



Modeling Adaptive Strategies to Achieve Sustainability

**WaterSMART: Applied Science Grants for FY2023
No. R23AS00446**

October 13, 2023

Prepared For:

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Executive Summary

October 13, 2023

Yolo Subbasin Groundwater Agency

Woodland, Yolo County, California

The Yolo Subbasin Groundwater Agency (YSGA) will use the grant funds to improve the YSGA’s surface water-groundwater availability model, develop projects and demand management strategies to support groundwater sustainability, develop a seasonal forecasting platform, and improve data management and public data access. The Project will result in updated data and tools that will improve water managers’ understanding of the most pressing water management challenges in the region and help them determine specific actions needed to address those challenges. If awarded in April 2024, all Project work will be completed by April 2026. The Project is not located on a Federal facility.

Technical Project Description

Applicant Category

The Yolo Subbasin Groundwater Agency (YSGA) is a Category A applicant because it is a local authority whose members include one or more organizations with water or power delivery authority located in the western United States. The YSGA was formed in 2017 as a joint powers authority comprised of 20 member agencies and six affiliated parties in Yolo County, California. YSGA members include four cities, ten reclamation districts, two water districts, two community service districts, and one federally recognized Native American tribe.

Detailed Project Description

Consistent with the workplan outlined in Evaluation Criterion C—Project Implementation, the Modeling Adaptive Strategies to Achieve Sustainability Project (Project) will improve water management in the Yolo Subbasin through enhancements to the YSGA’s surface water-groundwater availability model, development of projects and demand management strategies to support groundwater sustainability, development of a seasonal forecasting platform, and improved data management and public data access. The Project will help implement the January 2022 Groundwater Sustainability Plan (GSP)¹, the Yolo Subbasin’s plan to achieve groundwater sustainability over the next 20 years and prepare for future droughts. The YSGA is responsible for implementing the Groundwater Sustainability Plan consistent with the State of California’s 2014 groundwater law, known as the Sustainable Groundwater Management Act (SGMA).

This Project will improve the YSGA’s linked surface water–groundwater availability model by 1) incorporating new climate change datasets, 2) updating land use data, and 3) developing the ability to model economic decision-making. The YSGA will use the updated model to assess the Subbasin’s future water sustainability under different climate and groundwater scenarios. The YSGA will use the results of the modeled scenarios to develop additional projects and demand management strategies to maintain groundwater sustainability. The Project will also result in a seasonal forecasting platform that automatically forecasts and publishes water availability seven months ahead. Finally, the YSGA will improve data management and public access by making the following improvements to the publicly available Yolo County Water Resources Information Database²: 1) modernize user interface and storage platform, 2) incorporate data from other groundwater quality programs and store reports of infrastructure damage from land subsidence to improve sustainability indicators, 3) improve the connection to the statewide database, and 4) update the public data access site³.

Goals

The preliminary goals and objectives of the Project are listed below:

Goal 1: Improve water managers' understanding of the basin by providing data and tools necessary for water managers to understand basin conditions and consider impacts of policy decisions.

- **Objective 1.1:** Update the YSGA's surface water-groundwater availability model by 2025 with new climate change datasets, improved land use data, and economic elements.
- **Objective 1.2:** Incorporate up-to-date land use data into at least two YSGA Annual Reports.
 - **Objective 1.2.1:** *Hold at least three briefings with environmental stakeholders and wetland managers to inform correction of managed wetlands modeling.*
 - **Objective 1.2.2:** *Convene at least three YSGA Technical Advisory Committee meetings to develop and model at least three future land use change scenarios.*
- **Objective 1.3:** Meet with the Yolo County Agricultural Commissioner and Yolo County Farm Bureau to ground truth economic considerations related to model crop assumptions.

¹ [Yolo Subbasin Groundwater Sustainability Plan \(Groundwater Sustainability Plan\)](#)

² [Yolo County Water Resources Information Database \(WRID\)](#)

³ sgma.yologroundwater.org

- **Objective 1.4:** Create domestic well inventory; and quantify impacts from at least three climate and land use scenarios and quantify benefits of at least three demand management strategies.

Goal 2: Quantify the effects of near-term groundwater recharge projects and management actions, support the implementation of these projects and management actions through modeling and analysis, and consider impacts of policy decisions.

- **Objective 2.1:** Quantify the effects of at least five groundwater recharge projects by 2025 and provide that information to local agencies responsible for project implementation.
- **Objective 2.2:** Hold at least three meetings with interested YSGA member agencies and affiliated parties to develop potential demand management strategies for the Yolo Subbasin by 2026.
- **Objective 2.3:** Model at least three demand management strategies (management actions) not listed in the current Groundwater Sustainability Plan.
- **Objective 2.4:** Hold at least three meetings with the YSGA *Ad Hoc Drought Contingency Planning Committee* by 2026 to review the demand management strategies model results and consider realistic implementation (benefits versus costs) of demand management strategies. Develop a draft white paper by 2026 summarizing the results from modeling the benefits and costs of demand management strategies (management actions), which will also quantify the economic impact to the agricultural industry.

Goal 3: Support drought and flood resilience by developing seasonal forecasting platform.

- **Objective 3.1:** Automate import of seasonal climate forecasts to groundwater model.
- **Objective 3.2:** Develop automated workflow for climate data intake and modeling.
- **Objective 3.3:** Develop web template and publish relevant forecasting results. Provide presentation of seasonal forecasting platform to YSGA member agencies and Yolo County OES by 2026.

Goal 4: Improve public access to and understanding of groundwater data.

- **Objective 4.1:** Implement new data management system by 2025.
- **Objective 4.2:** Enable data storage and viewing for at least two new data types.
- **Objective 4.3:** Achieve near real-time consumption of statewide datasets by 2026.
- **Objective 4.4:** Implement new public data access site by 2026, and post web tutorial on yologroundwater.org for new users. Provide the YSGA Board with a presentation on the updated groundwater map highlighting enhancements and improved usability.

Project Location

The proposed Project will provide benefits for the entire Yolo Subbasin, located in the southwestern side of the Sacramento Valley Groundwater Basin, California (Attachment E, Figure 1). The Yolo Subbasin is bounded by Putah Creek to the south, the Sacramento River to the east, the coast range to the west, and roughly follows the Yolo County line to the north. The attached shapefile contains the boundary of the Yolo Subbasin.

Data Management Practices

The YSGA will develop all spatially explicit data or tools for this Project in industry standard formats compatible with Geographic Information System (GIS) platforms.

Evaluation Criteria

Water Management Challenges in the Yolo Subbasin (Evaluation Criterion A)

The Yolo Subbasin, like most areas of California, has experienced significant droughts in the past and expects climate change will increase the frequency and severity of droughts in the future. Drought impacts depend on several factors including temperature changes, precipitation levels, and water management practices. Yolo County experienced severe and extreme drought, with a Drought Severity and Coverage Index (DSCI) value of 400 in 2022.⁴ In 2021, 100% of the County experienced exceptional drought, with a DSCI maximum score 500. These droughts are not new. According to the U.S. Drought Monitor, Yolo County experienced some level of drought in 19 of the last 24 years. FEMA's National Risk Index⁵ rates Yolo County as 'relatively high' risk primarily rated to the risk of drought and impact to the County.

The YSGA expects drought and flooding events to become more frequent and severe due to the impacts of climate change. Assuming a range of greenhouse gas emissions, models predict⁶ Yolo County will experience a 3.9 to 4.7 °F increase in annual average maximum temperature by mid-century (2035 – 2064) and a 4.9 to 8.1 °F increase by end of century (2070-2099), which is consistent with State trends. As temperatures rise, landscaping and crops will require more water due to increased evapotranspiration rates. Climate change is also expected to cause more erratic precipitation events, meaning winter rain and snowfall will be less reliable. The County's water districts will have less surface water available to supply to growers, increasing the demand for groundwater. The Yolo Subbasin also has experienced an increase in frequency of extreme flooding events, which resulted in significant damage to rural infrastructure during the 2017, 2019, and 2023 storm events. Yolo County and partner agencies identified mitigation projects for incorporation in the County of Yolo's Hazard Mitigation Plan and the Yolo County Climate Action and Adaptation Plan to better prepare for future storm events.

