Hungry Hollow Project Implementation White Paper

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And in collaboration with:
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Covers: Front: Almond bloom on a Yolo County Farm
Back: Water flows through the Tehama-Colusa Canal near Dunnigan
Photo credit: YCFC&WCD, Sarah Leicht

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PLAIN LANGUAGE SUMMARY

The Hungry Hollow area spans ~50,000 acres north of Esparto and has a long history of flooding and erosion issues impacting farmland, roads, and District infrastructure dating back to the 1960s when it was first documented. Hungry Hollow floods in 2 out of every 3 years and flooding and erosion damage can impact up to 11,000 acres. In the last 15 years, groundwater levels during drought periods in domestic wells have increasingly become a concern in addition to flooding and erosion. Groundwater level declines have resulted in a loss of groundwater in storage between 2014 – 2024 of ~6,600 AFY. Although there's been a 319% expansion of tree crops in Hungry Hollow between 2008 and 2024, the total applied water demand in Hungry Hollow has only increased by 7% during that same period. To address flooding, erosion, and groundwater level decline concerns in Hungry Hollow, landowners and the YSGA have come together and created the Hungry Hollow Groundwater Working Group to develop practical solutions to address these concerns building upon historical efforts led by landowners and the Yolo RCD. Several landowners have taken the initiative to coordinate with the YSGA, District, Yolo RCD, and Center for Land Based Learning to support the conceptual planning of six projects, all of which have been approved by both the Hungry Hollow Groundwater Working Group and the YSGA Board to advance implementation as soon as possible. The six projects will collectively turn flooding and erosion damage during wet periods and groundwater level declines during droughts from a negative to a positive. Implementing these six projects will provide multiple benefits to substantially reduce flooding and erosion damage, fully offset groundwater level declines and increase groundwater levels over time, and cost savings with significant added benefit compared to the status quo.

EXECUTIVE SUMMARY

The Hungry Hollow Project Implementation White Paper outlines a community-driven, collaborative approach to addressing long-standing flooding, erosion, and groundwater sustainability challenges in the Hungry Hollow watershed, located north of Esparto in Yolo County. Spanning approximately 49,620 acres, the area has faced recurrent flooding (typically occurring in 2 out of 3 years), erosion from western hills runoff, and declining groundwater levels during droughts, which may damage cropland and irrigation canals, and the operation of irrigation systems, domestic wells, and agricultural wells.

This white paper provides a comprehensive assessment and management framework for the Hungry Hollow groundwater area. It begins with an overview of the region's physical characteristics, including its soils, agricultural land use, and flooding and erosion challenges. It describes the collaborative community partnership established to support groundwater management, outlining stakeholder engagement, governance, and the role of the Hungry Hollow Groundwater Working Group. A significant portion of the document focuses on the hydrogeologic conceptual model, examining the area's geology, hydrology, groundwater conditions, water quality, land use and crop conversions, water budget, and aquifer dynamics, including the impacts of drought, precipitation, and groundwater recharge.

This white paper builds on decades of local stewardship efforts, including the 2011 Hungry Hollow Watershed Stewardship Plan, and advances implementation of the 2022 Yolo Subbasin Groundwater Sustainability Plan (GSP) through the Hungry Hollow Groundwater Working Group for the Hungry Hollow area. Formed in 2025 as an ad-hoc advisory body to the Yolo Subbasin Groundwater Agency (YSGA), the Working Group—comprising local landowners—has identified, prioritized, and recommended six voluntary projects and management actions to increase groundwater recharge, reduce pumping through conjunctive use, improved land management, voluntary pumping reduction during droughts, and mitigation of flood and erosion risks.

This white paper explains the six prioritized projects in more detail and establishes next steps for piloting projects that are ready to implement while continuing to develop the scope, schedule, and budget for conceptual projects. The six prioritized projects are summarized below:

- **Hungry Hollow Winter On-Farm Recharge**: Utilizing existing canal infrastructure to spread winter surface water on up to 6,000+ acres of agricultural land (planning-level benefit estimated as 4,000 acre-feet per year (AFY) direct recharge).
- **Oat Creek Trickle Flow Recharge**: Slow diversion of water into Oat Creek for bed infiltration (planning-level benefit estimated as 20 AFY direct recharge).
- **Increase Conjunctive Use**: Connecting groundwater-irrigated lands (potential ~2,500 acres) to surface water delivery for in-lieu recharge (planning-level benefit estimated as 3,300 AFY in lieu recharge).
- **Voluntary Land Conversion and Water Management Practices**: Cover cropping, soil health improvements, and related practices on ~3,300 acres (planning-level benefit estimated as 3,100 AFY reduced applied water/improved infiltration).
- **Fox Canyon Slough Stormwater Capture and Recharge**: Culvert maintenance, regulating pond, bank benching, and capture features (planning-level benefit estimated as 90 AFY direct recharge).
- **Western Hills Erosion Management and Flood Managed Aquifer Recharge**: Rock dams, sediment traps, basins, and cover cropping to reduce runoff and capture flows for recharge (planning-level benefit estimated as 300 AFY direct recharge).

Collectively, the portfolio offers approximately 11,000 AFY in recharge benefits (range: 5,400–21,800 AFY), sufficient to offset modeled groundwater storage deficits in the area while providing substantial co-benefits including reduced flood damage (historically estimated at $16.80–$173+/acre annually; inflation adjusted), improved soil health, habitat enhancement, and agricultural resilience.

A phased implementation is recommended over the next 3+ years, starting with pilots for on-farm and Oat Creek recharge using existing infrastructure, while advancing planning, design, permitting, and funding for the other projects (Conjunctive Use, Land Management Practices, Fox Canyon, and Western Hills). Funding will need to combine landowner contributions, local agency support (YSGA, YCFCWCD, Yolo RCD, and Center for Land-Based Learning), and external grants to advance projects. Success depends on continued landowner participation, adaptive management based on monitoring, and integration with broader YSGA efforts. Early implementation of one or more of the proposed projects would maximize long-term cost savings and benefits, significantly outperforming the status quo of delaying action for another decade.

This white paper provides the technical foundation, governance framework, and actionable path forward to achieve sustainable groundwater management and watershed health in Hungry Hollow.

1. INTRODUCTION

The Yolo Subbasin Groundwater Agency (YSGA) is the Groundwater Sustainability Agency (GSA) responsible for implementing the Sustainable Groundwater Management Act (SGMA) in the Yolo Subbasin. YSGA works collaboratively with local agencies, landowners, and stakeholders to develop and implement the Yolo Subbasin Groundwater Sustainability Plan (GSP), adopted in 2022, which establishes sustainable management criteria for groundwater levels, quality, subsidence, and interconnected surface waters.

The preparation and development of this white paper was funded by the Department of Water Resources (DWR) SGMA Implementation Grant awarded to the YSGA in 2024. It documents the extensive community partnership and data-driven process undertaken in the Hungry Hollow area to identify, prioritize, and advance specific projects and management actions consistent with the GSP.

Hungry Hollow, a ~49,620-acre watershed north of Esparto bounded by the Capay Hills, Dunnigan Hills, and Cache Creek, has a long history of flooding, erosion, and more recent concerns regarding groundwater declines during drought periods. Through the Hungry Hollow Groundwater Working Group—established in 2025 following years of engagement via the earlier Hungry Hollow Sustainability Committee—landowners, YSGA staff, and partners (including West Yost Associates, Consero Solutions, Yolo County Resource Conservation District [Yolo County RCD], and Center for Land-Based Learning) have developed a robust hydrogeologic conceptual model, assessed data gaps, evaluated implementation options, and selected a prioritized portfolio of projects.

This white paper summarizes the physical and hydrogeologic setting (Section 2 and 5), community partnership and governance (Sections 3–4), project selection process (Section 6), detailed project descriptions and benefits (Section 7), and implementation and funding strategies (Section 8). Attachments provide supporting documents, including the Engagement Strategy, Charter, geologic cross-sections, groundwater hydrographs, and project ranking details.

The recommendations herein support proactive, voluntary, multi-benefit actions that enhance groundwater sustainability, reduce flood and erosion risks, and sustain the productive agricultural economy of Hungry Hollow while respecting private property rights and building on decades of local stewardship.

The preparation and development of this white paper was funded by the DWR SGM Implementation Grant awarded to the YSGA January 2024.

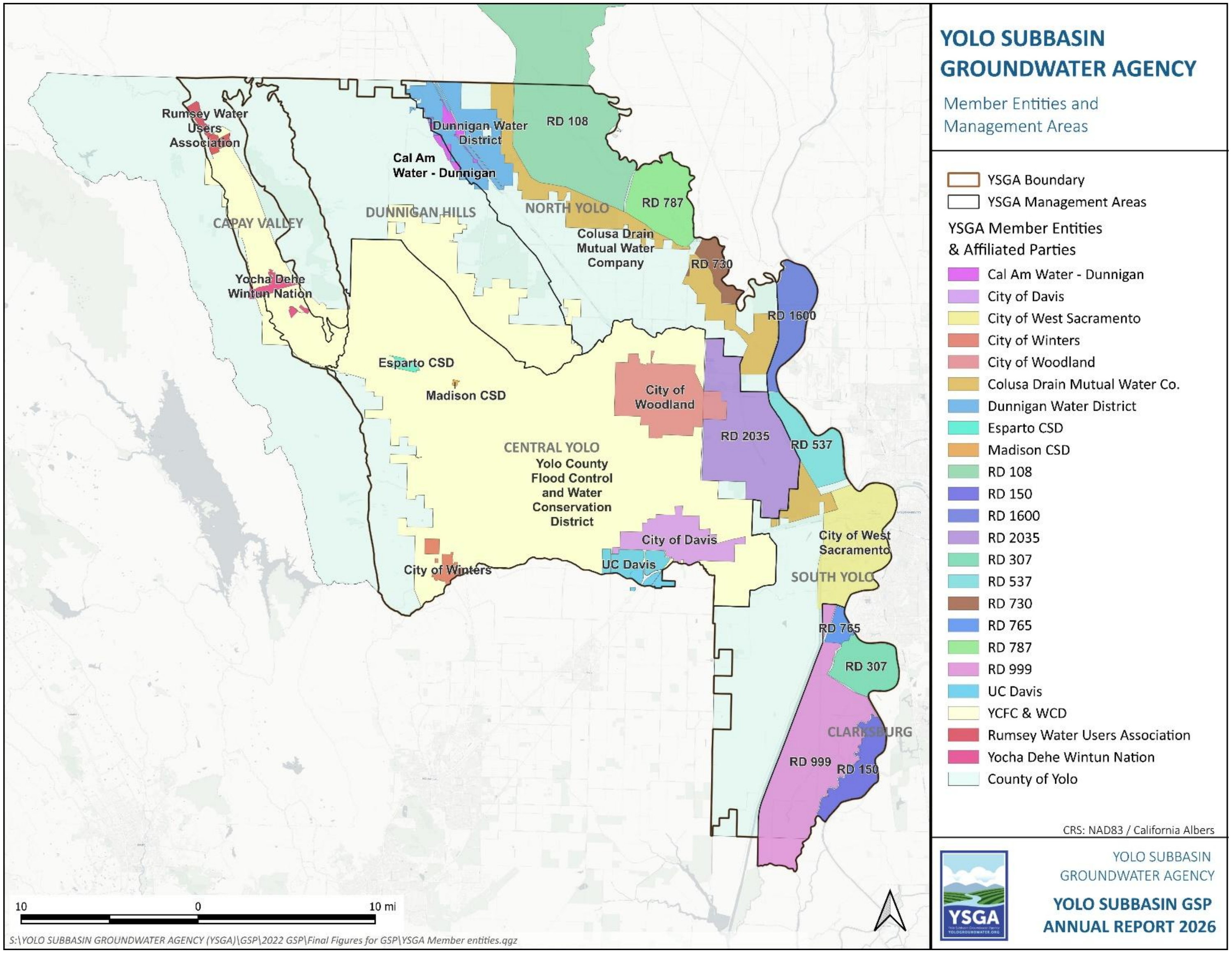

Figure 1. YSGA Management Areas and Member Entities.

2. HUNGRY HOLLOW AREA

2.1 Physical Setting

The Hungry Hollow Groundwater Working Group (Working Group; Figure 2) contains ~49,620 acres north of Esparto and is bounded by the Capay Hills to the west, Dunnigan Hills to the north, and Cache Creek to the south. This boundary that delineates Hungry Hollow was agreed upon by the Working Group members to reflect the extend of land that is either contained within the Goodnow Slough (i.e. Hungry Hollow) watershed, Yolo County Flood Control and Water Conservation District (YCFCWCD) service area, or lands that are managed by Working Group members. Vegetative cover on the hills typically is made up of non-native grasses and scattered oaks while in the lower hills, dryland barley and wheat is grown and natural cover is largely absent. Irrigated land makes up 60% (based on 2024 land use and crop data) of the area and is primarily located on the valley floor. The Goodnow Slough is the largest natural channel in the area that transports water and sediment from the hills to the valley floor floodplain during storms that result in a “flashy” hydrologic system. The Goodnow Slough extends into the Capay Hills and drains ~32,900-acres of land.

