as public trust resources, and their potential to be part of sustainability solutions. If future actions include groundwater allocations, managed wetlands face the potential of being excluded if not recognized in the GSP, risking further loss in critical wetland acreage.

SGMA Requirements Related to Managed Wetlands

A primary requirement for GSAs during GSP development is the consideration of the interests of "all beneficial uses and users of groundwater" [Water Code Section 10723.2], which includes "[e]nvironmental users of groundwater" [Water Code Section 10723.2(e)].

Articulated into the SGMA regulations, the concept of beneficial uses and users of groundwater is first represented in CCR, Title 23, Section 354.10. Notice and Communication, which directs the GSP to "…include a summary of information relating to notification and communication by the Agency with other agencies and interested parties including the following: (a) A description of the beneficial uses and users of groundwater in the basin, including the land uses and property interests potentially affected by the use of groundwater in the basin, the types of parties representing those interests, and the nature of consultation with those parties." [emphasis added].

Furthermore, the SGMA regulations provide a definition that explicitly includes managed wetlands as a beneficial user where:

> "'Water use sector' refers to categories of water demand based on the general land uses to which the water is applied, including urban, industrial, agricultural, managed wetlands, managed recharge, and native vegetation." CCR, Title 23, Section 351(al) [emphasis added].

GSAs are then directed to include all water user sectors in the description of the GSP area and to quantify groundwater use by these sectors in the historic, current and projected budgets [emphasis added]:

> CCR §354.8. Description of Plan Area: Each Plan shall include a description of the geographic areas covered, including the following information:
>
> (a) One or more maps of the basin that depict the following, as applicable:
>
> (4) Existing land use designations and the identification of water use sector and water source type.
>
> and,
>
> CCR §354.18. Water Budget:
>
> (b) The water budget shall quantify the following, either through direct measurements or estimates based on data:
>
> (3) Outflows from the groundwater system by water use sector, including evapotranspiration, groundwater extraction, groundwater discharge to surface water sources, and subsurface groundwater outflow.

Given these explicit requirements, GSAs are required to identify and map managed wetlands and include their water needs in water budgets in the GSP.

Furthermore, each GSP is also required to describe "undesirable results" where such included:

> "Potential effects on the beneficial uses and users of groundwater, on land uses and property interests, and other potential effects that may occur or are occurring from undesirable results." CCR, Title 23, Section 354.26(b)(3) [emphasis added]

Comment Overview

GSAs are required to consider public trust resources in their GSPs, including managed wetlands. Managed wetlands are beneficial users that require the application of surface or groundwater to provide wildlife habitat. The Yolo GSP does not adequately identify managed wetlands in land use maps and as a distinct water sector in the basin water budget.

Our comments are summarized as follows:

1. Identification of managed wetlands: While the GSP notes "managed and native wetlands" within the descriptive paragraph of beneficial users in the introductory section (see GSP p. 1-32), the accompanying land use figures do not show any managed wetlands (see GSP Figure 1-4). The Yolo Bypass Wildlife Area includes significant acres of managed wetlands that should be more clearly identified in land use maps and reflected in the acreage used in the water budget.
2. Water budget: Managed wetlands appear to be missing from the water budgets detailed in Appendix C. As represented in various tables in Appendix C (e.g., GSP Appendix C Table 11 and Table 41), the GSP appears to assume zero acres of managed wetlands in 2016 and less than 500 acres in prior years, as well as zero acres for the Yolo Bypass area for 1989 through 2016. Furthermore, there is no recognition of potentially expanded future acres of managed wetlands under proposals being considered by EcoRestore, the Putah Creek Preserve, and the Yolo Bypass Wildlife Area.
3. Identification of data gaps: Audubon appreciates that the representation and characterization of managed wetlands is recognized as a data gap (see GSP p. 4-26 and 4-29).
4. Consideration of managed wetlands: While the GSP indicates long-term sustainability, it does include some projects and management actions. Including managed wetlands in the projects and management actions can help achieve multiple benefits, providing both recharge and wildlife habitat. Furthermore, any consideration of projects that may redirect water for recharge should assure that existing native and managed wetlands are not adversely impacted.