In addition, the demand for water in the Yolo Subbasin is increasing because of the expansion of irrigated acreage and changes in cropping patterns. Irrigated acreage is expanding into areas historically dominated by native vegetation and rangeland because of demand for crops that farmers can only grow in Yolo County's fertile agricultural region, home to significant production of the nation's fruits and vegetables because of its unique Mediterranean climate. Farmers are planting many of these acres with water-intensive perennial crops, such as almonds and vineyards, that require water nearly year-round and cannot be fallowed in dry years. In 2021, farmers grew 66,000 more acres of perennial crops than in 1997, of which 12,700 acres are land that was previously unirrigated.

Due to climate change, drought, and increasing demand, evidence of groundwater overdraft is emerging in Subbasin areas, which are delineated as "areas of concern." These areas are entirely dependent on groundwater and experiencing rapid rates of land use change, with groundwater levels showing declining trends up to seven feet per year. These effects were accelerated during the recent 2020-22 drought; new areas of land subsided with subsidence rates of up to 12 cm/year⁷,

⁴ Drought Monitor, droughtmonitor.unl.edu

⁵ FEMA's National Risk Index

⁶ <https://cal-adapt.org/tools/local-climate-change-snapshot>

⁷ <https://data.cnra.ca.gov/dataset/tre-altamira-insar-subsidence>

and approximately 50 rural drinking water wells ran dry. Political tensions within Yolo County are increasing as rural residents who depend on wells for drinking water encounter conflict with farmers who use groundwater to produce food and maintain a livelihood. The Yolo County Board of Supervisors enacted a temporary moratorium on well drilling in certain areas of Yolo County in September 2023, for example, because of increasing concern about groundwater sustainability. Groundwater Sustainability Plan implementation needs to adapt to emerging concerns to ensure continued water resource viability for Yolo County residents.

Concerns or Outcomes if the Water Management Challenge is Not Addressed

Past droughts increased reliance on groundwater during dry periods in the Subbasin and declining groundwater levels, a trend the YSGA believes will continue without significant work to implement groundwater recharge projects and demand management strategies based on current, accurate modeling. The ability of member agencies to predict and assess conditions in a timely manner, as well as the ability of the YSGA to develop a reliable water budget, is currently limited because of the YSGA's surface water-groundwater availability model deficiencies. As a result, member agencies face significant uncertainty each fall and winter about how conditions will change in the coming water year, limiting the ability to proactively manage supplies and prepare for drought and flood emergencies. If local agencies do not address the increased frequency and severity of droughts and extreme flooding events, as well as increased water demand, these challenges will lead to Subbasin groundwater overdraft and the failure of the YSGA to achieve groundwater sustainability consistent with the Groundwater Sustainability Plan. The wells used by rural households for drinking water and farmers for agricultural irrigation would increasingly dry up. The City of Winters, a small city of 7,300 people entirely dependent on groundwater for drinking, could suffer water shortages, as would the small rural communities of Madison, Zamora, Dunnigan, Rumsey, and Esparto. Environmental impacts may also increase, as water bodies and terrestrial ecosystems could lose their connection to groundwater. Increased scarcity would continue to push environmental, domestic, and agricultural water users into conflict.

Addressing the Water Management Challenge

The Project will allow the YSGA to help its 26 member agencies and affiliated parties reduce the impacts of future droughts in the Yolo Subbasin on households and agriculture, as well as develop demand management strategies and prepare for emergencies. The Project will result in an improved YSGA surface water-groundwater availability model and a forecasting platform necessary to inform management actions needed to meet competing demands for water, address the decline in groundwater, reduce complications arising from drought, minimize conflicts over water, and inform other water management decisions. The Project will help with the following water management issues:

Water supply reliability: The updated surface water-groundwater availability model and new seasonal forecasting platform will provide a more holistic and accurate understanding of the water supply and groundwater conditions in different Subbasin areas, allowing the YSGA to prioritize groundwater recharge projects and demand management strategies in areas where the work is most needed. By targeting these so-called “areas of concern,” the YSGA will minimize impacts from existing water management challenges on vulnerable, groundwater-dependent communities.

Management of water deliveries: The seasonal forecasting platform will allow water districts to better predict their water supply for the coming season and pursue management actions to address changes, such as purchasing additional water supplies, communicating early with customers, or implementing demand management strategies. Furthermore, the Project's explicit focus on predicting and preparing for the impacts to drinking water wells from drought will inform the development of policies to protect these essential water supplies.

Conjunctive use: The updated surface water-groundwater availability model will improve conjunctive use of groundwater and surface water by providing potential storage estimates for proposed groundwater recharge projects. Increased groundwater recharge will allow agricultural water users to switch between groundwater and surface water depending on availability.

Groundwater conservation and irrigation efficiency: The Project will allow the YSGA to model strategies to conserve groundwater and increase irrigation efficiency. The YSGA will model voluntary conservation incentives and conservation mandates.

Drought management activities: The seasonal forecasting platform will provide water districts and emergency managers with advance notice of potential drought conditions, allowing early preparation of emergency response actions. The updated surface water-groundwater availability model will help the YSGA better understand the impact of drought conditions on Subbasin groundwater supplies. Using these tools, the YSGA plans to develop a domestic well mitigation program to provide financial assistance to impacted rural residential well owners when their wells dry up. The improved surface water-groundwater availability model, along with an accurate domestic well census, will allow the YSGA to roughly estimate the number of domestic wells impacted by severe drought conditions to inform the structure and budget of the program.

Project Benefits (Evaluation Criterion B)

Project Need

The Project will help address the increasing frequency and severity of drought and extreme flooding events and the increasing water demand in the Yolo Subbasin, the most significant water challenges in the Project area, by providing improved modeling to inform groundwater recharge projects and demand management strategies. Since the groundwater recharge projects divert surface water during high flows, this Project will also help inform actions to address extreme flooding events. These groundwater recharge projects, coupled with demand management strategies, also will help reduce the impact of drought on the Yolo Subbasin's approximately 1,700⁸ rural, shallow domestic wells.

The YSGA developed the Project using a collaborative process with input from multiple and diverse stakeholders, specifically through development of the Groundwater Sustainability Plan. Throughout the development of the Groundwater Sustainability Plan, the YSGA held public meetings to coordinate and engage the beneficial users within the Subbasin regarding actions needed to achieve groundwater sustainability. The YSGA conducted at least 40 public meetings and workshops between 2017 and 2021. During the outreach process for soliciting comments and feedback on the draft Groundwater Sustainability Plan, interested parties expressed concern about

⁸ <https://storymaps.arcgis.com/stories/f2b252d15a0d4e49887ba94ac17cc4bb>

the negative impacts of declining groundwater levels on rural residential wells and the need to mitigate the damage to these wells during droughts. Other Groundwater Sustainability Plan themes that this Project is designed to address include⁹:

- The need for creating plausible, dynamic land use scenarios through 2070, instead of the static land use scenario currently in place
- Lack of demand management strategies to address observed/potential overdraft
- Lack of confidence in the climate scenarios used in the plan
- Potential to use the YSGA's surface water-groundwater availability model for annual forecasting of water conditions
- Inadequate considerations of the managed wetlands water needs within the water budget
- Vulnerability of rural residential wells to drought and declining water levels

Tool Application

The YSGA will use the improved surface water-groundwater availability model and other Project tools immediately as follows:

Updated surface water-groundwater availability model (Task 1). The YSGA will immediately incorporate new climate change data, improved land use data, economic information, and domestic well information into the surface water-groundwater availability model and use the updated model to inform policy decisions going forward. The YSGA will also include this information in the five-year Groundwater Sustainability Plan update (2027).

Project analysis and demand management strategy development (Task 2). The YSGA will evaluate groundwater recharge projects and develop demand management strategies as soon as the updated model is available. The YSGA will develop a white paper with the proposed demand management strategies and areas with significant groundwater recharge potential and share the white paper with the YSGA Board of Directors and the public.

Seasonal forecasting platform (Task 3). The YSGA will first pilot the forecasting platform with local water districts, County staff, and growers. The YSGA will then assess the performance of the forecasting platform annually with the goal of publicly launching the platform with the five-year Groundwater Sustainability Plan update in 2027.

Data management improvements (Task 4). YSGA will launch each improvement at completion and incorporate it into existing platforms.