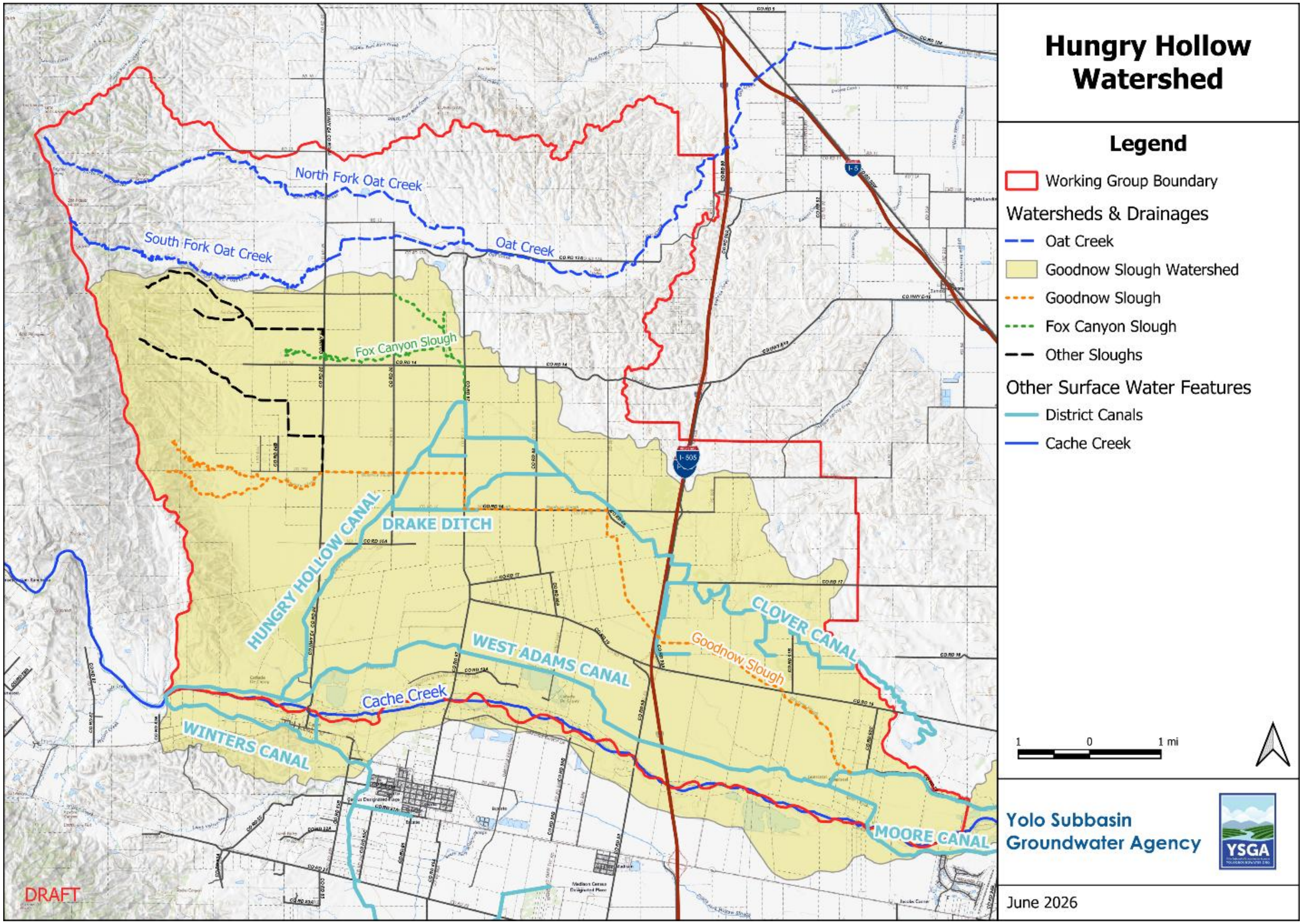

Figure 2. Hungry Hollow watershed.

2.2 Soils

Soils in the upper watershed are derived from upper Cretaceous marine sedimentary formations. These are mainly sandstone, conglomerate, and shale of the Tehama formation. Soils of the low terraces are derived from the upper Pleistocene non-marine sedimentary deposits which consist of silt, clay, silty sand, and basal beds of reworked tuff. The Red Bluff formation lies at the base of the Capay Hills and generally delineates the boundary between the upper watershed and the lower. This formation is easily eroded and is distinguished by poorly sorted, reddish-brown sands and gravels and minor clay beds. The lower watershed is overlain by Pleistocene and recent alluvial fan deposits. Soils vary widely throughout the lower watershed. The proportion of silts and clay increase in the lower extremities of the watershed. Sandy clays appear to be the most prevalent soil type except in areas adjacent to Cache Creek. The creek has meandered over considerable areas north of its present location and has deposited sand and gravel. Most of the soils in Hungry Hollow's valley are considered Class I soils (i.e. highest-quality agricultural lands, featuring deep, well-drained profiles with very few limitations for crop production) with few restrictions for agricultural use. For detailed description of soils within the area, see the GSP (YSGA, 2022) or Hungry Hollow Watershed Stewardship Plan (Stewardship Plan, 2011). Figure 3 shows the soils map provided in the Stewardship Plan.

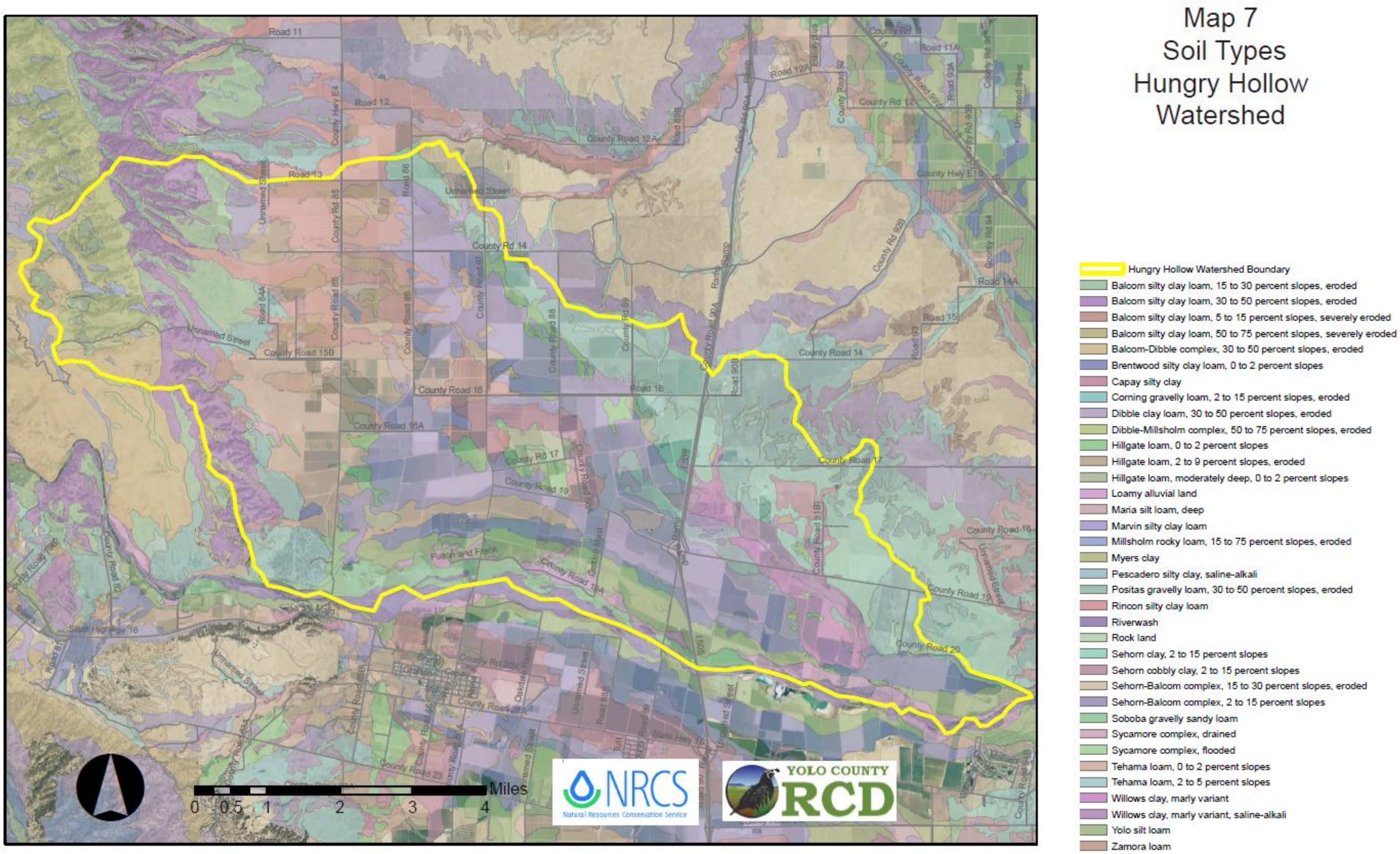

Figure 3. Hungry Hollow watershed soil types (source: Stewardship Plan).

2.3 Agriculture

The California Department of Conservation's (DOC) Farmland Mapping and Monitoring Program (FMMP) produces maps and statistical data used for analyzing impacts on California's agricultural resources. Agricultural land is rated according to soil quality and irrigation status; the best quality land is called Prime Farmland. The maps are updated approximately every two years with the use of GIS data, public review, and field reconnaissance and can be useful in prioritizing agricultural land preservation efforts as well as understanding land use changes over time.

FMMP's study area is contiguous with modern soil surveys developed by the US Department of Agriculture (USDA). The minimum land use mapping unit is 10 acres unless specified. Smaller units of land are incorporated into the surrounding map classifications. To most accurately represent the Natural Resource Conservation Service (NRCS) digital soil survey, soil units of one acre or larger are depicted in Important Farmland Maps. Hungry Hollow Watershed Stewardship Plan (Stewardship Plan; 2011) describes in more detail the farmland shown on Figure 4.

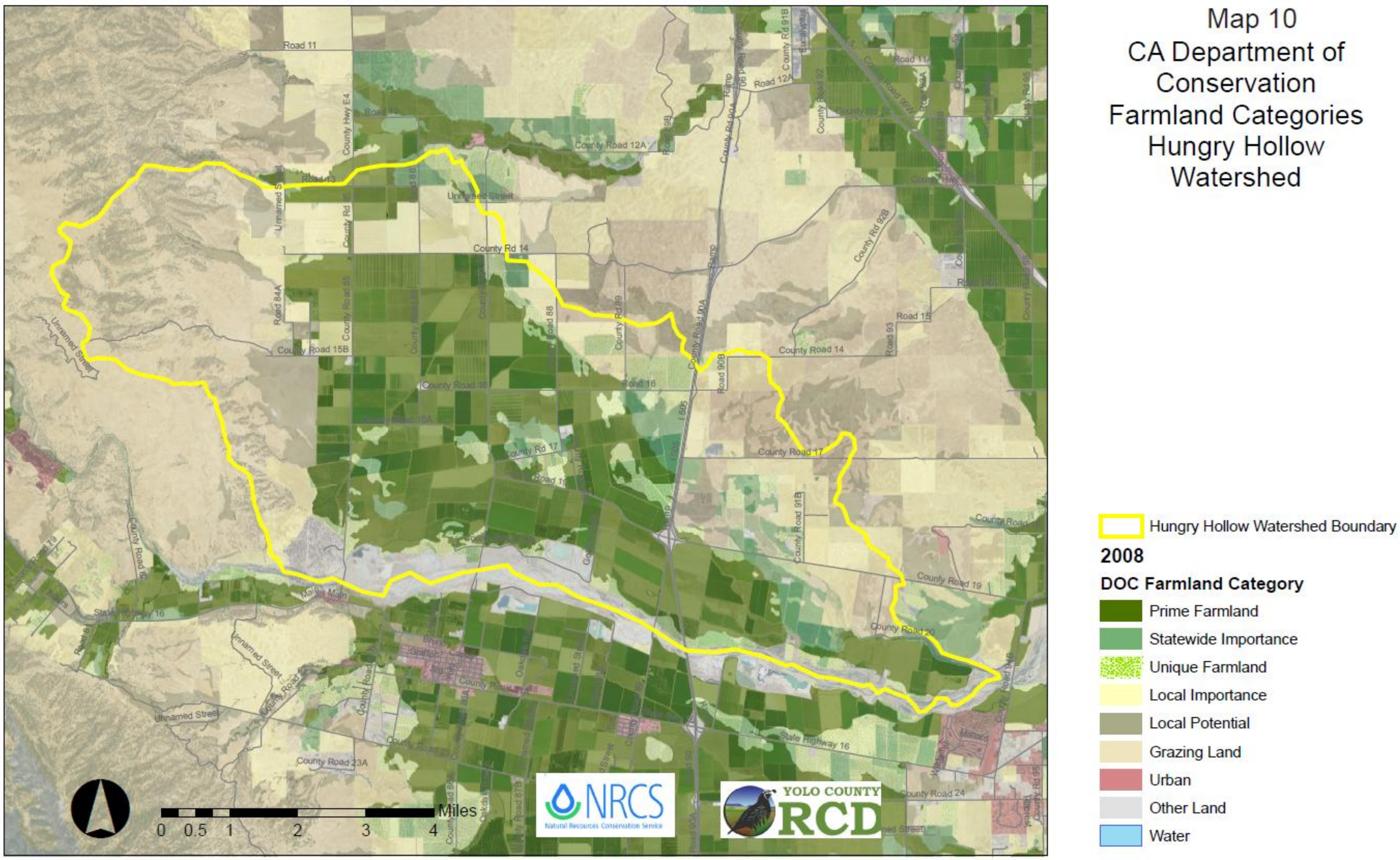

Figure 4. Hungry Hollow watershed farmland categories (source: Stewardship Plan).