Draft Groundwater Sustainability Plan Page-by-Page Comments

Additional page-by-page comments on YSGA's draft GSP are detailed below. We welcome any follow up questions and look forward to seeing the issues raised below addressed in the final GSP submission in January 2022.

> Section 1.5.2, page 1-13: The basin also includes significant acres of managed wetlands, which should be a different designation than "native vegetation" as these lands are actively managed for migratory bird habitat. The identification and representation of managed wetlands needs further improvement to reflect known managed wetland areas.
>
> Figure 1-4, page 1-16: Managed wetlands should be listed as a unique land use.
>
> Figure 2-51, page 2-120: When viewed in combination with Figure 1-4 (Land Use), it appears that managed wetlands are being potentially mischaracterized or missing altogether. In Figure 1-4, much of the Yolo Bypass is designated as "riparian vegetation" while Figure 2-51 indicates

some of this same land is "iGDE." In both figures, known managed wetlands at the Yolo Bypass Wildlife Area are not identified. These managed wetlands are different than riparian vegetation and groundwater dependent ecosystems because they apply surface or groundwater to flood migratory bird habitat from fall to spring.

Section 2.2.9, page 2-130: The GSP indicates that future baseline land use holds constant the land use acres represented for the 2016 baseline and "relies on the historical land use datasets in Table 2-21." However, as represented in Table 2-21, there are zero acres of managed wetlands represented in 2016. Thus, the GSP is projecting the future condition to have zero acres of managed wetlands, which is inaccurate.

Table 2-21, page 2-131: This table indicates zero managed wetlands in 2016 and less than 500 acres of managed wetlands in any prior year. This is incorrect as there are managed wetland acres in the Yolo Bypass Wildlife Area and other locations in the subbasin. Furthermore, as commented previously, this 2016 condition is used to represent the future baseline condition. Managed wetland acres may increase above current conditions, as a result of on-going efforts in the Yolo Bypass and the Putah Creek watershed. The information in Appendix C, Table 25 (page 69) indicates the acres in Table 2-21 are all from the subarea named "Central Yolo Subregion" and zero acres of managed wetlands are included in the subarea named "South Yolo MA" (see Appendix C, Table 41, page 101). Figure 4 in Appendix C indicates the South Yolo MA is the area generally covering the Yolo Bypass, including the Yolo Bypass Wildlife Area, so managed wetland acres should be represented in this management area.

Section 2.3.5, page 2-146: The description of the South Yolo Management Area should include discussion of managed wetlands associated with the Yolo Bypass Wildlife Area and other public and private wetland easements. This is a significant and important habitat area for migratory birds, fisheries (e.g. as planned by EcoRestore), and other important native species. Many of the lands within the Yolo Bypass actively apply surface or groundwater to create and maintain important habitat and wildlife food sources.

Section 4.11.1, page 4-26: Audubon appreciates that the YGSA recognizes the significant data gap regarding properly identifying and incorporating managed wetlands into the GSP. Audubon is developing a dataset of the spatial extent of managed wetlands in the Central Valley, which we will share for inclusion in future GSP updates. We recommend current acreage estimates in the Yolo Bypass Wildlife Area be used initially to include a more accurate estimate of managed wetland acres in the GSP for submission to DWR in January 2022.

Section 4.11.2.3, page 4-29: Same comment as provided for Section 4.11.1.

Table 5-1, MA 4, page 5-5: Managed wetlands provide opportunities for multi-benefit recharge and should be part of discussions about Managed Aquifer Recharge programs.

Table 5-1, P2, page 5-8: Audubon appreciates the inclusion of managed wetlands specifically as a model-improvement need under this designated project.