Implementation Benefits

The YSGA expects the following benefits to occur from Project implementation:

Updated surface water-groundwater availability model (Task 1). YSGA and its member agencies will use the model to assess current and future subbasin conditions. Possible benefits include using

⁹Comments on the Groundwater Sustainability Plan can be found at:
https://www.yologroundwater.org/files/bd5041070/Yolo+GSP_AppendixC.pdf

model output to inform land use policies, quantify the economic impacts of land use decisions, and predict changes in cropping patterns based on market prices and water availability.

Project analysis and demand management strategy development (Task 2). The YSGA Board of Directors will use the updated model to evaluate groundwater recharge projects and develop and model demand management strategies, including analyzing costs and benefits.

Seasonal forecasting platform (Task 3). The development of a seasonal forecasting platform will allow the YSGA and member agencies to predict the coming year's groundwater conditions, facilitating proactive action such as groundwater recharge and dry well response. For the water districts in the County, the forecasting platform will enhance the prediction of surface water supply quantity, the development of allocations, and the proactive search for additional supply if needed. For Yolo County, the platform will provide advance notice of drought and flood risk, allowing for emergency preparedness. Furthermore, the platform will allow growers the ability to better predict what water supplies will be available to them, supporting crop decisions.

Data management improvements (Task 4). The YSGA will use the updated data management system to improve storage and analysis of required data for Groundwater Sustainability Plan implementation, as well as accessibility. The new system will allow YSGA staff and consultants to input and access data through mobile electronic devices while in the field, thereby increasing the efficiency of data entry and reducing errors. YSGA's member agencies also will have access to the database to add data or run reports as needed. The data management system also will allow for the development of reports for interested parties on water conditions, therefore leading to an improved, shared understanding of conditions in real time.

The Project will improve water management decisions as follows:

- **Improve water management decision making.** The Project will provide information necessary to reduce uncertainty around difficult water management decisions by providing current, accurate information about water conditions, including groundwater extraction. Water and land managers in the Yolo Subbasin currently lack the information necessary to make informed decisions about water management actions, including demand management. This Project will provide analysis of the economic and water supply impacts of proposed water management actions under consideration by the YSGA's members agencies.
- **Support the annual development of surface water supply allocations.** Each irrigation season, water districts must assess the available water supply and establish allocations for water sales. They often lack the data to estimate available water supply until a few weeks before irrigation season, after precipitation events end. The seasonal forecasting tool would allow water districts to look ahead seven months to anticipate the availability of water and plan the irrigation season. Additionally, the YSGA will introduce water marketing strategies to help farmers make crop decisions based on water availability.
- **Improve the annual prediction of surface and groundwater conditions and properly prepare for flood and drought response.** The seasonal forecasting tool will allow water managers to better predict water availability and groundwater conditions of the upcoming year, enabling proactive action.

- **Enhance flood and drought response.** The seasonal forecasting tool will be valuable to flood and drought emergency response by predicting the likelihood and severity of emergency events before they occur.
- **Incentivize public involvement by improving accessibility of complex data.** Public involvement in the policy process is limited by the complexity and accessibility of data necessary to support decisions. Improving the accessibility of data will allow policy engagement to start from a place of shared understanding of current conditions. This public engagement is essential to the YSGA process.

The results of the Project will be applicable to other areas of California because the YSGA will make the updated model, data management system, economic model, and forecasting platform available to other water districts or groundwater sustainability agencies interested in adapting the tools for their own use. Statewide, the Stockholm Environment Institute (SEI) is also involved in related forecasting and economic modeling efforts. A current project in partnership with the State Water Resources Control Board (Water Board) focuses on building an automated version of the Sacramento River watershed WEAP model with the capability to forecast streamflow and reservoir conditions seven months in advance. The same effort is also supporting the development of a statewide economic model of farmer's cropping decisions in response to market conditions and water supply. This Project proposes to build on this existing work and create a version of this forecasting platform focused on water conditions in Yolo County, integrating the Sacramento River work with additional modeling of conditions specific to the Yolo Subbasin.

The Project will help address the impacts of climate change and increasing water demand, the most significant water challenges in the Yolo Subbasin, by providing improved modeling to inform groundwater recharge projects and development of water management actions. The Project will correct long-term data gaps identified in the Groundwater Sustainability Plan by improving climate change forecasts, incorporating more accurate land use data, and explicitly considering the impacts of policy decisions on drinking water wells. Combined with the ability to consider economic impacts, the improved surface water-groundwater availability model will support the development of reasoned and equitable demand management strategies to help achieve groundwater sustainability. The seasonal forecasting tool will provide water and emergency managers with the ability to predict conditions for the upcoming year. With successful implementation, this will improve the region's resilience to drought and flood conditions by enabling more efficient water supply management and emergency preparedness. The Project will result in proposed demand management actions developed by a collaborative process based on the best available data, providing ample opportunity for stakeholder input and a clear understanding of the costs and benefits of each choice. Combined with an improved data management system and public data interface, this Project intends to reduce conflict around difficult water management decisions by promoting a collective base of understanding.

Complements to Local Projects

This Project will complement the Yolo County Climate Action and Adaptation Plan implementation, the Yolo County Office of Emergency Service's dry well assistance program, and development of a countywide plan to protect small community water systems from drought. Since

Yolo County is in the process of preparing the Yolo County Climate Action and Adaptation Plan¹⁰ and developing goals and objectives related to drought resilience, the Project will help inform implementation actions to achieve these goals and objectives. Development of the 2030 Plan kicked off in Fall 2023, and implementation will begin in 2024. Water availability is central to Yolo County’s agricultural economy, so the Project will provide significant assistance in evaluating actions to achieve these goals.

This Project will help support the Yolo County Office of Emergency Services and the Yolo County Flood Control and Water Conservation District dry well assistance program to provide emergency water supply during drought periods. The Project will further help implement a new 2022 state law (SB 552) requiring each county to develop a plan demonstrating the potential drought and water shortage risk and propose interim and long-term solutions for state small water systems and domestic wells within the county. Yolo County staff are currently working to draft a drought contingency plan in accordance with this new law. This Project complements these efforts by allowing for forecast of drought conditions, including impact location and severity, and by reducing drought impact severity through long-term basin management actions.

Project Implementation (Evaluation Criterion C)

Approach and Methodology

The YSGA’s surface water-groundwater availability model is an integrated WEAP-MODFLOW model that is the product of many years of modeling work in Yolo County in partnership with the Stockholm Environment Institute (SEI). It integrates rainfall-runoff hydrology, reservoir operation, water demands from cities and crops, and allocations of water to those demands from surface and groundwater supplies. The WEAP model used in the YSGA’s surface water-groundwater availability model builds on several years of development of the Cache Creek system at the Yolo County scale. The MODFLOW portion of the YSGA’s surface water-groundwater availability model integrates earlier work from a 2016 IWFM model and a 2006 IGSM model. The YSGA’s surface water-groundwater availability model represents the most advanced and integrated versions of the variety of modeling efforts that have focused on Yolo County. Its water budget forms the foundation of the Groundwater Sustainability Plan, and it will continue to be refined and updated throughout the Groundwater Sustainability Plan implementation timeline.

Cal-Adapt Analytics Engine Climate Datasets: The current climate change scenarios used in the YSGA’s surface water-groundwater availability model represented the best available data and the statewide standard at the time of Groundwater Sustainability Plan preparation. All scenarios within Yolo County from this dataset modeled an increase in future precipitation compared to the historical baseline conditions. Since the development of the Groundwater Sustainability Plan, and inclusion of the original climate scenarios, climate science has continued to develop, and it is important to use the updated data to reflect the best available science. These new climate change datasets are downscaled from the Climate Model Intercomparison Project projections specifically for California and will be available at finer spatial resolution (3 km; finer than ever). The improved surface water-groundwater availability model will help the YSGA evaluate the impact of climate

¹⁰ <https://www.yolocounty.org/government/general-government-departments/community-services/climate-action-sustainability/2030-climate-action-adaptation-plan>

change on groundwater levels and aquifer storage in the Yolo Subbasin to appropriately prepare demand management strategies for the future.

Land use data: The California Department of Water Resources has implemented remote sensing products as the official statewide crop mapping datasets since 2014. The statewide datasets have a significant delay, however, which limits their applicability for annual assessment of water conditions. For example, the Department released the 2020 statewide land use data in March 2023; YSGA needs to assess groundwater conditions on an annual basis and needs land use data by February of the following year. Current assessment of basin conditions relies on land use data pieced together from a variety of conflicting sources, including the Yolo County Agricultural Commissioner, local irrigation districts, and narrative information. The purchase of timely and cohesive data is necessary to ensure annual reporting of basin conditions to the State and interested parties is accurate and relevant.