2.4 Flooding and Erosion Issues

In 1964, the Northern Yolo Soil Conservation District (NYSCD) and YCFCWCD requested the California State Division of Soil Conservation to make a reconnaissance investigation of the Hungry Hollow area. This study was completed in November 1966 (NYSCD & YCFCWCD, 1966) and found that the average annual area inundated spanned over 1,000 acres and the estimated annual cost of flood damage was estimated to be greater than $16.80/acre. Assuming flood protection of 10% of the area, it was estimated that the same cost in flood damages could be offset by implementing projects that used land treatment and structures in sloughs to implement this level of flood protection. Figure 5 shows the areas where in 1966 flooding was known to occur.

In 1971, NYSCD and YCFCWCD prepared the Hungry Hollow Watershed Work Plan document (NYSCD & YCFCWCD, 1971). This document identified that flooding occurs in the Hungry Hollow watershed in 2 out of 3 years and typically occurs within the months of December, January, and February. Historical flooding can impact up to 10,500 acres and has resulted in significant agricultural losses. Frequent flooding delays early spring planting, impacts farming operations, and damages roads. Figure 6 shows the potential areas that could be impacted by flooding within the 100-year flood zone as designated by FEMA. When comparing Figure 5 and 6, the area prone to inundation is relatively similar.

Due to long standing historical flooding and erosion issues within the Hungry Hollow watershed, the Hungry Hollow Soil Conservation District (HHSCD) was formed in 1957. HHSCD's purpose was to correct flooding issues within the watershed. HHSCD was responsible for designing and installing a flood conveyance system. This mandate presented difficulties that HHSCD could not overcome with its own resources. The main deficiency was its lack of adequate taxing power and right of eminent domain. As a result, the proposed system was only partly completed (Hungry Hollow No. 3). In 1961, the HHSCD was combined with the NYSCD for greater operating efficiency (NYSCD & YCFCWCD, 1971).

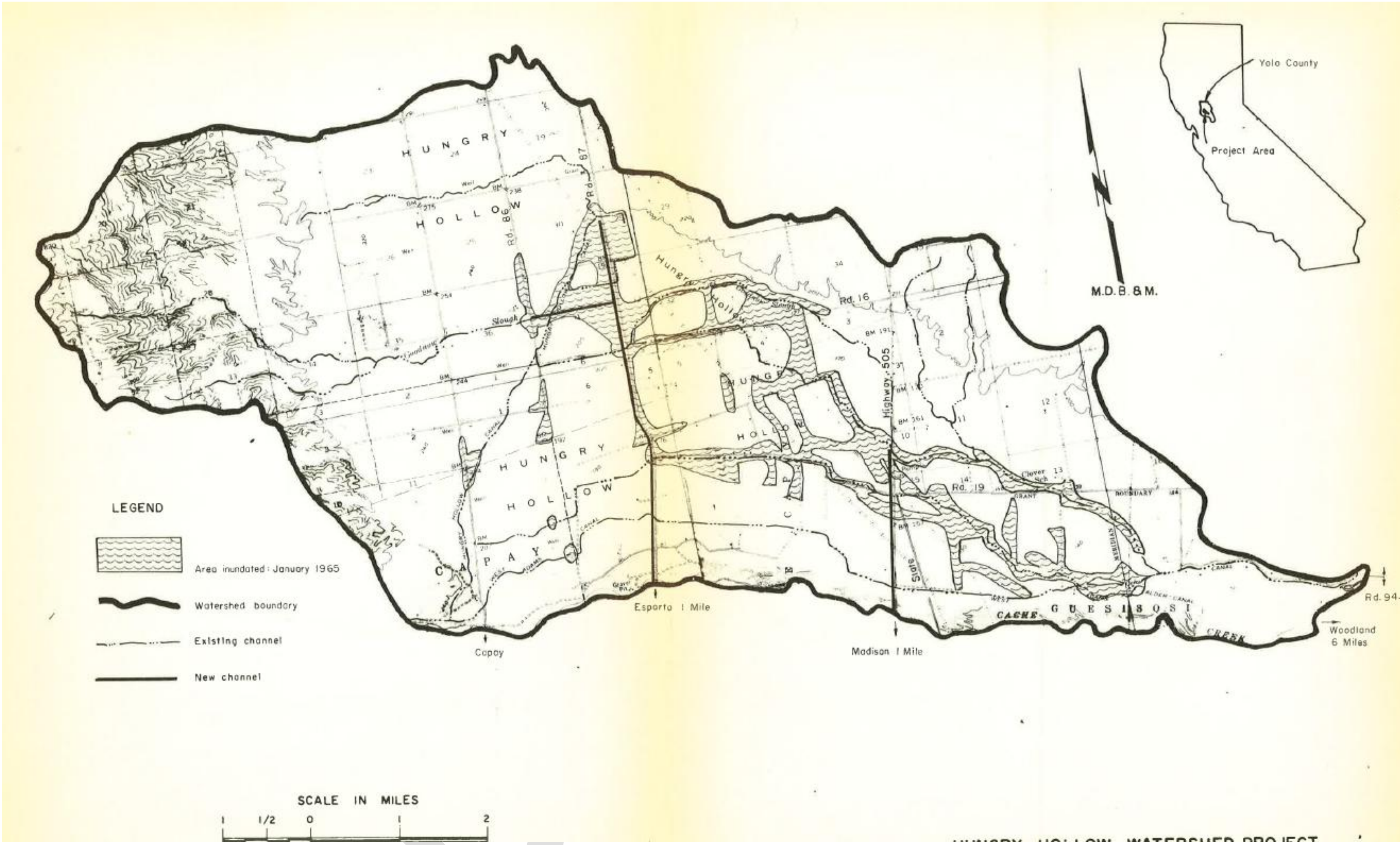

Figure 5. Flood areas identified in 1966 (source: NYSDC & YCFCWCD).

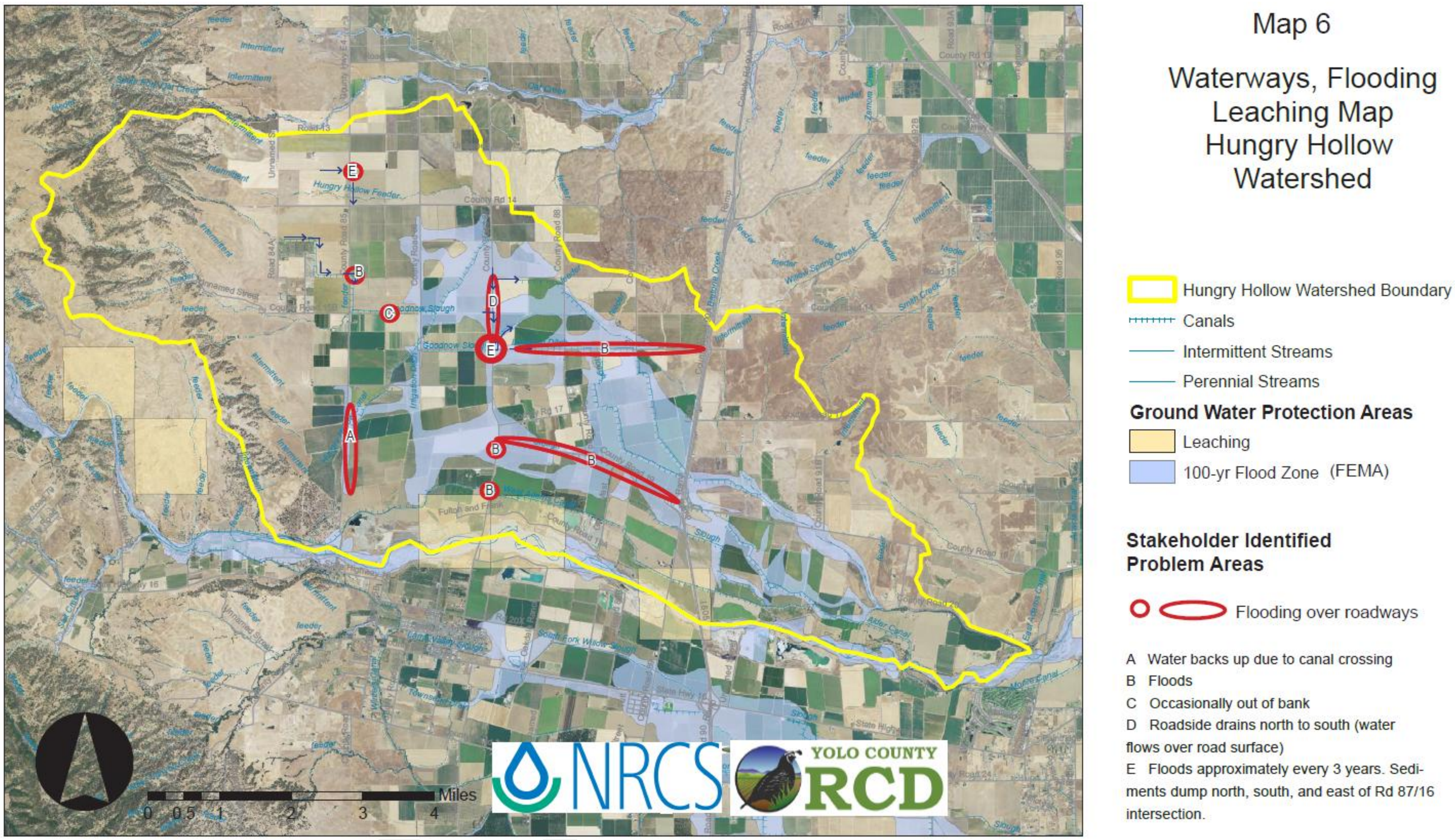

Figure 6. 100-year flood zone areas and identified flood areas by stakeholders in 2011 (source: Stewardship Plan).

3. COMMUNITY PARTNERSHIP

This White Paper builds on an extensive history of community collaboration, data collection, and analysis conducted in Hungry Hollow since the 1960s, when the community first started documenting flooding and erosion issues. The Hungry Hollow community worked with the NYSCD and YCFCWCD to document flooding and erosion issues that occurred between the 1960s and 1970s. The Hungry Hollow community then worked with the Yolo RCD in the 2000s to develop the Stewardship Plan, which documented flooding, erosion, water quality, water resources, land use, wildlife habitat, and invasive vegetation concerns. In 2021, the YSGA worked with Hungry Hollow landowners and interested parties to create the informal Hungry Hollow Sustainability Committee in response to these long-term community concerns and increasing concerns about groundwater sustainability.

In 2025, the Hungry Hollow Sustainability Committee evolved into the Working Group, focused on recommending groundwater sustainability project and management actions to the YSGA Board of Directors consistent with the Yolo Subbasin GSP. Over the course of six years (2021 – present), the YSGA and the Hungry Hollow community met 19 times to review data and identify, prioritize, and attempt to make progress to implement projects and management actions to help achieve groundwater sustainability.

During this time, the YSGA also worked with the community to secure significant grant funding (~$440,000 in total) to help support ongoing efforts to address identified challenges in Hungry Hollow. The following sections describe the history of YSGA's partnership with the Hungry Hollow community, including cooperative efforts to secure grant funding to support continued partnership, community engagement, data collection, and project implementation.

3.1 Background

The Hungry Hollow watershed has experienced annual flooding and erosion issues for decades (NYSCD & YCFCWCD, 1971) and has also been documented as a concern in the Hungry Hollow Watershed Stewardship Plan (Stewardship Plan; 2011). Landowners formed the Hungry Hollow Stakeholders Group in 2007 to address Hungry Hollow resources issues with the support of the Yolo County Resource Conservation District. The Hungry Hollow Stakeholders Group completed the Hungry Hollow Watershed Stewardship Plan in 2011 and documented the following resource concerns:

Erosion: *Rangeland, Farmland (agricultural runoff)*

Water Quality and Water Resources: *Flooding, Drainage, Sediment, Groundwater, Surface Water, Conservation*

Land Use: *Agricultural land protection/conservation, Private property rights*

Wildlife and Wildlife Habitat: *Beneficial wildlife, Harmful wildlife, Habitat needs, Endangered/Threatened Species*

Invasive Vegetation: *Rangeland, Farmland, Riparian, Roadsides*

Native Vegetation: *Perennial grasslands, Oak woodlands, Hedgerows, Riparian areas (creeks, canals, sloughs, and irrigation ditches)*

Of the resource concerns identified, flooding and erosion were identified as a major concern. Most of the members of the Stakeholders Group had an interest in improving land management practices to increase water infiltration and slow stormwater flows, as well as coordinating management of stormwater flows through existing water channels.

The Stewardship Plan establishes goals and associated objectives to guide voluntary action by landowners. The goals and objectives documented in the Stewardship Plan and current progress to date are shown below in Table 1.

Table 1. Hungry Hollow Watershed Stewardship Plan progress since adoption.