Appendix C: As represented in the comments specific to the GSP, Audubon has several concerns with the water budgets developed and documented within Appendix C. These range from under-represented managed wetland land use acres to questions about how the water needs and water sources for the few acres of managed wetlands included were derived. Appendix C indicates use

of crop coefficients and CIMIS data (e.g. Table 6, page 23) to estimate water needs. However, managed wetlands have unique crop coefficients and the water sources – both surface and groundwater – may be unique for given managed wetland areas. These crop coefficients will need refinement for managed wetlands and should be identified as a data gap for further improvement.

Thank you for your consideration of Audubon California's comments. If you would like to discuss this matter further, please do not hesitate to contact me at (916) 737-5707 or via email at samantha.arthur@audubon.org.

Sincerely,

Samantha Arthur
Working Lands Program Director
Audubon California

Sarah Leicht

From: linda bell [redacted]
Sent: Wednesday, October 27, 2021 1:12 PM
To: Info
Subject: Draft GSP Comments

October 27, 2021

Submitted online via: info@yolosga.org

Re: Yolo Groundwater Sustainability Plan

Dear Yolo SGA Staff,

I appreciate the opportunity to comment on the Yolo Groundwater Sustainability Plan, and I thank all of the staff who have helped reviewers, such as I, to understand the information in the Draft Plan. It has been a very informative process, and I will continue to read about the intricacies of California's water environment and legal policies.

Reading, and commenting on this topic, while California was experiencing record temperatures, fire, and rainfall…. I believe made all of us realize that though we are experiencing a weather cycle…it is time to review our idea of what is normal.

Defining the Future by the Past

Are Historic Water Cycles Still Valid Predictors of Future Climate Cycles?
(CCR 354.18 c) 3) A)) states that "Projected hydrology shall utilize 50 years of historical precipitation, evaporation, and streamflow information as the baseline condition for estimating future hydrology.". Though past weather patterns are still part of climate studies, recent climate and hydrology research sees a future with more extremes of precipitation and temperature.

""There is growing evidence that global warming is changing the water cycle in terms of altering the spatial and temporal distributions of water availability worldwide. Specifically changes in the magnitude, timing, frequency, and form of precipitation (rainfall/snowfall) and runoff (rained runoff/snow melt/..)…"

"The determination and application of the water year classification, runoff quantities and drought indices are based on the *stationary* assumption that the future hydro climate in California would mimic the historical condition. However, existing research has reported non-stationary changes in hydroclimatic variables across the State. " "Indices that are calculated under the stationarity assumption will become less informative further into the future when higher warming and larger changes (I.e., stronger non-stationarity) in precipitation are projected." (Projected Changes in Water Year Types and Hydrological Drought in California's Central Valley in the 21st Century (2021) Me, Anderson, Lynn and Arnold)

The implications for water infrastructure/management are that "Greater amounts of winter-season runoff combined with static flood protection rules would lead to greater uncontrolled releases from SWP and CVP reservoirs. Reduced spring-season runoff into the reservoirs would lead to decreased water supplies and deliveries to SWP and CVP water users."(Progress on incorporating climate change into management of California's water resources" (2008) Anderson, Chung, Anderson, Brekke, Easton, Ejeta, Peterson and Snyder.)

Can The Choice of a Specific Time Span Influence Predictions?
The fact that the 48 year historic baseline (1971-2018) of the Plan's water budget starts just before the Indian Valley Reservoir comes on line is very important. Indian Valley Reservoir is operated to meet current year demand, not to maximize carryover storage; so its releases are important to the flow of Cache Creek. "Since completion of the Indian Valley Reservoir in 1975, the District's water resources became less vulnerable to the dry years that periodically limit water resources in Yolo County." "The conjunctive water management benefits associated with the Indian Valley Reservoir, and other District operations are directly evident in long-term hydrography for representative wells that show recovered groundwater levels after the reservoir came on line in 1977 to 1978." (Borcalli, 2000) and (Ludhorff & Scalmanini, 2004)

The importance of the Indian Valley Reservoir was also noted in Appendix C (page 87) for the Dunnigan Hills Subregion. It states that "Drought years like the 1976-1977 would not result in as severe a depletion as they did in the past, primarily because of increased surface water availability (e.g. Indian Valley Reservoir surface water) and to some extent by overall increased irrigation efficiencies."