Data management system and public-facing site: YSGA has continually developed the data management system at wrid.facilitiesmap.com over several years; it is the comprehensive record of groundwater conditions available in Yolo County. The system integrates monitoring data from the YSGA, its member agencies, the California Department of Water Resources, and federal programs into one platform. The interface at sgma.yologroundwater.org provides open public access to the data. Both sites are already well established and are the primary source of groundwater level data for interested parties in Yolo County.

Work Plan

The proposed work plan is provided below, which includes tasks and milestones (subtasks) and anticipated start and end dates. Following the work plan is a summary table of the anticipated products for each task. Some cost share activities will commence prior to the Bureau announcing final awards (September 2023 – March 2024), and all federally funded activities are estimated to commence after the award date (assumed as April 2024). A more detailed Project schedule is provided as an attachment, along with a crosswalk of the goals, objectives, tasks, milestones, and products (see ‘Att_C_Crosswalk’).

TASK 1 – IMPROVE THE YSGA’S SURFACE WATER-GROUNDWATER AVAILABILITY MODEL (September 2023 – March 2026)

The YSGA will improve the surface water-groundwater availability model to address weaknesses identified during Groundwater Sustainability Plan development. SEI will help make changes and maintain the YSGA model, as they originally developed the model.

Milestone 1.1: Incorporate New Climate Change Datasets (April-June 2024)

SEI will update the surface water-groundwater availability model with new climate change datasets provided by the State of California through its Cal-Adapt Analytics Engine, a climate data platform developed for California’s fifth climate change assessment (expected to be available in late 2023).

Milestone 1.2: Improve Land Use Data (January 2024 – January 2025)

The YSGA will annually purchase timely, standardized land use data to incorporate into the surface water-groundwater availability model, use the updated model to calculate the surface water and

groundwater budget, and report the information to the State and interested parties in two YSGA Annual Reports during the grant period. SEI and YSGA will also work with the YSGA Technical Advisory Committee to develop up to three probable future land use scenarios for the Subbasin. The YSGA will input the scenarios into the surface water-groundwater availability model and run the model to determine each scenario's impact on groundwater use and basin sustainability over a 50-year timeline. YSGA will provide this information in the first five-year update of the Groundwater Sustainability Plan. Finally, the YSGA Technical Advisory Committee will work to estimate historical managed wetlands data and operations, as well as guide future scenarios for their possible evolution in the future (Yolo Subbasin GSP, pg. 2-155).

Milestone 1.3: Incorporate Economic Elements into the Model (September 2023-April 2025)

SEI will create an economics model to simulate grower behavior. Specifically, the economics model will calculate the optimal mix of crops for a catchment based on crop price, labor, and other inputs, as well as the surface water and groundwater availability. YSGA will calibrate the model and verify it using information developed for Yolo County. SEI will create the code in the WEAP software to perform the economics calculations. The economics model for the County will then be refined to the scale of 38 distinct catchments.

Milestone 1.4: Use model to Assess Domestic Well Impacts (January 2025-March 2026)

YSGA staff will create a Yolo Subbasin rural residential well inventory to help ensure decisionmakers have accurate records to assist residents during drought. Following guidance of CA DWR's Considerations for Identifying and Addressing Drinking Water Well Impacts¹¹, the YSGA will use local records (e.g., parcel data, well completion reports) to confirm existing data and add new data on the number and location of rural residential drinking water wells in the Yolo Subbasin. YSGA staff will pull all available data into GIS and create one comprehensive database containing all known rural residential wells, as well as catalogue community and municipal drinking water wells. Once the YSGA creates the drinking water well inventory, the YSGA will model changes in drinking water well groundwater levels resulting from implementation of demand management strategies. For any scenario, the model can export a GIS-compatible file of predicted groundwater levels. By comparing the predicted groundwater levels with the drinking water well inventory, YSGA will identify the wells most susceptible to going dry.

TASK 2 – DEVELOP AND MODEL PROJECTS AND MANAGEMENT ACTIONS TO SUPPORT POLICY DECISIONS (January 2024-September 2025)

Milestone 2.1: Model Developed and Planned Projects (January-June 2024)

The YSGA has developed a variety of groundwater recharge projects throughout the Subbasin. The estimated total volume of recharge is approximately 30,000 acre-feet (AF) per year. The YSGA will incorporate the operational parameters and constraints of at least five recharge projects into the water budget model and share results with local agencies responsible for project implementation.

¹¹ https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Files/Considerations-for-Identifying-and-Addressing-Drinking-Water-Well-Impacts_FINAL.pdf

Milestone 2.2: Staff Development of Potential Demand Management Strategies (July-December 2024)

The YSGA will develop at least three potential demand management strategies for evaluation by interested beneficial users. Demand management strategies such as an allocation system, a financial incentive program, and/or a groundwater market program will be evaluated to reduce consumptive use of water in “areas of concern.”

Milestone 2.3: Model Potential Demand Management Strategies (January-June 2025)

The YSGA will incorporate selected demand management strategies (see Task 2, Milestone 2.2 discussed above) into the surface water-groundwater availability model to evaluate the potential benefits of successful implementation of these strategies on the availability of groundwater in the Yolo Subbasin, especially during droughts. The YSGA will model at least three demand management strategies and quantify the water savings achieved through each proposed strategy.

Milestone 2.4: Financial Analysis of Potential Demand Management Strategies (July-September 2025)

Using the economic model developed in Task 1 (Milestone 1.3), the YSGA will evaluate the costs and benefits of implementing potential demand management strategies. This task will entail analysis at a reconnaissance (screening) level of detail, up to three water management actions or projects to establish costs, benefits, and determine their impact on Yolo County agricultural production and the regional economy. This screening-level analysis will be used to rank alternative proposals based on cost-effectiveness and information generated under this task.

TASK 3 – DEVELOP SEASONAL FORECASTING PLATFORM (April 2025-March 2026)

This task will result in a seven-month water supply forecast for the area the YSGA serves. The same surface water-groundwater availability model currently used for historical water budgets will also be used for updating long-term climate change analysis (Task 1, Milestone 1.1) in a shorter term (i.e., seasonal) forecasting mode. The workflow leverages existing projects that YSGA has successfully implemented.

Milestone 3.1: Automate Import of Seasonal Climate Forecasts (April-June 2025)

Downscaled seasonal climate forecasts for the seven months ahead are available as gridded datasets from models participating in the North American Multi Model Ensemble (NMME)¹². Data (precipitation, temperature, humidity, and wind speed) are updated monthly. These datasets are available through Dr. John Abatzologou’s lab¹³ based at the University of California, Merced. The SEI team will automate the download and importing of these datasets on the first of each month into the surface water-groundwater availability model.

Milestone 3.2: Run the YSGA’s Surface Water-Groundwater Availability Model Ahead 7 Months (July-August 2025)

After the seasonal climate forecast datasets are imported into the surface water-groundwater availability model, the model will be run monthly for the season ahead. The model will be run on Amazon Web Services. Workflow will be developed that automates the climate update (Milestone 3.1 above) and the running of the model.

¹² <https://www.ncei.noaa.gov/products/weather-climate-models/north-american-multi-model>

¹³ <https://www.climatologylab.org/datasets.html>

Milestone 3.3: Extract Relevant Results from the YSGA’s Surface Water-Groundwater Availability Model and Post to a Webpage (September 2025-March 2026)

After the surface water-groundwater availability model is run, SEI will populate a web template with key results of the forecast. YSGA will consult interested parties to determine the results of most interest. Some of the expected results to be posted include climate forecasts; predicted reservoir supplies; expected water demands; potential supply reductions; and impacts on groundwater wells. A link to an example of the webpage¹⁴ under development for the State Board project in California is included in the footnote, showing the results of forecast watershed flows into major reservoirs.