Category	Item ID	Description	Status
Erosion & Sedimentation	**GOAL 1**	**Manage watershed lands to minimize unnatural rates of erosion and sedimentation**	
	Objective 1.1	Reduce streambank instability and erosion in the foothills	Not Started
	Objective 1.2	Reduce erosion resulting from agricultural activities	Individual landowner progress
	Objective 1.3	Increase the use of erosion control techniques and practices for existing land uses	Not Started
	Objective 1.4	Make the Hungry Hollow community aware of the causes of erosion	Ongoing. Occurs within YSGA process.
Water Supply & Stormwater	**GOAL 2**	**Use and manage surface, groundwater, and stormwater wisely to meet current and future needs**	
	Objective 2.1	Use a watershed approach for analyzing flooding issues	Not Started
	Objective 2.2	Support creative and collaborative solutions to surface and stormwater conveyance needs	Not Started
	Objective 2.3	Make the Hungry Hollow community aware of surface and stormwater conveyance needs	Ongoing. Occurs within YSGA process.
	Objective 2.4	Increase water use efficiency	Individual landowner progress
Water Quality	**GOAL 3**	**Maintain and improve water quality for all water users**	
	Objective 3.1	Prevent groundwater and surface water contamination from nutrients, chemicals, and sediment	Not Started
	Objective 3.2	Determine sources of water quality impairment	Individual landowner progress
	Objective 3.3	Make the community aware of causes (i.e., products and practices) of water quality impairment	Not Started
Habitat & Wildlife	**GOAL 4**	**Maintain and improve watershed habitats to support a diversity of native plants and animals**	
	Objective 4.1	Protect existing native plant and animal communities, habitats, and wildlife corridors	Not Started
	Objective 4.2	Reestablish native plant communities in appropriate areas	Not Started
	Objective 4.3	Establish and maintain wildlife corridors between open spaces	Individual landowner progress
	Objective 4.4	Manage non-native invasive vegetation	Individual landowner progress
Sustainable Agriculture	**GOAL 5**	**Promote land management practices that support a sustainable and productive agricultural economy**	
	Objective 5.1	Use a watershed approach when making natural resource decisions	Not Started
	Objective 5.2	Increase the awareness and use of sustainable agricultural practices	Ongoing. Occurs within YSGA process.
	Objective 5.3	Support a marketing effort that promotes Hungry Hollow products	Individual landowner progress
	Objective 5.4	Encourage appropriate land protection measures to allow willing farmers to keep their land in agricultural production	Individual landowner progress
Stakeholder Collaboration	**GOAL 6**	**Promote a watershed approach for decisions involving Hungry Hollow by supporting communication and collaboration among all stakeholders**	
	Objective 6.1	Support an open forum for meaningful discussion of issues concerning the watershed including public-private land management issues	Ongoing. Occurs within YSGA process.
	Objective 6.2	Increase awareness of watershed issues	Ongoing. Occurs within YSGA process.

The Hungry Hollow Watershed Stewardship Plan also identified two types of project implementation:

(1) Projects, studies, and educational programs implemented by the Hungry Hollow Stakeholder Group; and
(2) Projects implemented by individual landowners or small groups.

The Hungry Hollow Watershed Stewardship Plan further assumed the Yolo RCD, in cooperation with the Hungry Hollow Stakeholders Group, will provide technical, coordinating, permitting, and grant writing support for individual and larger projects (e.g. conservation work on Goodnow Slough). The Hungry Hollow Stakeholders Group decided the next step was to work with interested parties to develop specific work plans for implementation projects with timelines, responsibilities, resource needs, and success criteria clearly defined.

In 2021, YSGA received multiple landowners within the Hungry Hollow area noting concerns around declining groundwater levels, lowering of pumps, and wells going dry. Groundwater levels across the subbasin were generally in decline as a result of a second dry year and limited surface water supply availability.

YSGA staff reached out to Yolo RCD and members of the original Stakeholders Group in 2026 to obtain information on what progress has been made based on the Stewardship Plan. Individual landowners like Good Humus Produce and others have made efforts to advance numerous objectives within each category. However, from what was shared, steps 1 and 2 have not been implemented to the degree intended as described in the Stewardship Plan and there has been no specific work plan with timelines, responsibilities, resource needs, and success criteria defined for any current awareness activities. Lack of funding to support Yolo RCD was cited as one of the reasons why progress hasn't been made to the degree envisioned in the Stewardship Plan. Considering the limited progress made on implementing the Stewardship Plan and defining success criteria for each of the categories, this White Paper aims to build upon the data and analysis detailed in the Stewardship Plan to support implementation of specific projects described in Sections 7 and 8 which will have clear success criteria defined as the projects advance from the piloting stage to implementation.

In summary, concerns within the Hungry Hollow area have evolved over the years ranging from:

- flooding and erosion issues in the 1970s
- flooding, erosion, water quality, water resources, land use, wildlife and wildlife habitat, invasive vegetation, and native vegetation in the 2000s
- declining groundwater levels, lowering of pumps, and wells going dry in the 2020s

3.2 Working Group Outreach Activities

As a result of the need for additional assistance with Hungry Hollow Watershed Stewardship Plan implementation and increasing concerns about groundwater sustainability, Hungry Hollow landowners and YSGA agreed to partner in 2021, eventually forming the Working Group in 2025. The community and YSGA worked together to develop an engagement strategy, a charter, and a list of priority projects and management actions to help achieve groundwater sustainability.

The YSGA first received reports in September 2021 from multiple landowners within the Hungry Hollow area noting concerns around declining groundwater levels, lowering of pumps, and wells going dry. Groundwater levels across the Yolo Subbasin were generally in decline because of a second dry year and limited surface water supply availability. In response, the YSGA hosted an introductory meeting on October 7, 2021 with the Hungry Hollow community to discuss groundwater sustainability concerns and develop collaborative actions to address the concerns. Some landowners vocalized interest in recommending Yolo County impose a groundwater well moratorium on new irrigated lands. The YSGA agreed to continue discussions regarding all alternatives to achieve groundwater sustainability, including increasing groundwater recharge, water use efficiency, and surface water use. On November 19, 2021, YSGA hosted a second Hungry Hollow community meeting and established the Hungry Hollow Sustainability Committee, which eventually adopted the following goals and objectives:

- Collect data
- Understand groundwater challenges
- Identify and promote sustainable water-use practices
- Advise local agencies regarding implementation of SGMA

In January 2022, the Hungry Hollow community submitted 23 unique comment letters on the draft Yolo Subbasin GSP, required by the State of California to implement SGMA, regarding the Hungry Hollow area. The YSGA worked with the Hungry Hollow Sustainability Committee to achieve the identified goals and objectives over the next four years, as described in Table 2.

Table 2. YSGA support to Hungry Hollow Groundwater Working Group from 2021 to present.

Date	Event	Details	Grant Funded
August 9, 2021	Hungry Hollow Monitoring	YSGA requested support from DWR Technical Support Services (TSS) to drill new monitoring wells in Hungry Hollow to address data gaps.	
September 1, 2021	Hungry Hollow Monitoring	YSGA received concerns about water levels in Hungry Hollow area and began bolstering data collection.	
October 7, 2021	YSGA & Hungry Hollow Landowners Meeting	YSGA convenes an introductory meeting with the Hungry Hollow landowners. At this meeting, YSGA staff listened to concerns and their interest to impose a well moratorium on development of new irrigated lands that was requested in a letter to the County Board of Supervisors drafted by the Hungry Hollow Groundwater Committee.	
November 19, 2021	YSGA & Hungry Hollow Landowners Meeting	YSGA convenes meeting with Hungry Hollow landowners at Matchbook to discuss forming Hungry Hollow Groundwater Committee	
January 1, 2022	GSP Comments	23 stakeholders within Yolo Subbasin, including Hungry Hollow area, provided comments on Yolo Subbasin GSP regarding the Hungry Hollow area.	
February 10, 2022	Groundwater Committee Meeting	Good Humus convenes Groundwater Committee meeting to discuss purpose of Committee, brainstorm initiatives/planning strategies for sustainability, data needed/project proponents for Hungry Hollow water budget pilot project, and identify additional pilot projects.	
March 10, 2022	Groundwater Committee Meeting	YSGA convenes Groundwater Committee meeting to discuss outreach, community concerns, data needed, and goals.	
April 7, 2022	Groundwater Committee Meeting	YSGA convenes Groundwater Committee meeting to provide update on Executive Order N-7-22, March special board meeting, and reviewed draft outreach materials for June 2022 town hall meeting. Outreach materials included identifying area of interest and list of those invited, reviewed well information form, discussed community outreach goals and strategy, and agenda.	

Date	Event	Details	Grant Funded
June 22, 2022	Town Hall	YSGA and Committee host Town Hall to discuss collecting data on groundwater challenges, promoting sustainable water-use practices, and advising local agencies. Participants highlighted worsening conditions in Hungry Hollow, including declining water levels, dry wells, and the need for deeper replacements, supported by landowner data showing significant long-term declines across Western Yolo County. HHGC stressed that individual water use impacts the shared resource and urged broader community involvement in conservation, data sharing, and collaborative solutions. Key priorities include gathering more groundwater data, community education on water-saving practices and rain capture, securing modest funding and volunteers, and advancing data-driven, proactive planning to ensure long-term water sustainability. Unfortunately, this meeting did not lead to landowners increasing engagement or data collection efforts with one another.	
July 19, 2022	Committee Meeting	YSGA convenes Committee to discuss short-term goals, including community workshops, and long-term goals, including investigation and investment in surface water conveyance and storage, groundwater recharge projects, collection of existing reports and data on subsurface conditions, and consultation with experts. In addition, YSGA shared the draft Healing Starts Here proposal. This grant opportunity was pursued by the YSGA at the request of Good Humus.	
July 20, 2022	Hungry Hollow Tour	Good Humus hosts tour with California Alliance of Family Farmers. Participants meet with Assemblymember Cecilia Aguilar-Curry to discuss issues, as well as policy barriers and next steps.	
August 1, 2022	YSGA Grant Pursuits	YSGA submitted Healing Starts Here proposal to New Pluralists requesting $500k to drive development of urgently needed, inclusive, creating solutions for groundwater management in Hungry Hollow and identify implementable projects and demand management strategies.	
October 26, 2022	Domestic Well Workshop	YSGA convenes domestic well workshop to share resources available to report well issues, demonstrate well water level measurements, and share contact information for future collaboration.	

Date	Event	Details	Grant Funded
December 15, 2022	YSGA Grant Pursuits	YSGA submitted SGMA Implementation Grant Application to DWR. This application requested $440k for Hungry Hollow area to develop a water budget, delineate hydrogeologic distinctions, construct PMAs with the community, and develop a guide for on-farm pilot project opportunities.	
December 22, 2022	Committee Meeting	YSGA convenes Committee to discuss planned outreach efforts for 2023, strategies for filling data gaps, and monitoring efforts to date.	
January 1, 2023	YSGA Grant Pursuits	YSGA is informed that Healing Starts Here proposal was not selected by New Pluralists.	
February 15, 2023	Committee Meeting	YSGA convenes Committee to provide information about grant funding options for installation of meters on wells, discuss draft mission statement, plan workshop, and identify future grant opportunities.	
April 1, 2023	YSGA Grant Pursuits	YSGA applied for two grants: (1) grant to develop video series in cooperation with Committee, Center for Land-Based Learning, and Yolo RCD to highlight sustainable farming practices in Yolo County, and (2) grant to Westside IRWM to install meters on small farm wells.	
May 1, 2023	YSGA Grant Pursuits	YSGA receives grant from Westside IRWM for meters on small farm wells. The following Committee members had meters installed: (1) Good Humus, (2) Harren, and (3) Grumpy Goats Farms	Yes
May 1, 2023	Multi-Completion Well	YSGA installs multi-completion well in Hungry Hollow from through DWR TSS program.	Yes
June 1, 2023	YSGA Grant Pursuits	YSGA awarded SGMA Implementation Grant which includes $440k for Hungry Hollow area.	Yes
June 19, 2023	YSGA Board Meeting	YSGA Board of Directors receive update from staff on data collection and stakeholder outreach in Hungry Hollow. Good Humus attended and addressed concerns of inadequate action taken by YSGA to Board.	Yes
August 1, 2023	GSP Comment Letter	Hungry Hollow community members submit GSP comment letter to DWR requesting corrective actions to address localized areas of concern that include Hungry Hollow, Yolo Zamora, Winters, and Plainfield.	Yes
August 2023 – May 2024	Sustainable Farming Video Series	YSGA works with Committee, Center for Land Based Learning, and Yolo Resource Conservation District to create video series highlighting Yolo County sustainable farming practices.	Yes
November 1, 2023	Committee Facilitation	YSGA submits application to DWR for Facilitation Support Services (FSS) and requests facilitator suggested by Good Humus, Odin Zackman with DIGIN.	Yes

Date	Event	Details	Grant Funded
June 2024 – April 2025	Committee Meetings — DIG IN	YSGA hires DIGIN to facilitate four Committee meetings, resulting in stakeholder assessment, and declaration of cooperation. Facilitation was funded by DWR. In addition, YSGA staff digitized well completion reports in Hungry Hollow and collected t-TEM data along the Hungry Hollow Canal.	Yes
May 2025 - Feb 2026	Committee Meetings — Consero Solutions	YSGA hires Consero Solutions to facilitate four meetings, resulting in adoption of engagement strategy, charter, and formation of the formal Hungry Hollow Groundwater Working Group. Consero Solutions supported YSGA to develop prioritization criteria, identify 16 projects and management actions to address groundwater sustainability, and select five priority projects and management actions. Facilitation was funded by YSGA SGMA Implementation grant. In addition, YSGA staff developed a draft water budget for Hungry Hollow and worked with landowners to develop five priority projects to address groundwater concerns in the area.	Yes
March 2026 - present	Committee Meetings - YSGA	YSGA facilitated May 2026 meeting resulting in adoption of sixth project requested by landowners to support success of the other five, obtained Working Group feedback on the estimated benefits from implementing all six projects, and started discussion on "What if" scenarios to proactively plan for future drought while project implementation is underway. Further advancement of project planning and implementation is ongoing.	Yes

3.2.1 Engagement Strategy Development

In 2025, YSGA staff worked with Hungry Hollow landowners to develop an Engagement Strategy, included as **Attachment A** to this White Paper. This Engagement Strategy, approved by the YSGA Executive Officer on October 23, 2025, established the formal framework to collaboratively develop and facilitate the new Working Group composed of landowners and other interested parties within the Hungry Hollow area. The Engagement Strategy facilitated not only the creation of the Working Group, but the identification, prioritization, and implementation of projects and management actions to advance the Yolo Subbasin GSP in the Hungry Hollow area.