The Plan needs to address a future with less predictable water resources by setting more conservative criteria thresholds. The Agency has assumed that "…..the Yolo Subbasin is a relatively stable basin, with groundwater levels maintaining a relatively consistent long-term average elevation or depth to groundwater. While groundwater levels decline during dry conditions…….groundwater levels substantially recover during wet years." This assumption has led to minimum thresholds that could lead to undesirable results in management areas. This assumption is found throughout the Plan as a reason for determining minimum thresholds

Management Areas

"Each Agency may define one or more management areas within a basin if the Agency has determined that creation of management areas will facilitate implementation of the Plan. Management areas may define different minimum thresholds and be operated to different measurable objectives than the basin at large, provided that undesirable

results are defined consistently throughout the basin. A basin that includes one or more management areas shall describe: (a) The reason for the creation of each management area." (CCR 354.20 (a))

The Agency established six management areas. Though these management areas are used throughout the basin description to show the distribution of hydrologic soils; their formal description in Section 2.3 is unable to give a concise reason for their delineation. It states that "Management areas were developed based on prior investigations, which delineated somewhat different subbasin areas, and have been adapted to the purpose of this GSP." The description continues on, but with no clear summation of the various changes.

The confusion in what were the reasons that Capay Valley, the Dunnigan Hills, Central Yolo, South Yolo, and North Yolo were originally separated as distinctive management areas; is then compounded by the fact that four of them are immediately regrouped into one minimum threshold for defining Chronic Lowering of Groundwater Levels and Reduction of Groundwater Storage.

The Agency needs to define the characteristics of each area that led to their original selection as separate management areas; and then explain how their common threshold level will not result in undesirable results in one, or more, of the areas.

Setting the minimum threshold for the Dunnigan Hills and Hungry Hollow (which is part of the Central Yolo management area) at "Exceedance of the historic minimum elevation in the period of record of each Representative Well in two consecutive years." could definitely lead to undesirable results. Both of these areas are already showing signs of overdraft.

Data Gaps

Bulletin 118 "Non-Basin Areas"

DWR's Bulletin 118 creates a regulatory gap by defining only alluvial basins and not fractured, hard-rock and volcanic aquifers (which it labels "non-basin areas"). The western edge of the Central Yolo Management Area forms the border with the "non-basin" Capay Hills and Coast Range. The Hungry Hollow area borders the Capay Hills and Winters borders the Coast Range. Both of these areas are designated as Areas of Concern by the GSP.

Groundwater in fractured hard-rock aquifers are very vulnerable to overdraft since their pore spaces are smaller than alluvial aquifers. The predictability of a well's yield can also vary depending on their location in the aquifer.

Updates, since the Plan has been printed, show that in the years between 1997 and 2016 perennial crop acreage has increased from about 2800 to 4800 acres in the Winter's area. Hungry Hollow has also seen large increases in perennial crops with acreage between 1994 and 2018 increasing from about 4000 to 17500 acres. (The acres on both of these sets of numbers has been taken off bar graphs. The Winters graph is in 1000 acre intervals, and the Hungry Hollow at 5000 acre intervals; so I may be a little off in my count.)

The summary accompanying these charts listed: 1) Potential trend emerging around Winters and Hungry Hollow with declining groundwater levels. 2) Areas near the rangeland/ farming interface seem to be changing more quickly. 3) Proximity of newly drilled wells to areas with largest changes, and 4) Trends in land use change, and potential hardening of water demand.

These two areas, Hungry Hollow and Winters, should be set into a separate Management Area to investigate the effects on groundwater availability of: 1) proximity to the fractured rock/volcanic influence of the Capay Hills and Coast Range; and 2) increased perennial agriculture.