TASK 4 – IMPROVE DATA MANAGEMENT AND PUBLIC DATA ACCESS (January 2024-March 2026)

Created in 2004, the Yolo County Water Resources Information Database¹⁵ was developed as a standardized storage and reporting mechanism for groundwater data in Yolo County. Since 2008, Websoft Developers (Websoft)¹⁶ has maintained and improved the database and its web-based interface. Websoft will be the contractor performing work under this task with the design input of YSGA staff. In 2021 and 2022, the YSGA made improvements to the database and enabled the connection with the yologroundwater.org Groundwater Data Map¹⁷ to provide open access to the data that is housed in the database. Additional improvements that are proposed as part of this Project include:

Milestone 4.1: Migration to Modern System (January-September 2024)

In this task, YSGA will migrate data and code to a more modern user interface and storage platform. To support data capture, YSGA will build a mobile application to allow authorized users to store and save well data in the field in an offline mode and later sync data when connectivity is available.

Milestone 4.2: Add Data Management Support for Additional Sustainability Indicators (October 2024-March 2025)

Websoft Developers will work with YSGA to improve the groundwater quality database and incorporate data from other groundwater quality programs. YSGA will store the results of the previous historical GPS land subsidence surveys in the database to ensure the preservation of the data. Furthermore, YSGA will investigate the feasibility of storing reports of infrastructure damage from land subsidence in this database. YSGA also will analyze the feasibility of adding information about surface water flows.

Milestone 4.3: Improve Connection to Statewide Database (April -May 2025)

Websoft will utilize the API provided by the California Department of Water Resources to query and import data from the statewide database into the Yolo County Water Resources Information Database.

¹⁴ <http://sacwam.weap21.org/Forecast/2023-03-01/>

¹⁵ <https://wrid.facilitiesmap.com/Login.aspx>

¹⁶ <https://www.websoftdev.com/>

¹⁷ <https://sgma.yologroundwater.org/>

Milestone 4.4: Improve Public Data Access Site (June 2025-March 2026)

Once the above improvements are made to the Water Resources Information Database, Websoft will update the public-facing groundwater site (sgma.yologroundwater.org), will be updated to match these improvements. Websoft also will modify the public facing groundwater site to allow easier navigation and improved querying capabilities, as well as modify the interface to ensure it is supported on mobile devices.

Anticipated Products

Task	Products
TASK 1: IMPROVE THE YSGA’S SURFACE WATER-GROUNDWATER AVAILABILITY MODEL	Memo about methodology to be incorporated into Groundwater Sustainability Plan update
	Model files with updated climate scenarios
	3 Land Use files (with wetland details updated)
	Annual Land Use Model Input files for each scenario
TASK 2: DEVELOP & MODEL PMAS TO SUPPORT POLICY DECISIONS	Policy options white paper
	Anticipated Project Benefits (maps, graphs, etc.)
	List and description of potential strategies
	Anticipated groundwater impact (Excel, maps, etc.)
TASK 3: DEVELOP SEASONAL FORECASTING PLATFORM	Anticipated cost and benefit for each strategy (Excel)
	Public water forecasting platform (website)
	Code importing seasonal climate forecasts
	Workflow of automated climate update and model runs (code)
TASK 4: IMPROVE DATA MANAGEMENT AND PUBLIC DATA ACCESS	Web template of categorical results for forecasted watershed flows
	Enhancements to wrid.facilitiesmap.com
	Enhancements to sgma.yologroundwater.org

Project Partners

The project partners will include all 26 YSGA member agencies and affiliated parties, all of whom have a seat on the YSGA Board of Directors, along with the Community Alliance with Family Farmers. Their roles are outlined below:

- The YSGA Ad Hoc Drought Contingency Planning Committee will review and oversee the Project schedule and work plan upon contract execution through quarterly meetings, as well as recommend projects and management actions to the Board of Directors. This committee will be the primary mechanism for discussing potential demand management strategies for incorporation in the YSGA’s surface water-groundwater availability model and the Groundwater Sustainability Plan. The Board of Directors will receive quarterly updates on Project progress and serve as the governing body overseeing the Project schedule and budget.
- The YSGA Technical Advisory Committee, composed of technical staff from the YSGA member agencies, will assist with the technical review of modeling work completed as part of this Project. The YSGA will convene the Technical Advisory Committee to develop future land use change scenarios and advise on the modeling of managed wetlands.

- The Community Alliance with Family Farmers will assist the YSGA in keeping a pulse on the perspective of small and disadvantaged farmers and will ensure the YSGA considers economic impacts to that constituency as part of developing demand management strategies.

Project Team Experience and Qualifications

Administrative Experience: The YSGA is the lead applicant and has the expertise to manage the grant and the project, including internal processes for financial tracking, accountability, and reporting. Kristin Sicke, Executive Officer for the Yolo Subbasin Groundwater Agency, and her colleagues will be responsible for executing contracts with consultants and regional partners, paying invoices, submitting grant reimbursements, and managing the budget. Ms. Sicke will review and approve all grant reimbursements, as well as oversee implementation of internal controls consistent with adopted financial policies and procedures. Ms. Sicke will lead her team's efforts to manage the project, building on her experience serving as General Manager of the Yolo County Flood Control and Water Conservation District (District; a local agency with a \$7 million annual budget) and as Agency Executive Officer, responsible for implementation of more than 70 projects and actions in the Yolo Subbasin Groundwater Sustainability Plan. Ms. Sicke has managed three grants in the past eight years totaling \$1.5 million, including gathering and reporting information to state agencies. Ms. Sicke also worked for the California Department of Water Resources for four years before joining the District, where she gained experience managing grants for the state.

Programmatic Expertise: The YSGA and its member agencies and affiliated parties possess the programmatic expertise necessary to implement the proposed actions. As described above, Ms. Sicke has more than 15 years of experience working in California water management and holds a master's degree in civil and environmental engineering. Additionally, Sarah Leicht and Nathan Fisher hold degrees in Environmental Science and Management and are the primary technical authors of the Yolo Subbasin annual reports, evaluating groundwater sustainability in all facets of their day-to-day activities with spatial data analysis and map development.

Plans to Meet Capacity Gaps: To fill technical modeling capacity gaps, the YSGA will contract with SEI to integrate the updated State climate change models and land use data into the YSGA's surface water-groundwater availability model, which the Institute originally developed using their proprietary software. Additionally, SEI will assist with development of the seasonal forecasting elements and incorporation of the economic analysis into the YSGA's surface water-groundwater availability model. In addition, the YSGA will contract with Websoft Developers to assist with migrating the Water Resources Information Database to a modern user interface, adding support for additional sustainability indicators, improving the connection to the statewide database, and improving public data access to the YSGA's website.

YSGA Team

Kristin Sicke, P.E.: Kristin Sicke's current position is explained above, and Ms. Sicke received an M.S. in Civil and Environmental Engineering from the University of California, Davis in 2011 and worked for the California Department of Water Resources for four years before joining the District in 2015. Since joining the District, Kristin has been focused on optimizing the conjunctive management of surface and groundwater resources to provide a safe and reliable water supply and to sustain the socioeconomic and environmental well-being of Yolo County.

Sarah Leicht, Water Resources Technician: Sarah holds a B.S. in Environmental Science and Management – Natural Resource Management from the University of California, Davis, along with minors in Economics and GIS. In her time as a Water Resources Technician for the YSGA, Sarah contributed to the development of the Groundwater Sustainability Plan and led the development of the 2021 and 2022 Annual Reports. She also advised the development of the public-facing groundwater data site at sgma.yologroundwater.org and manages the Water Resources Information Database.

Nathan Fisher, Water Resources Technician: Nathan received a B.S. in Environmental Science and Management – Geospatial Information Science from the University of California, Davis in June 2022. Since joining the YSGA team in 2023, Nathan has assisted with the development of the 2022 Annual Report and expanding the YSGA Groundwater Monitoring Network.

Stockholm Environment Institute (SEI) Team

Vishal Mehta, PhD: Vishal will be the SEI lead, serving as the point of contact and Project Manager. As a Senior Scientist at SEI, Vishal leads collaborative water resources planning under climate change and other uncertainties with state and local agencies, and water utilities.

Charles Young, PhD: Charles is a Senior Scientist with SEI. He has over 30 years of experience in river basin planning, groundwater modeling, crop growth simulations and rainfall-runoff hydrology. His recent experience includes leading the Sacramento Water Allocation Model (SacWAM) for use in the Bay-Delta planning process as well as several water allocation models for instream flow management and drought response with the State Water Board. Charles will play supervisory and supportive role in the Hydrogeology, Groundwater components, and a lead role in Agricultural Improvements components of the work.