Purpose

The Engagement Strategy guides the community engagement processes to ensure Hungry Hollow landowners and interested parties (defined as existing landowners, growers, and residents per the Board-approved Charter as described below in Section 4) provide feedback to directly inform recommendations concerning projects and management actions. This collaborative approach draws upon the model successfully employed in the development of the 2011 Hungry Hollow Watershed Stewardship Plan.

Goals and Objectives

The Engagement Strategy contained four primary phases with specific, time-bound objectives:

- **Phase 1 (Completed):** Solicitation and incorporation of initial landowner and stakeholder feedback on proposed prioritization criteria and lists of implementation options (June and September 2025).
- **Phase 2 (Completed):** Development and approval of the Working Group Charter, including feedback on draft documents, appointment processes, and release of the approved Charter and Engagement Strategy. Key milestones included YSGA Board of Directors approval of the Charter on September 15, 2025, issuance of applications for Working Group appointments, and final Board approval of appointments in November 2025.
- **Phase 3 (Completed):** Review and ranking of projects and management actions by the Working Group, culminating in YSGA Board of Directors approval of recommended rankings in November 2025 and initiation of further development of the top five priorities.
- **Phase 4 (Ongoing / Forward-Looking):**
    - Preparation, review, and finalization of the Hungry Hollow White Paper, documenting the hydrogeologic setting, pilot project results, outreach activities, and priority projects and management actions. This includes Working Group and YSGA Board of Directors feedback cycles targeted for late winter through late spring 2026, with anticipated YSGA Board of Directors approval in late spring 2026.
    - Coordination regarding integration with overlapping YSGA Management Area Committees.
    - Transition to implementation of approved priority projects and management actions in late spring/early summer 2026.

The Engagement Strategy reflects a completed formation and prioritization phase and now focuses on finalizing the White Paper and commencing on-the-ground implementation of selected projects. All actions remain subject to ultimate oversight and approval by the YSGA Board of Directors.

4. GOVERNANCE

4.1 Charter

Leading up to September 2025, the YSGA worked with members of the Hungry Hollow Sustainability Committee to develop a charter to establish the new Working Group. The YSGA established the Working Group is an ad-hoc advisory body to facilitate collaborative input from Hungry Hollow landowners and interested parties in support of groundwater sustainability efforts within the Yolo Subbasin GSP. The Working Group operates under a charter approved by the YSGA Board of Directors on September 16, 2025. It serves solely in an advisory capacity and possesses no independent authority to bind YSGA to any specific action or decision made by the Working Group.

Goals

The Working Group goals are:

- Achieve sustainable groundwater management in Hungry Hollow by maintaining or enhancing groundwater quantity and quality through the implementation of projects and management actions to support beneficial uses and users.
- Bring together interested parties in a collaborative, voluntary process to enhance and protect human economic activities and groundwater resources, promote stewardship through community outreach and education, support cooperative planning and implementation of projects, and respect public and private property rights.

Composition and Appointment

The Working Group consists of up to **11 voting members**, all appointed by the YSGA Board of Directors.

- Ten members may be Hungry Hollow landowners (or their designees), selected to ensure geographic representation from the Hungry Hollow West and/or East areas and diversity of experience across five specified categories:
    - Small non-irrigated landowner (<100 acres);
    - Small irrigated landowner (<100 acres);
    - Large non-irrigated landowner (>100 acres);
    - Large irrigated landowner (>100 acres); and
    - A grower or grazer who leases and actively manages land in the region.
- The eleventh member is the YSGA Executive Officer, who serves as Chair.

No two representatives from the same family or business entity may serve simultaneously. Members need not be affiliated with YSGA or any of its member agencies.

Appointment occurs through a transparent, public process: interested individuals submit applications, which are made available for public review; proposed appointments are publicly posted in advance; the YSGA Board of Directors appoints members by majority vote at a noticed public meeting, after considering public comment. The process is designed to ensure equal opportunity and compliance with the Brown Act.

Terms of Service

Initial members serve from the date of appointment through at least April 2026. Thereafter, members serve at the pleasure of the YSGA Board of Directors until a successor is appointed, resignation, or removal (for cause, including insufficient attendance or disruptive behavior). Members must attend at least two-thirds of scheduled meetings to maintain good standing; failure to do so may result in removal and replacement by the YSGA Board of Directors. The YSGA Board of Directors may dissolve or cease support for the Working Group at any time.

Responsibilities

As an advisory body, the Working Group's primary functions are to:

- Provide localized feedback and data on groundwater conditions in Hungry Hollow (water levels, quality, subsidence, interconnected surface water, dry wells, etc.);
- Collaborate with YSGA on the identification, development, and prioritization of groundwater sustainability projects and management actions consistent with the GSP;
- Advise on project details, funding applications, and sustainable financing; and
- Submit recommendations for new projects or actions to the YSGA Executive Officer.

The Working Group functions in parallel with YSGA staff efforts and does not supplant the YSGA Board of Director's ultimate decision-making authority.

Meetings

The Working Group meets at least bimonthly for 1–2 hours. Meetings are organized and facilitated by the YSGA Executive Officer (or designee). Agendas and materials are distributed electronically in advance. Members may participate remotely via conference call or video, provided hybrid capabilities ensure all participants can hear one another. Non-members may attend but have no voting rights. Meeting summaries are prepared and approved at subsequent meetings. YSGA provides broader updates to interested Hungry Hollow landowners to facilitate informal input.

Decision-Making Process

The following charter language governs the Working Group's decision making:

- **Quorum**: Majority of members (e.g. 6 of 11).
- **Voting**: Each member has one equal vote, cast individually and in person (no proxies). The Chair (Executive Officer) votes last and is excluded from tie determinations.
- **Standard**: The group strives for consensus but may act by majority vote.
- **Tie Votes**: The matter is tabled for future consideration to seek greater consensus.

- **Dispute Resolution**: Conflicts are addressed respectfully and directly. The Executive Officer facilitates resolution; unresolved issues may be referred to an impartial facilitator (if funding permits). Dissenting views are summarized and forwarded to the YSGA Board of Directors.

All recommendations to the YSGA Board include any alternative perspectives when consensus is not achieved. The YSGA Board of Directors holds sole authority to amend the Charter. The working group may propose amendments or the YSGA Board of Directors following consultation with staff and solicitation of landowner feedback. Amendments take effect immediately upon Board approval unless otherwise specified.

This structure establishes a balanced, landowner-inclusive advisory forum while preserving final decision-making authority with the YSGA Board of Directors.

The adopted charter is included in the White Paper as **Attachment B**. The YSGA Board of Directors may update the charter at any time and will seek feedback from the Working Group on substantive changes.

4.2 Hungry Hollow Groundwater Working Group Voting Members

Upon adoption of the Working Group charter, YSGA released a Working Group member application to identify landowners in Hungry Hollow with an interest in serving as the first voting Working Group members. The YSGA received seven applications representing landowners and, after review by the YSGA Executive Officer, YSGA staff proposed all seven to the YSGA Board of Directors for approval. The YSGA Board of Directors appointed the following members to the Working Group on November 17, 2025:

1. Carl Evers, Pamunkey Vineyards (initially Carl Evers of AgIS Capital)
2. Michael Doherty, Grindstone Wines
3. Fritz Durst, Durst Organic Growers
4. Geoff Klein, Bullseye Farms
5. Matt Loehse, Big W Ranch
6. Annie Main, Good Humus Produce
7. Jason Yarborough, Cobram Estate Olives (initially Justin Smith)

On May 18, 2026, the YSGA Board approved and appointed Jason Yarborough to replace Justin Smith on the Working Group. On September 21, 2026, the YSGA approved and appointed Kel Mitchel to replace Carl Evers on the Working Group.

4.3 Future of Hungry Hollow Groundwater Working Group

The YSGA currently supports the Working Group with grant funding. The YSGA recognizes Hungry Hollow landowners can coordinate with one another to advance projects and management actions not directly related to YSGA activities without YSGA assistance. The YSGA intends to establish Management Area Committees that will advise the YSGA on implementation of the Yolo Subbasin GSP and specific projects and management actions relevant to each management area. YSGA staff anticipates the Working Group may dissolve in the future and YSGA will invite Hungry Hollow Working Group members to join the appropriate Management Area Committee.

5. HYDROGEOLOGIC CONCEPTUAL MODEL

5.1 Hydrologic Setting & Surface Water Availability

Hungry Hollow primarily consists of two watersheds: Goodnow Slough and Oat Creek (Figure 7). The Oat Creek watershed is drained by the north and south fork of Oat Creek. The Goodnow Slough watershed is drained by the Fox Canyon, Goodnow, and other unnamed sloughs. As described in Section 2.4, Hungry Hollow floods 2 out of 3 years and may inundate approximately 1,000 to 11,000 acres of land. Flooding typically occurs around the "Hot Spot" areas identified on Figure 7.

Figure 8 shows the annual and historical average precipitation, cumulative departure from the mean precipitation (CDFM; a metric calculated to visualize trends), water year type, and District surface water availability[1] since 1970 for the Working Group area. The lowest annual precipitation recorded occurred in 2013 at 5.1 inches which was the initiation of a historic drought experienced throughout the state. The highest annual precipitation occurred in 1983 at 41.4 inches which also corresponds to a time when groundwater levels were near historic highs. From 1970 to 2024, the historical average annual precipitation is 19.7 inches. CDFM shows that precipitation patterns occur in cycles and relate to water year types[2].

[1] Surface water availability is based on historical irrigation diversions for the entire District service area and is not specific to Hungry Hollow.

[2] CDFM from 1970-1975 shows the initial conditions inherent in the 1970 to 2024 time series and is not reflective of the longer-term historical precipitation trend.

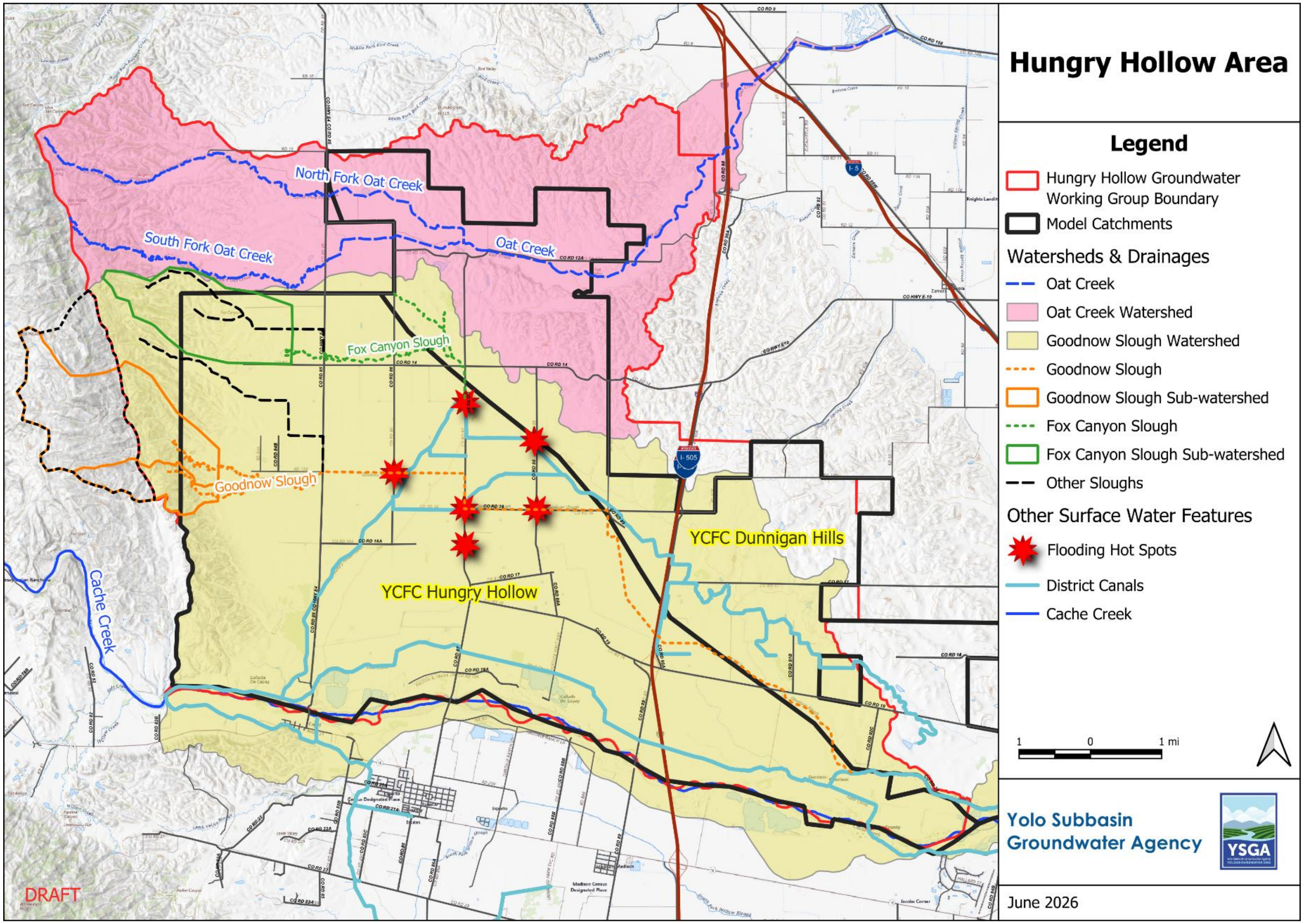

Figure 7. Hungry Hollow sloughs, canals, model catchments, flood areas, and watersheds identified by working group and YSGA staff.