The Yolo County HCP/NCCP Application form contains a map of 18 Planning Units that breaks out a number of planning units along this western edge of the Plan Area. The northern portion of this zone is called the Capay Hills and the southern the South Blue Hills. The North Blue Hills encompasses the area called the Capay Valley in the Yolo Plan. This is a map that should be reviewed by the GSA. Since it is already on the Yolo County Agency website, it would be helpful. The link to the Yolo Habitat Conservancy Geomapper is: Yolo Habitat Conservancy Geomapper

Land Use Data Gap

Land Use data for the Draft Water Budget Model was held constant from 2016 to 2018, since data after 2016 was not available when the model was programed. This means that part of the increase in water demand created by new residential and agricultural land use is missing from the water budget. This loss is especially critical in the areas of the Dunnigan Hills and Hungry Hollow where new agricultural development, especially perennial crops, such as orchards, has been especially strong. Both of these areas have not been adequately studied to assess this impact on groundwater.

The Water budget needs to be re-calculated with the new numbers on both residential and agricultural land use.

Environmental Benefits

General Principles (9350.4 (e)) states that "An Agency shall have the responsibility for adopting a Plan that defines the basin setting and establishes criteria that will maintain or achieve sustainable groundwater management, and the Department shall have the ongoing responsibility to evaluate the adequacy of that Plan and the success of its implementation"

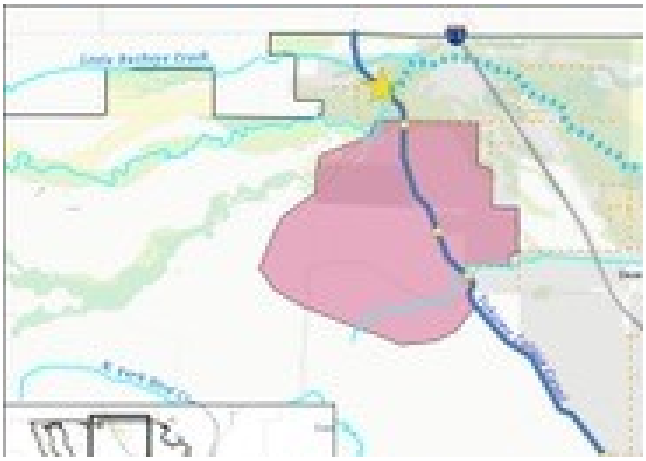
Though the Yolo GSP starts with a thorough portrayal of the geological and hydrological elements of the Yolo Basin setting, it lacks a comprehensive biological/ecological view of the above-ground community resources of the Basin. Very little of the report, only 18 pages, is devoted to the discussion of how measurable goals and minimum thresholds relate to the species of plants and wildlife that live in the environment in which the Representative Wells are drilled.

The 18 pages mentioned above, include Section 2.2.7 (page 2-109), the Groundwater Dependent Ecosystems Section, and a Section 2.2.7.4 (page 2-123) referred to as "Additional Ecological Data". Table 2-20 (page 2-124) lists Species Present in California Freshwater Species Database, but they are aggregated at a HUC 12 GDE Unit Scale. This is at a very broad scale that does not adequately address the impacts that land use, and Plan projects, may have on environmental beneficiaries.

This was evident in the recharge project (Project 19) which has already been approved by the GSA Board as a test pilot for recharge in the Basin. Project 19, and (I believe) Project 20, are in the immediate area of "Critical Habitat" for the California Tiger Salamander, a species listed as both State and Federally Threatened. The accompanying map shows the location of Project 19 as the large star just north of the critical habitat area. The small stars are described as "Future Recharge Diversion Points". These 3 diversion points, which I believe are Project 20, are located directly in the Critical Habitat Area for the California Tiger Salamander.

The Recovery Plans for the California Tiger Salamander need to be included in the Plan and addressed before these projects are fully approved.