Jack Seiber, MS: Mr. Seiber is Deputy Directory and a Senior Scientist for the Stockholm Environment Institute, U.S. Center, where he develops computer-based tools to assist in long-range scenario planning, and works with researchers, policy makers and other stakeholders worldwide to help build a path to a sustainable future. His work focuses on integrated water resources planning at the watershed scale, with a special focus on the potential impacts of climate change. Since 1993 he has been the lead software developer of WEAP, the Water Evaluation And Planning system.

Additional SEI team members that will be involved in a lesser capacity include Laura Forni, MS, Romina Diaz-Gomez, PhD, and Marina Mautner, PhD.

Websoft Developers

Manoj Desai, P.E.: Manoj is the owner of Websoft Developers and has been involved in the development of the Yolo County Water Resources Information Database since its inception. Manoj has 25 years of experience in web development and leads his team of developers to help government agencies and private corporations of all sizes operate more efficiently and reliably by leveraging information technology.

Project Team Accomplishments Similar in Scope

The YSGA team manages the existing surface water-groundwater availability model and has implemented model updates in the past. SEI developed the WEAP software and has been involved

in building the YSGA surface water-groundwater availability model since 2011. Websoft Developers has designed, maintained, and improved the Yolo County Water Resources Information Database since its inception in 2004, including several major update projects.

Project Team Readiness

YSGA staff, the SEI team, and Websoft Developers are prepared for Project implementation with workload availability and staff capacity. There will be no delay.

Dissemination of Results (Evaluation Criterion D)

The YSGA will present Project results at relevant YSGA Board of Directors meetings and summarize results on the YSGA's website as pertinent to the task completed. As the YSGA develops annual reports, the updated land use data, and projects and management actions will be discussed and provided to the Department of Water Resources. Additionally, when the YSGA completes the 5-year amendment to the GSP, the climate change scenarios and economic impacts analysis will be included, along with a robust analysis of the demand management strategies for the Subbasin's sustainability. The YSGA is the primary beneficiary of the Project, as it will ensure compliance with SGMA and long-term sustainability for the beneficial users of Yolo Subbasin's groundwater resources. Additionally, the YSGA will disseminate results to local stakeholders and farmers in the YSGA's annual newsletter. The YSGA will disseminate results with the relevant committees, task forces, and liaisons of the Association of California Water Agencies (ACWA) and Northern California Water Association (NCWA), which will entail presentations at various conferences, meetings, forums, and workshops to share lessons learned with other Groundwater Sustainability Agencies. YSGA also will participate in at least one Reclamation-sponsored webinar to disseminate deliverables and discuss ways to apply deliverables to management questions.

Presidential and Department of the Interior Priorities (Evaluation Criterion E)

Climate Change

The project addresses climate change by ensuring the Yolo Subbasin is prepared for the increasing impact of drought and extreme flood events resulting from temperature changes on water resource availability and management. By incorporating the latest climate scenarios into the surface water-groundwater availability model, YSGA's member agencies can better predict precipitation and evapotranspiration changes in the future and quantify the effects of those changes on surface water and groundwater supplies. In addition, the seasonal forecasting tool will enhance the ability of Yolo Subbasin water managers to assess the risks of drought and flooding events before they occur. YSGA member agencies will use these tools to increase climate resilience by preparing for emergencies and reducing climate change impacts through implementation of new projects and management actions in response to precipitation and evapotranspiration changes. The Project will build long-term drought resilience by supporting the development of policies to optimize conjunctive use of surface water and groundwater. Groundwater resources will be preserved for years when surface water is not available, mitigating the extreme low groundwater levels experienced during drought. The Project is expected to provide benefits through the GSP implementation horizon (2042 and beyond). The YSGA has the authority and the responsibility to safeguard water resources in Yolo County through 2042. The tools and data developed in this Project will continue to be implemented and refined throughout that timeline.

Disadvantaged or Underserved Communities

The Project will serve the following disadvantaged communities (DACs), identified using the Climate and Economic Justice Screening Tool¹⁸: Tract 06113011400 – population 4,076, Tract 06113010102 – population 7,729, Tract 06113010101 – population 6,796, Tract 06113010204 – population 5,189, Tract 06113010203 – population 5,355, Tract 06113010800 – population 3,532, Tract 06113011102 – population 5,182, Tract 06113011001 – population 7,486, and Yocha Dehe Wintun Nation. These communities include the towns of Dunnigan, Knights Landing, Yolo, and Zamora, as well as portions of the cities of West Sacramento and Woodland. The Project will serve a total DAC population of approximately 43,345. Within the identified DACs, the towns of Dunnigan and Zamora, as well as unincorporated rural residences are dependent on individual domestic wells for household and drinking water supplies. The towns of Knights Landing and Yolo are serviced by community wells run by small service districts. The cities of West Sacramento and Woodland rely on groundwater when surface water is unavailable or inadequate. The Project will serve and protect all the above water needs in the following ways:

- Improving the YSGA’s understanding of individual domestic wells and explicitly modeling impacts of water management decisions on domestic wells.
- Developing and modeling demand management strategies to understand more about policies needed to protect domestic, community, and municipal wells from future drought periods.
- Seasonal forecasting of surface water and groundwater conditions will allow Yolo OES and partners to prepare for the effects of flood or drought on these communities, including predicting the location and severity of potential dry wells. Forecasting will also allow the cities of Davis, Woodland, and West Sacramento to better predict their surface water supplies for the coming year.
- Improved data management will provide stakeholders with accessible, easy-to-understand information about surface and groundwater conditions to support their engagement in the YSGA policy process and management of their personal water supply.

In addition, the economic viability of these DACs is highly dependent on agricultural production. This Project provides necessary data to support groundwater management decisions that will shape the County’s agricultural future. The Project integrates important considerations such as the prevention of groundwater overdraft and dry wells, and the potential economic losses caused by demand management.

Tribal Benefits

The Yocha Dehe Wintun Nation is a YSGA member agency, a Yolo Subbasin groundwater beneficial user, and an irrigation customer for surface water from the Cache Creek watershed. The Yocha Dehe Wintun Nation will directly benefit from a robust drought planning process and more secure water supplies in the Yolo Subbasin. The YSGA also will offer to model projects and management actions with the surface water-groundwater availability model. The Project does not support the Bureau of Reclamation’s Tribal trust responsibilities or a Reclamation activity with a Tribe.

¹⁸ <https://screeningtool.geoplatform.gov/>



Modeling Adaptive Strategies to Achieve Sustainability – Additional Attachments

**WaterSMART: Applied Science Grants for FY2023
No. R23AS00446**

October 13, 2023

Prepared For:
Bureau of Reclamation
Water Resources and Planning Office
Mail Code: 86-63000
P.O. Box 25007
Denver, CO 80225-0007

Submitted By:
Yolo Subbasin Groundwater Agency
34274 State Highway 16
Woodland, CA 95695
Kristin Sicke, Executive Officer
ksicke@yolosga.org
(530) 662-3211

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Environmental and Cultural Resources Compliance

The Project only involves data and modeling tasks, so will not impact any environmental or cultural resources. The specific information requested in section H.1 is outlined below:

- The Project will not include any earth-disturbing work or impact the surrounding environment.
- The Project will not negatively impact any federally listed species in Yolo County and will hopefully benefit federally listed species. Task 1, Milestone 1.2: Improve Land Use Data, will improve modeling of managed wetlands, which in turn will provide more accurate information about wetland habitat in Yolo County for three federally listed species (the giant garter snake, Least Bell's vireo, and the California tiger salamander).
- No impacts to water quality in any "Waters of the United States" will occur because of the Project.
- Yolo County Flood Control and Water Conservation District owns and operates three dams: Cache Creek Dam and Capay Dam (both constructed in 1914), and the Indian Valley Dam (constructed in 1975).
- The proposed project will not modify or affect any features of an irrigation system.
- No buildings, structures, or features owned by Yolo County Flood Control and Water Conservation District are currently listed on the National Register of Historic Places.
- There are no known archeological sites within the proposed project area.
- None of the proposed data acquisition and modeling tasks will result in disproportionately high and adverse effects on low income or minority populations.
- None of the proposed data acquisition and modeling tasks will limit access to, and ceremonial use of, Indian sacred sites or result in other impacts on tribal lands.
- The Project will not contribute to the introduction, continued existence, or spread of noxious weeds or non-native invasive species known to occur in the area.