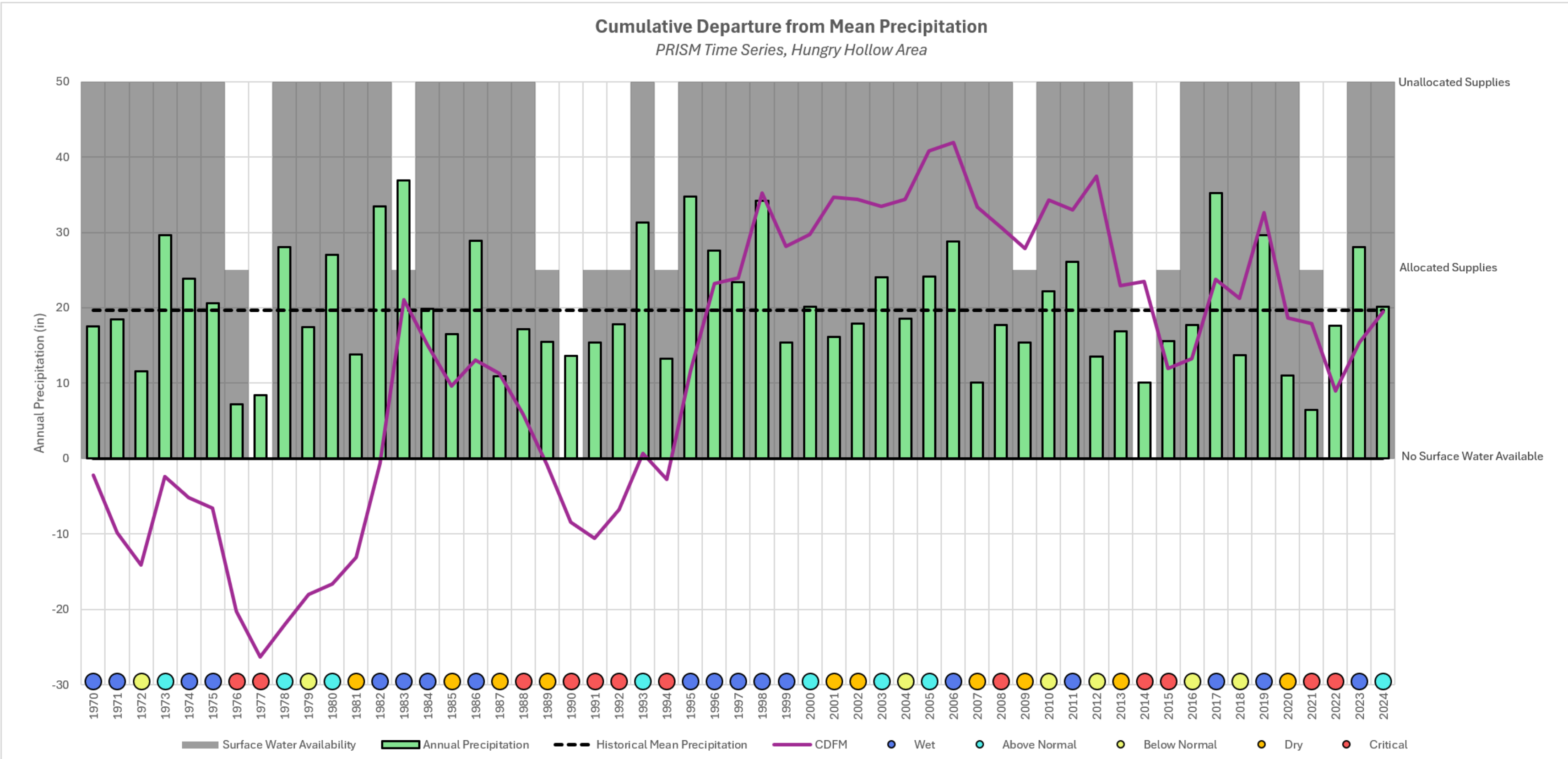

Figure 8. Hungry Hollow precipitation trends and surface water availability.

5.2 Geologic Setting

Hungry Hollow lies within the Great Valley geologic province. The Great Valley province is characterized by broadly warped bedrock, a sequence of marine sedimentary rocks known as the Great Valley Sequence, which formed when a Cretaceous (145 to 66 million years [Ma]) sea filled the Sacramento Valley (Harvey & Associates, 2008). The geologic deposits found within Hungry Hollow and the Dunnigan Hills (Figure 9) are briefly described below and are characterized in order of their age with a description of the overall depositional and structural environment occurring during those geologic periods. Geologic cross sections prepared by Ludhorff and Scalmanini Consulting Engineers (LSCE) for the Hungry Hollow Area can be found in **Attachment C**.

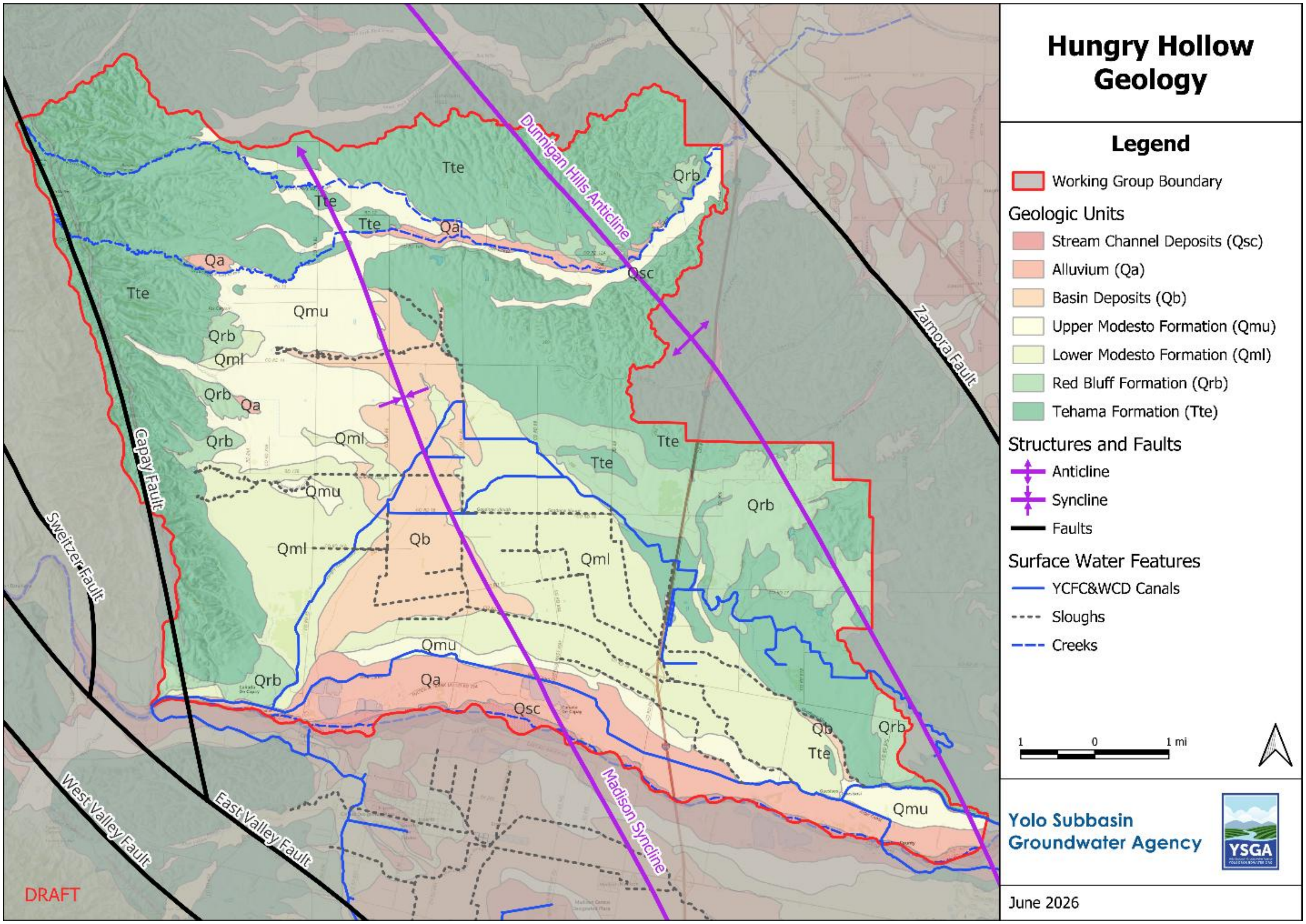

Figure 9. Geologic map for Hungry Hollow.

5.2.1 Holocene Deposits (Approximately 12 thousand years [ka] to present)

The depositional environment across the broader Sacramento Valley is dominated by active fluvial, alluvial, and flood-basin sedimentation. In Yolo County, major tributaries such as Cache Creek serve as primary sediment conveyors, transporting sand, silt, and gravel eastward from the Coast Ranges to build the relatively flat valley floor near Woodland. Although sedimentation remains the dominant geomorphic process, the landscape is also influenced by ongoing tectonic deformation associated with late Cenozoic compression along the western margin of the Sacramento Valley. This deformation, which began during the late Miocene to Pliocene and continues today, is expressed by active folding and blind thrust faulting beneath structures such as the Dunnigan Hills, Plainfield Ridge anticline, and Madison syncline. Continued uplift and folding subtly modify local topography and influence drainage patterns, stream migration, and sediment distribution across the valley floor.

Holocene deposits within the area consist of stream channel deposits and undivided basin deposits that make up the upper portion of the alluvium. Stream channel deposits consist of open, active stream channels that transport typically light tan to gray in color gravel, sand, silt, and clay and may reach 75 feet in thickness. Coarser grained deposits of sand and gravel typically occur adjacent to major stream channels like Cache Creek. Thinner sand beds occur as alluvial plain and distributary channel deposits. Undivided basin deposits are typically fine-grained silt and clay derived from modern alluvium and vary from 3 to 6 feet in thickness near the perimeter and may reach 180 feet in thickness at the center of the Sacramento Valley.

5.2.2 Pleistocene Deposits (2.58 Ma to Approximately 12 ka)

Driven by cyclical global glacial–interglacial cycles, the Pleistocene climate fluctuated between cool, wet glacial periods and warmer interglacial intervals. Extensive glaciation in the Sierra Nevada, combined with continued uplift and erosion of the Coast Ranges, generated large volumes of sediment that were transported to construct broad alluvial fans and floodplains across the Sacramento Valley. These high-energy depositional systems produced the Riverbank and Modesto Formations (Figure 9). Intermittent volcanic eruptions from the Lassen volcanic center deposited widespread tephra across the Sacramento Valley, including the Rockland Ash (approximately 575–610 ka), which serves as an important regional chronostratigraphic marker within Quaternary alluvial deposits. Volcanic activity also continued at the Clear Lake Volcanic Field west of Yolo County. Continued transpressional deformation within the Coast Ranges–Great Valley fold-and-thrust belt produced blind thrust faulting and growth of the Dunnigan Hills anticline, progressively folding and uplifting the western margin of the Sacramento Valley and driving stream incision and drainage reorganization.

Pleistocene deposits within the Hungry Hollow area consist principally of the Riverbank and Modesto Formations together with remnants of the Red Bluff Formation. The Riverbank and Modesto Formations comprise a complex sequence of unconsolidated channel sands and gravels interbedded with overbank silts and clays. Separation of Holocene alluvium from the Modesto and Riverbank Formations is commonly difficult because of their similar lithologic characteristics and the absence of distinctive field markers.

The Red Bluff Formation overlies the Tehama Formation and consists primarily of thin, laterally extensive pediment gravels deposited during the early to middle Pleistocene, with an age generally constrained between approximately 1 Ma and 400 ka (Harwood and Helley, 1985; Munk, 1993). Although traditionally regarded as a regional marker separating Quaternary deposits from the Tehama Formation, Munk (1993) demonstrated that many deposits previously mapped as Red Bluff in the Dunnigan Hills are not necessarily correlative with the type Red Bluff Formation, highlighting the importance of geomorphic position, soil development, and geochronologic control for reliable stratigraphic correlation. Exposures assigned to the Red Bluff Formation occur west of Hungry Hollow along the Capay Hills. It's possible that what has been classified as Red Bluff Formation may indeed be related to Cache Creek gravels and therefore, potentially would be associated with alluvium or Modesto and Riverbank Formation.