The Agency needs to address plant and wildlife species outside of the riparian and wetland areas, because these species will be effected as surface and groundwater resources are impacted by expanding agriculture/municipalities. The permitting of wells in un-developed, open spaces can also lead to the removal of native vegetation to accommodate agricultural crops and structures. Oak Woodland areas are a favorite of developers, and many of these oak communities are situated in areas considered "non-basin", and so not presently covered by SGMA.



The Minimum Thresholds for Chronic Lowering of Groundwater Levels and Groundwater Storage in the North Yolo Management Area, which is here proposed as a measure to compensate for Voluntary Agreements; is an interesting combination of farmer and environmental beneficiaries issues. The threshold is described as: "Exceedance of the historic elevation in the period of record of each Representative Well **plus** 20 percent of the depth between the historic maximum and historic minimum elevation for the period of record of the Representative Well in two consecutive years." The explanation is that "The minimum thresholds for the North Yolo management area are set lower than historic conditions recognizing that water districts, such as 108, in this area may experience reductions in surface water deliveries from the Sacramento River as the Voluntary Agreements with the State Water Resource Board are implemented. "

In the Voluntary Agreement I read online for the San Francisco/Sacramento-San Joaquin Delta Estuary and Watershed …"The SRSCs propose that during above normal, below normal and dry years, which cumulatively total about 58% of all years according the Sacramento Valley 8-station index, they would make available 100,000 acre-feet through land fallowing/crop shifting (or limited groundwater substitution) within their service areas. This supply would be made available to Reclamation and Reclamation…."

If the North Yolo Agreement is similar to the above Agreement, then a threshold as severe as this would seem to be over favoring the SRSC's interests.

The Agency's explanation is then followed by the statement "Historical performance of the North Yolo management areas shows that groundwater levels typically recover to a long-term average during wet periods. Therefore, setting the minimum threshold lower than the historical low is not expected to create long-term undesirable effects on groundwater levels."

The Assumption that the Yolo Subbasin is a relatively stable basin

The Assumption that the Yolo Subbasin is a relatively stable basin where groundwater levels will rebound after drought, or heavy groundwater use, is a response that the Agency gives to all the situations where minimum thresholds are set at historic, or lower than historic, levels. The argument is that: "In the Yolo Subbasin, groundwater storage changes are positive in wet years and negative in dry year, with no significant trend (decline or increase) over the past 50 years." (Appendix C, page 1)

Though this kind of a cycle has occurred in the past,…. is a "stable" cycle of drought-and-flood, or large declines and increases, a pattern that we want to accept by declaring historic minimum groundwater elevations sustainable conditions? The Sustainable Groundwater Management Act was written in 2014 because of the repercussions of such a cycle.

It would seem that the setting of minimum threshold levels at historic lows over consecutive years is perpetuating, not improving, the sustainability of the Yolo Subbasin.

I would like the Agency to explain why setting minimum thresholds at such low levels is a sustainable management practice.

Sustainable Management Criteria

The Plan, in Section 2.2.3 (page 2-54) decides to not set a minimum threshold for Saltwater Intrusion because "Seawater intrusion, as observed in California's coastal aquifers, will not likely occur within the Yolo Subbasin because the ocean is over 50 miles away, farther if measured along the waterways. The southern portion of the Yolo Subbasin is located within the Sacramento-San Joaquin Delta and has been subject to salinity intrusions during the early part of the last century, but not since 1944 and 1990 (DWR 1995) and probably not thereafter due to the state management of flows through the Delta to prohibit salinity intrusion."

Even if the southern portion of the Yolo Subbasin is outside of *direct* seawater contact, the Yolo Basin could be indirectly affected. The Basin's Sacramento River water supplies could be cut to: 1) provide for the immediate flows needed to push back salt water intrusions in the lower Delta, or 2) to retain reservoir water for a future need to curtail salt water intrusions. In either case, there would be *indirect* effects.

The Plan needs to explain how it would replace these surface water supplies in such a situation. The September 21st 2021 Water Resources Control Board Meeting was talking about just such a condition; so the Plan should explain how it would replace these water resources.