Required Permits or Approvals

No permits or approvals are required for this project.

Overlap or Duplication of Effort Statement

There is no overlap associated with the implementation of this Project and other active or anticipated Yolo Subbasin Groundwater Agency proposals or projects. This Project is not duplicative of any proposal or project that has been or will be submitted for funding consideration to any other potential funding source.

Conflict of Interest Disclosure Statement

Per 2 CFR §200.112, the Yolo Subbasin Groundwater Agency has no actual or potential conflict of interest at the time of submission of this application. The Yolo Subbasin Groundwater Agency has an adopted Conflict of Interest Code approved by the California Fair Political Practices Commission.

Uniform Audit Reporting Statement

Yolo Subbasin Groundwater Agency acknowledges the requirement for a Single Audit report if expending \$750,000 or more in Federal award funds in the Yolo Subbasin Groundwater Agency's fiscal year. Currently, the Yolo Subbasin Groundwater Agency does not have access to other federal funds and does not anticipate expending more than \$400,000; however, if the Single Audit report becomes applicable, the Yolo Subbasin Groundwater Agency will ensure compliance.

SF-LLL: Disclosure of Lobbying Activities

Yolo Subbasin Groundwater Agency has no lobbying activities to disclose.

Letters of Support

Please see below the letters of support from Yolo County, Dunnigan Water District, Reclamation District 108, Westside Sac IRWM, and the Community Alliance with Family Farmers.



County of Yolo

DEPARTMENT OF COMMUNITY SERVICES

Leslie Lindbo
DIRECTOR

292 West Beamer Street
Woodland, CA 95695-2598
(530) 666-8775
www.yolocounty.org

September 22, 2023

Bureau of Reclamation
Columbia-Pacific Regional Office
1150 N. Curtis Road
Boise, Idaho 83706

Subject: Letter of Support for Yolo Subbasin Groundwater Agency's *Modeling Adaptive Strategies to Achieve Sustainability Project*

Dear Grant Review Committee Members,

Yolo County is pleased to express support for the Yolo Subbasin Groundwater Agency's (YSGA) WaterSMART Applied Science Grant Program application to update existing Yolo Subbasin groundwater models and data, develop a seasonal forecasting platform, and improve public access to this information.

The Yolo Subbasin Groundwater Agency's *Modeling Adaptive Strategies to Achieve Sustainability Project* will improve groundwater sustainability and help to prevent overdraft of the Yolo Subbasin and increase resilience to climate change. YSGA's approach will improve access to and use of hydrologic data, develop and improve water management tools, and improve modeling and forecasting capabilities. Water managers in Yolo County and surrounding subbasins will use the improved data and tools to increase water supply reliability, improve water management, evaluate water marketing strategies, promote groundwater conservation and irrigation efficiency, and support drought management activities in Yolo County.

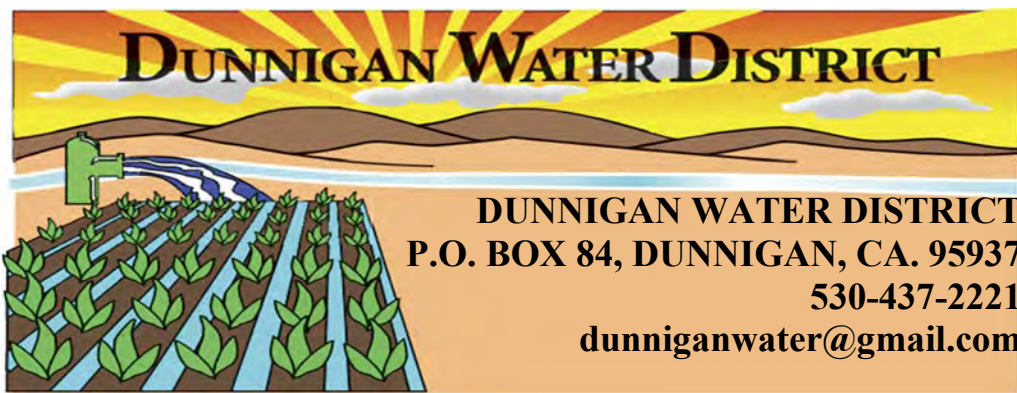
From Yolo County's perspective, YSGA's work to further this project is critical. As an agricultural County whose economy depends on a healthy and sustainable groundwater supply, we believe this project is important because climate resiliency and groundwater sustainability affects all Yolo County residents.

Please feel free to reach me at Leslie.Lindbo@yolocounty.org or (530) 666-8775 if you have any questions or require additional information. Thank you for your time and consideration.

Sincerely,

Leslie Lindbo

Director, Department of Community Services
Yolo County



September 25, 2023

Bureau of Reclamation
Columbia-Pacific Regional Office
1150 N. Curtis Road
Boise, Idaho 83706

Subject: Letter of Support for Yolo Subbasin Groundwater Agency's Modeling Adaptive Strategies to Achieve Sustainability Project

Dear Grant Review Committee Members,

Dunnigan Water District (DWD) strongly supports the Yolo Subbasin Groundwater Agency's (YSGA) application to the WaterSMART Applied Science Grant Program to update existing Yolo Subbasin groundwater models and data, develop a seasonal forecasting platform, and improve public access to this information. As a local agency working alongside Yolo GSA to monitor and manage the subbasin, we believe this project is important because it will improve the ability to keep the Yolo Subbasin in a sustainable condition and plan future actions to maintain that sustainability by enabling better public access and providing more accurate outlooks.

The proposed project further addresses pressing groundwater management actions necessary to adapt and respond to climate change. The Modeling Adaptive Strategies to Achieve Sustainability Project will improve groundwater sustainability and help to prevent overdraft of the Yolo Subbasin. YSGA's approach is consistent with the WaterSMART Applied Science Grant Program's objective to improve access to and use of hydrologic data, develop and improve water management tools, and improve modeling and forecasting capabilities. Water managers in Yolo County will use the improved data and tools to increase water supply reliability, improve water management, evaluate water marketing strategies, promote groundwater conservation and irrigation efficiency, and support drought management activities in Yolo County.

From DWD's perspective, YSGA's work to further this project is critical to maintaining the sustainability of our basin and to help alleviate subsidence that has been occurring for the past century. Our own District facilities are highly susceptible to subsidence caused by groundwater depletion and sustainability is crucial for our landowners.

Please feel free to reach me at wvanderwaal@rd108.org or 530.812.6276 if you have any questions or require additional information. Thank you for your time and consideration.

Sincerely,

A handwritten signature in blue ink, appearing to read "W Vanderwaal", is positioned above the typed name.

William Vanderwaal
General Manager
Dunnigan Water District

September 25, 2023



**Reclamation
District 108**

975 Wilson Bend Road
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and Secretary
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Deputy Managers
William R Vanderwaal
Meegan Nagy

Bureau of Reclamation
Columbia-Pacific Regional Office
1150 N. Curtis Road
Boise, Idaho 83706

Subject: Letter of Support for Yolo Subbasin Groundwater Agency's
Modeling Adaptive Strategies to Achieve Sustainability Project

Dear Grant Review Committee Members,

Reclamation District 108 strongly supports the Yolo Subbasin Groundwater Agency's (YSGA) application to the WaterSMART Applied Science Grant Program to update existing Yolo Subbasin groundwater models and data, develop a seasonal forecasting platform, and improve public access to this information. As a local agency working alongside Yolo GSA to monitor and manage the subbasin, we believe this project is important because it will improve the ability to keep the Yolo Subbasin in a sustainable condition and plan future actions to maintain that sustainability by enabling better public access and providing more accurate outlooks.

The proposed project further addresses pressing groundwater management actions necessary to adapt and respond to climate change. The Modeling Adaptive Strategies to Achieve Sustainability Project will improve groundwater sustainability and help to prevent overdraft of the Yolo Subbasin. YSGA's approach is consistent with the WaterSMART Applied Science Grant Program's objective to improve access to and use of hydrologic data, develop and improve water management tools, and improve modeling and forecasting capabilities. Water managers in Yolo County will use the improved data and tools to increase water supply reliability, improve water management, evaluate water marketing strategies, promote groundwater conservation and irrigation efficiency, and support drought management activities in Yolo County.

From Reclamation District 108's perspective, YSGA's work to further this project is critical to maintaining the sustainability of our basin and to help alleviate subsidence that has been occurring for the past century.