As noted in Section 5.2.1, the Hungry Hollow and Dunnigan Hills are located within an area of active Quaternary tectonic deformation (Unruh and Moores, 1992; Munk, 1993). Unruh and Moores (1992) evaluated the structure and tectonics of the area. Munk investigated stratigraphy, geomorphology, soils, and recent tectonics of the Dunnigan Hills and made several key findings. Figure 10 from Munk (1993) provides an illustration:

- Unruh and Moores (1992) interpreted the Dunnigan Hills anticline to be the surface expression of an active, blind, east-vergent thrust fault beneath the southwestern Sacramento Valley. Building on this structural model, Munk (1993) concluded that uplift and folding of the present Dunnigan Hills anticline likely initiated during the middle Pleistocene (approximately 400–200 ka). Based on geomorphic, stratigraphic, pedologic, and geochronologic evidence, Munk estimated approximately 300 ft of total uplift relative to the Sacramento Valley floor, corresponding to an average uplift rate of approximately 0.008–0.02 inches per year.
- The physiography of the Dunnigan Hills is characteristic of an asymmetric, gently southeast-plunging anticline, with the east limb dipping approximately 4–8° northeast, the west limb dipping 1–3° southwest, and nearly horizontal beds occurring near the fold axis. The southeast plunge is geomorphically significant because it is expressed by a progressive decrease in anticline crest elevation accompanied by a systematic decrease in drainage density. Munk interpreted these relationships to indicate southward propagation of uplift and folding through time, with the northern Dunnigan Hills having experienced a longer period of uplift and erosion than the southern part of the structure.
- Uplift and folding of the Dunnigan Hills resulted in extensive drainage reorganization through stream piracy. Munk concluded that the South Fork of Bird Creek formerly drained areas now captured by the North Fork of Oat Creek, and that the South Fork of Oat Creek formerly flowed into Hungry Hollow before being diverted into the present Oat Creek drainage. Oat Creek also captured several west-limb tributaries that formerly drained toward Hungry Hollow but now flow eastward to the Sacramento Valley. Based on terrace chronology and geomorphic relationships, these drainage reorganizations occurred during the late Pleistocene to early Holocene. The resulting stream piracy progressively reduced the contributing drainage area to Hungry Hollow while increasing drainage toward the Sacramento Valley, illustrating how tectonic uplift and associated erosion reorganized watershed boundaries during growth of the Dunnigan Hills anticline.

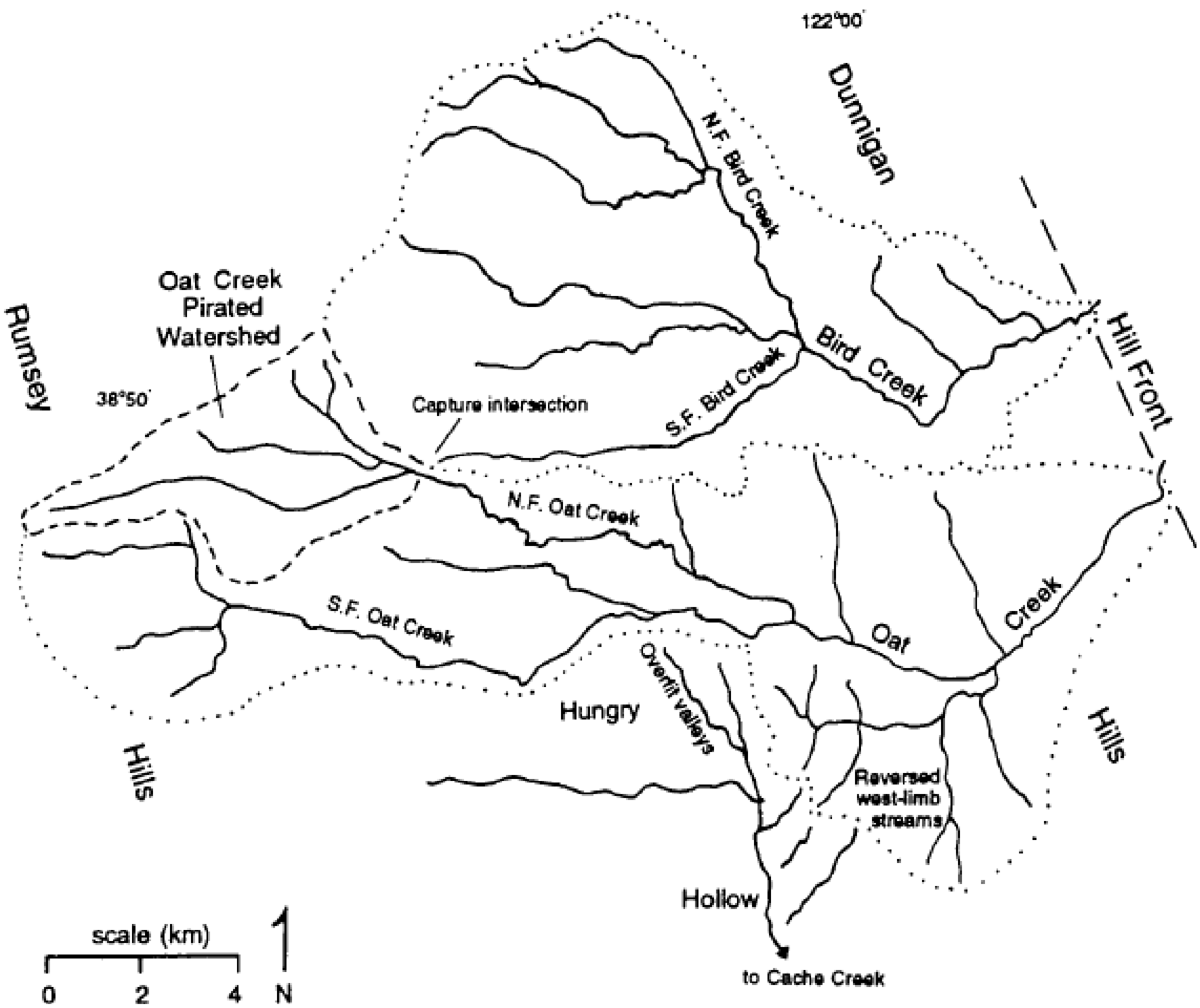

Figure 10. Drainage pattern and watershed boundaries for Bird Creek and Oat Creek in the Dunnigan and Rumsey Hills.

Figure 10. Evidence of stream piracy in the Hungry Hollow and Dunnigan Hills area (source: Munk).

5.2.3 Pliocene (5.3 to 2.58 Ma)

The Pliocene climate was generally warmer and wetter than the succeeding Pleistocene, supporting extensive woodlands, riparian forests, and wetlands throughout the Sacramento Valley. Regionally, late Miocene to Pliocene marine regression, combined with continued uplift of the Coast Ranges and infilling of the Sacramento Basin, transformed shallow-marine and estuarine environments into terrestrial fluvial and alluvial systems. In Yolo County, this transition is represented by deposition of the Tehama Formation, a thick sequence of fluvial, floodplain, and alluvial-fan sediments that are well exposed west of Esparto. Volcanism associated with the ancestral Cascade volcanic arc supplied abundant volcaniclastic sediment to the basin and produced widespread tephra deposits, including the Putah Tuff Member of the Tehama Formation near the close of the Pliocene; volcanic activity continued into the early Pleistocene with emplacement of the Sutter Buttes volcanic complex. Throughout this period, continued motion along the San Andreas transform system produced regional transpressional deformation, promoting uplift of the Coast Ranges, subsidence of the Sacramento Basin, and progressive isolation of the Sacramento Valley from marine influence.

The Tehama Formation is a thick, nonmarine sequence of alluvial-plain, floodplain, and fluvial deposits consisting predominantly of silts and clays interbedded with laterally discontinuous fluvial channel sand and gravel deposits. Sediments are typically pale green, gray, tan, and yellowish gray in color and are generally considered to be late Pliocene to early Pleistocene in age (approximately 3.5 to 1 Ma), although deposition locally began during the latest Miocene. For hydrogeologic characterization, the Tehama Formation is commonly divided into upper and lower hydrostratigraphic units based on groundwater salinity and aquifer properties rather than lithostratigraphy.

The upper Tehama Formation extends from the base of the overlying Quaternary alluvium to depths approaching 1,500 feet below mean sea level beneath portions of the central region of the Yolo Subbasin and contains much of the principal freshwater-bearing aquifer system, including the deep and shallow sandy aquifer units identified by LSCE (2004). The lower Tehama Formation is generally defined by the hydrochemical transition to increasingly saline groundwater below the freshwater boundary. This interval extends to depths approaching 3,000 feet below mean sea level and contains additional, laterally discontinuous fluvial sand bodies identified by LSCE (2004), although it is not commonly developed for groundwater production because of increasing groundwater salinity.

In the Hungry Hollow–Dunnigan Hills area, the Tehama Formation underlies the Quaternary alluvium and exerts a primary control on aquifer distribution, groundwater occurrence, and regional groundwater flow. Structural deformation associated with the actively growing Dunnigan Hills anticline has locally folded and uplifted the Tehama Formation, influencing the geometry and continuity of water-bearing sand bodies, groundwater gradients, and the hydraulic connection between the Tehama Formation and overlying Quaternary alluvial deposits. Compressional deformation associated with growth of the Dunnigan Hills anticline likely modified the hydraulic properties of the Tehama Formation by locally compacting fine-grained deposits, increasing hydraulic anisotropy, and deforming the geometry and continuity of fluvial sand bodies. In addition, folding and associated faulting may have created localized barriers or conduits to groundwater flow, resulting in greater hydrogeologic compartmentalization than would be expected in an undeformed alluvial sequence.

The Putah Tuff Member of the Tehama Formation is a light-gray to white, vitric, pumiceous ash-fall tuff containing abundant glass shards with hypersthene and hornblende phenocrysts (Sarna-Wojcicki, 1976). The unit is approximately 3.3–3.4 Ma and forms a laterally persistent outcrop along the southwestern margin of the Sacramento Valley from the Capay Hills southward to Vacaville. Because of its distinctive mineralogy, widespread distribution, and well-constrained age, the Putah Tuff Member serves as an important regional chronostratigraphic marker for correlating the Tehama Formation and constraining the timing of late Cenozoic deformation and basin evolution (Sarna-Wojcicki, 1976; Harwood and Helley, 1987). In the Hungry Hollow–Dunnigan Hills area, the Putah Tuff Member provides a key time-stratigraphic datum demonstrating that uplift and folding of the Dunnigan Hills anticline occurred well after deposition of the Tehama Formation. Munk (1993) concluded that uplift associated with the blind east-vergent thrust underlying the Dunnigan Hills initiated during the middle Pleistocene (approximately 0.4 to 0.2 Ma), indicating that more than 3 million years elapsed between deposition of the Putah Tuff

Member and the onset of tectonic deformation. The Putah Tuff Member provides a critical geologic benchmark for reconstructing the late Cenozoic tectonic and geomorphic evolution of the Hungry Hollow–Dunnigan Hills area.

5.3 Well Construction Reports and Geophysical Data

Wells and boreholes have been drilled in Yolo County since the early 1900s. In addition, DWR and YSGA have collected geophysical data via Airborne Electromagnetic (AEM) and towed transient electromagnetic (tTEM) methods in Hungry Hollow since 2020. Figure 11 shows the locations of the WCRs and geophysical data that has been collected within Hungry Hollow. 414 Well Completion Reports (WCRs) have been documented within the Hungry Hollow area from the early 1900s to 2024. DWR and YSGA have collected over 76 miles of geophysical data in Hungry Hollow. This data collectively provides valuable information on the below ground geologic and hydrogeologic structure of the unsaturated zone and saturated zone (i.e. aquifer) that wasn't previously available when developing the Yolo Subbasin GSP. Section 5.8 discusses more detailed information on the data and our current understanding of the Hungry Hollow aquifer system.