Please feel free to reach me at lbair@rd108.org or 530.437.2221 if you have any questions or require additional information. Thank you for your time and consideration.

Sincerely,

A handwritten signature in blue ink that reads 'L Bair'.

Lewis Bair
General Manager
Reclamation District 108



Christopher M. Silke, P.E.
Napa County Flood Control and Water Conservation District
804 First Street,
Napa, CA 94558

October 2, 2023
Bureau of Reclamation
Columbia-Pacific Regional Office
1150 N. Curtis Road
Boise, Idaho 83706

Subject: Letter of Support for the Yolo Subbasin Groundwater Agency's Modeling Adaptive Strategies to Achieve Sustainability Project

Dear Grant Review Committee Members,

The Westside Sacramento Integrated Regional Water Management (IRWM) Coordinating Committee strongly supports the Yolo Subbasin Groundwater Agency's (YSGA) application to the WaterSMART Applied Science Grant Program to update existing Yolo Subbasin groundwater models and data, develop a seasonal forecasting platform, and improve public access to this information. As a regional partnership working to identify and address regional water resources opportunities and challenges, we believe this project is important because it will increase understanding of the Yolo Subbasin and improve regional resilience to expected changes in weather patterns, including prolonged drought conditions.

The *Modeling Adaptive Strategies to Achieve Sustainability Project* will improve groundwater sustainability and help to prevent the overdraft of the Yolo Subbasin. YSGA is a trusted and respected local agency and the products it develops through this project will be widely accepted in the water supply community. Water managers in Yolo County will use the improved data and tools to increase water supply reliability, improve water management, evaluate water marketing strategies, promote groundwater conservation and irrigation efficiency, and support drought management activities in Yolo County.

From the IRWM perspective, YSGA's work to further this project is critical because many of the agricultural producers in Yolo County rely exclusively on groundwater, and understanding the capacity and constraints of the groundwater system is vital to sustainable agriculture, which is a major component of the local and regional economy.

Please feel free to reach me at Christopher.Silke@countyofnapa.org or (707) 299 – 1755 if you have any questions or require additional information. Thank you for your time and consideration.

Sincerely,

A handwritten signature in blue ink that reads "Christopher Silke".

Christopher M. Silke, P.E.
Westside IRWM Coordinating Committee Chair
Engineering Manager – Water Resources
Napa County Flood Control and Water Conservation District



September 21, 2023

Bureau of Reclamation
Columbia-Pacific Regional Office
1150 N. Curtis Road
Boise, Idaho 83706

Subject: Letter of Support for Yolo Sub-basin Groundwater Agency's *Modeling Adaptive Strategies to Achieve Sustainability Project*

Dear Grant Review Committee Members,

The Community Alliance with Family Farmers (CAFF) has represented small and mid-scale family farmers in California for over 45 years, seeking to preserve family-scale agriculture, promote local food systems, and advance environmental sustainability.

CAFF strongly supports the Yolo Sub-basin Groundwater Agency's (YSGA) application to the WaterSMART Applied Science Grant Program to update existing Yolo Sub-basin groundwater models and data, develop a seasonal forecasting platform, and improve public access to this information. As a local agency working with the CA Department of Water Resources to improve outreach and engagement with small farms in the Sustainable Groundwater Management Act, we have found numerous small farms in the Yolo Sub-basin affected by declining groundwater levels. The YSGA has lacked sufficient data to anticipate such impacts and we believe that this project will assist them in improving their modeling across the sub-basin.

Though the Yolo County Flood Control and Water Conservation District, which is leading the YSGA, has long-term data, the agency only covers a portion of the YSGA territory and needs more data and improved modeling to cover the entire sub-basin. The sub-basin has also seen the increased planting of perennial water-intensive crops that alter the water demand profile of agriculture. Furthermore, climate change impacts call into question the relevance of historical time series and require new modeling approaches. The *Modeling Adaptive Strategies to Achieve Sustainability Project* will improve groundwater sustainability and help to prevent overdraft of the Yolo Sub-basin.

From CAFF's perspective, YSGA's work to further this project is critical because it is urgent to improve the agency's data and modeling to avoid drought impacts on small farms that we have seen result through well interference from large orchards.

Please feel free to reach me at dave@caff.org, 530-756-1298 (o), or 310-925-0857 (cell) if you have any questions or require additional information.

Sincerely,

David Runsten
Water Policy Director

Official Resolution

The Yolo Subbasin Groundwater Agency Board of Directors adopted an official resolution on September 18, 2023.

RESOLUTION NO. 23-02

A RESOLUTION OF THE BOARD OF DIRECTORS OF THE YOLO SUBBASIN GROUNDWATER AGENCY APPROVING THE APPLICATION TO THE USBR FOR THE WATERSMART APPLIED SCIENCE GRANT PROGRAM

WHEREAS, 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”). SGMA became effective on January 1, 2015; and

WHEREAS, the Yolo Subbasin Groundwater Agency (“YSGA”) is a joint powers authority established and existing pursuant to a Joint Exercise of Powers Agreement (“YSGA JPA”) dated and effective June 19, 2017 and the Joint Exercise of Powers Act, Cal. Government Code section 6500 *et seq.*; and

WHEREAS, pursuant to SGMA, YSGA is the Groundwater Sustainability Agency (“GSA”) for the Yolo Subbasin of the Sacramento Valley Groundwater Basin, California Department of Water Resources Basin No. 5-21.67 (“Subbasin”); and

WHEREAS, the [YSGA JPA Article 3.6 – Powers of the Agency](#) – confirms the YSGA has the power to borrow funds and apply for grants and loans for the funding of activities within the purposes of the Agency; and

WHEREAS, the YSGA adopted the [Yolo Subbasin GSP](#) on January 24, 2022, which included 12 Management Actions and 77 Projects for ensuring sustainable groundwater management, and the YSGA is interested in obtaining grant funding to implement these Management Actions and Projects; and

WHEREAS, the YSGA is seeking to improve regional water management with advanced data and tools necessary for water managers within the subbasin to understand and react to basin conditions proactively; and

WHEREAS, the United States Bureau of Reclamation (USBR) has published a notice of funding opportunity for the WaterSMART Applied Science Grants (NOFO No. R23AS00446); and the YSGA appreciates USBR’s solicitation and funding opportunity.

NOW, THEREFORE, BE IT RESOLVED:

1. The Board of Directors of the Yolo Subbasin Groundwater Agency allows an application to be made to the United States Bureau of Reclamation (USBR) for the USBR WaterSMART Applied Science Grant Program.
2. The Board of Directors of YSGA has the authority and shall enter into a funding agreement with the United States Bureau of Reclamation to receive a grant, if selected.
3. The Board of Directors of YSGA authorizes and directs the Executive Officer, or designee, to prepare the necessary data, conduct investigations, and file such application. Additionally, if selected for a WaterSMART Grant, the YSGA will work with USBR to meet established deadlines for entering into a cooperative agreement.

Certification of Secretary

The undersigned hereby certifies that the foregoing resolution was duly adopted by the Board of Directors of YSGA at a special meeting held on September 18, 2023, by the following vote:

AYES: City of Davis, City of West Sacramento, City of Winters, City of Woodland, Dunnigan Water District, Madison Community Service District, Reclamation District 108, Reclamation District 307, Reclamation District 537, Reclamation District 730, Reclamation District 765, Reclamation District 787, Reclamation District 999, Rumsey Water Users Association, Yocha Dehe Wintun Nation, Yolo County, Yolo County Flood Control and Water Conservation District, California American Water Company – Dunnigan, Yolo County Farm Bureau, and Environmental Representative – Ann Brice.

NOES: None.

ABSTAIN: None.

ABSENT: Esparto Community Service District, Reclamation District 150, Reclamation District 1600, Reclamation District 2035, University of California, Davis, and Colusa Drain Mutual Water Company.



Kristin Sicke, Board Secretary




Dated: September 18, 2023

Letters of Funding Commitment

If selected, Yolo Subbasin Groundwater Agency will provide letters of funding commitment prior to the award.

Figure 1: Location of the Yolo Subbasin within the Sacramento Valley Groundwater Basin



-  Yolo Subbasin Boundary
-  Sacramento Valley Groundwater Basin
-  County Boundaries

Source: CA DWR Bulletin 118 Groundwater Basins, ESRI