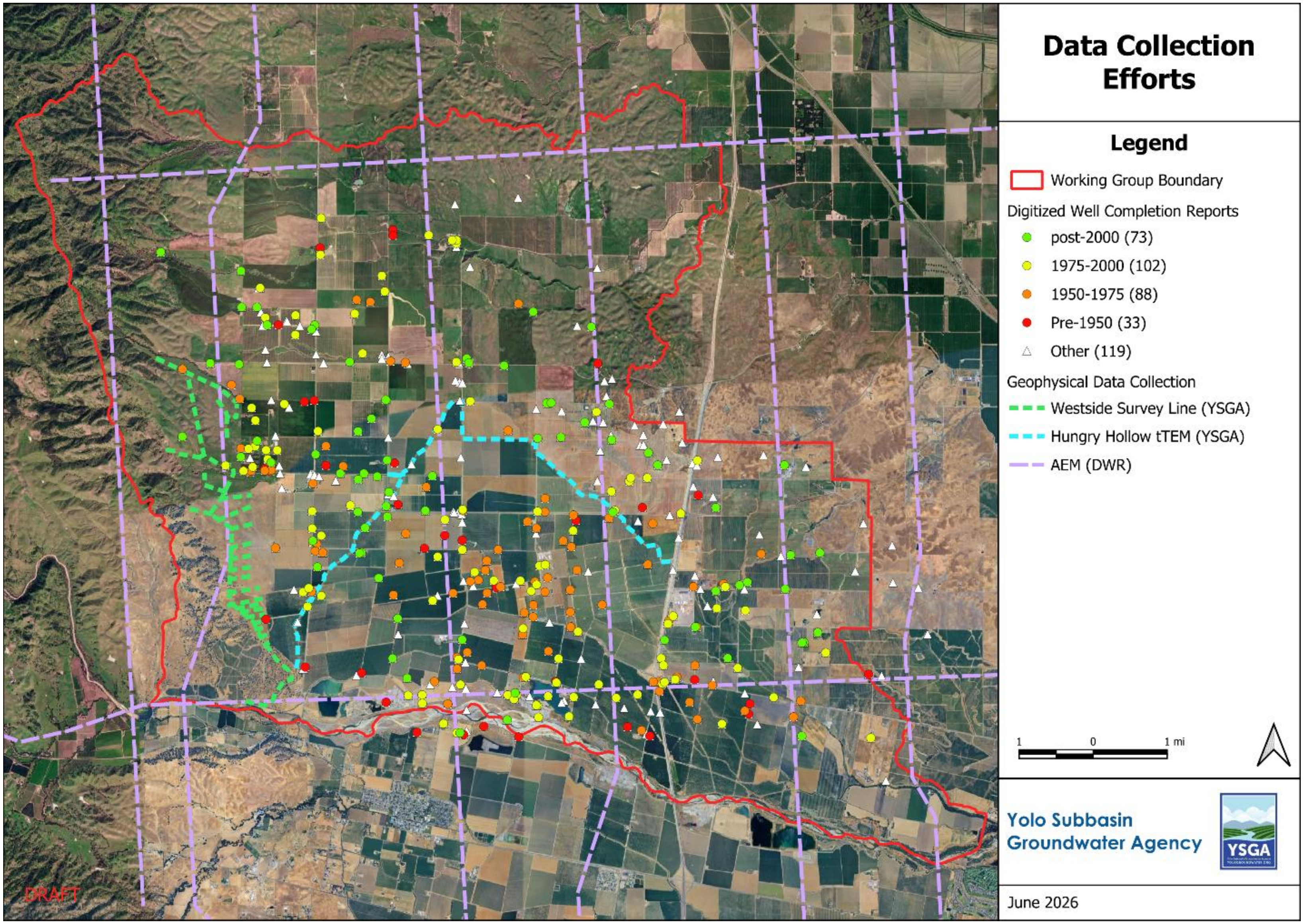

Figure 11. Data collection efforts in Hungry Hollow.

5.4 Groundwater Elevations

Groundwater elevations (i.e. groundwater levels) within Hungry Hollow are known to fluctuate over time depending on precipitation, groundwater recharge, and groundwater extraction patterns. Figure 12 shows the Fall 2022 and Fall 2024 groundwater elevation contours and well completion depth elevations (total depth of wells/boreholes converted to elevation relative to mean sea level) in Hungry Hollow. By comparing the Fall 2022 and Fall 2024 groundwater elevation contours to the well completion depth elevations, we can identify which wells are sensitive or vulnerable to stark changes in groundwater elevations during droughts. Fall 2022 marked the trough of groundwater level declines during the most recent drought. Water level declines in Fall 2022 resulted in a few shallow domestic wells (as shown by the well completion depth elevations), primarily located in the northwest section of the Hungry Hollow, lowering their pumps or going dry (based on data provided by landowners in the area). Since Fall 2022, water levels in the southern half of the Hungry Hollow rose over 50 feet in some areas between Fall 2022 and Fall 2024 indicating a strong recovery from the drought.

Figure 13 shows the Fall 2022 and Fall 2024 groundwater elevation contours relative to the change in groundwater elevation at each well location. The smallest change in groundwater elevation between Fall 2022 and Fall 2024 occurred near Cache Creek, Oat Creek, and within the Dunnigan Hills, whereas the most substantial changes occurred within the center of area, especially west of County Road 85 near County Road 15. Areas with the greatest change in groundwater elevations are the most sensitive to fluctuations in precipitation, groundwater recharge, and groundwater extraction. Individual groundwater well hydrographs can be found in **Attachment D**.

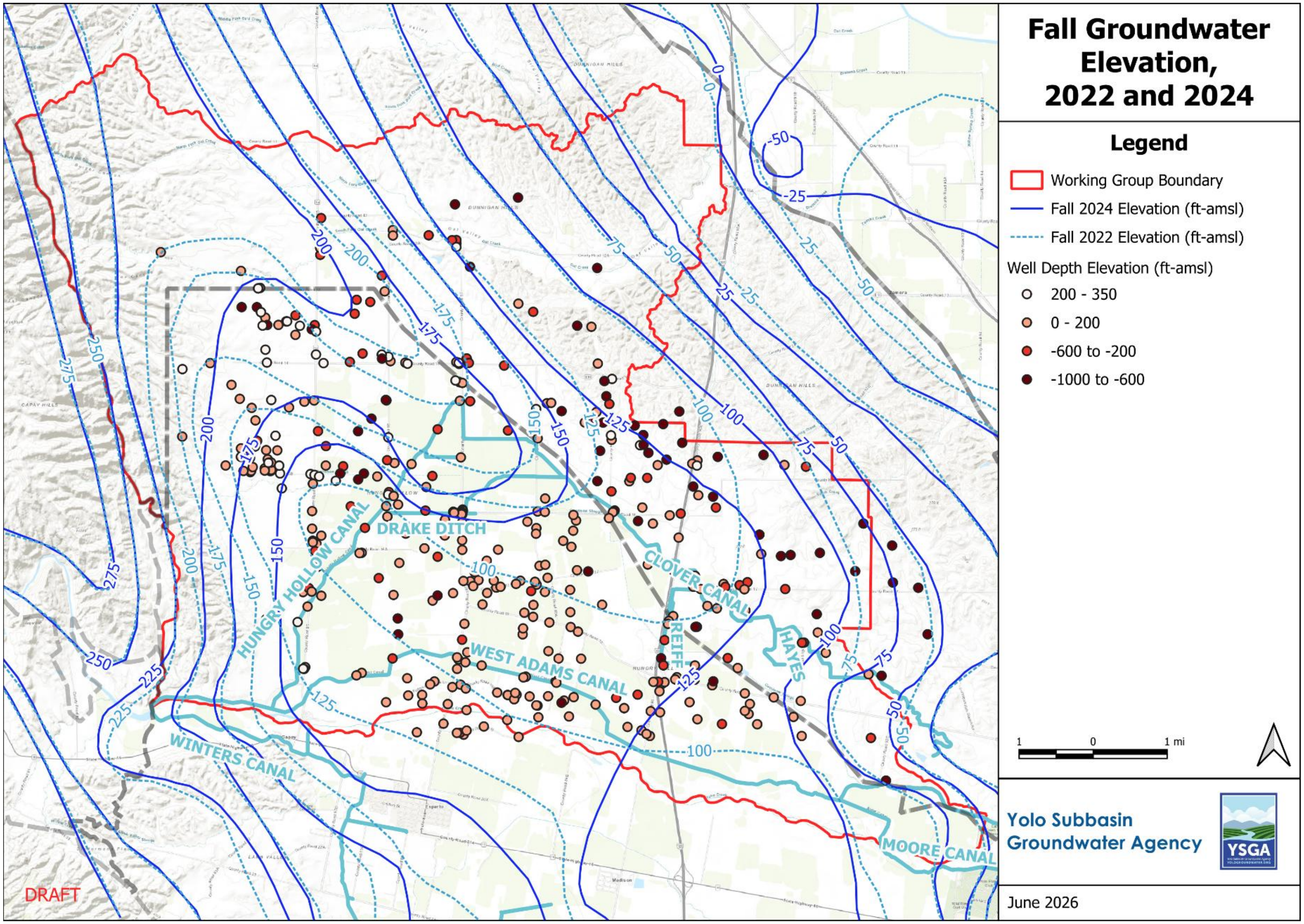

Figure 12. Fall 2022 and 2024 groundwater elevation contours and well depths.

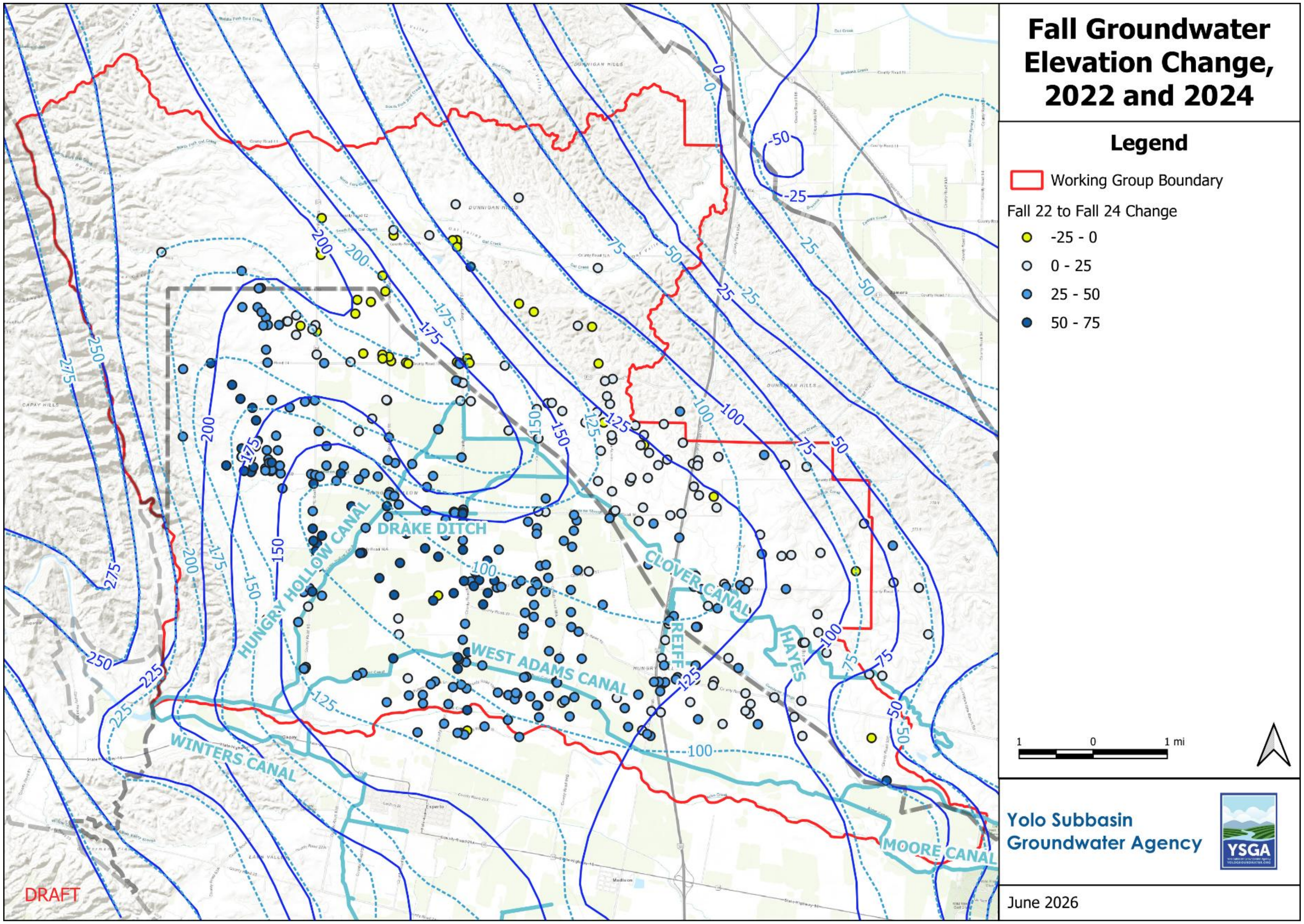

Figure 13. Change in groundwater elevation from fall 2022 to fall 2024.

5.5 Water Quality

The YSGA currently relies on water quality data provided by the State Water Resources Control Board - Division of Water Quality database known as the Groundwater Ambient Monitoring and Assessment (GAMA) Program. The data collected and maintained through the GAMA Program also includes data from other state and federal agencies, including Regional Water Boards, Department of Water Resources, Department of Pesticide Regulations, U.S. Geological Survey, and Lawrence Livermore National Laboratory, University of CA and CA State University, and cooperating local water agencies and well owners. The Yolo Subbasin GSP established sustainable management criteria (SMC) for total dissolved solids (TDS), which includes a minimum threshold (MT), measurable objective (MO), and what constitutes an undesirable result to occur when there is a measurable degradation of groundwater quality. At this time, no other constituent has had sustainable management criteria established to measure degradation of water quality. However, YSGA staff track water quality trends for arsenic, boron hexavalent chromium, and nitrate (as N), in addition to TDS, as they are commonly present in groundwater throughout the subbasin either due to being naturally occurring or because of agricultural activities.

Historical groundwater quality data is available at 42 wells within the Hungry Hollow. Table 3 provides a summary of the data at each well. Figure 14 through 18 shows maximum concentration observed and associated sample collection date for arsenic, boron, hexavalent chromium, nitrate, and TDS.

Table 3. Groundwater quality summary at GAMA wells.

GAMA Well ID	Constituent	Sample Year Range	Minimum	Maximum	Average
10N01W02P001M	Arsenic (µg/L)	1981-1981	0.0	0.0	0.0
10N01W02Q001M	Arsenic (µg/L)	1981-1981	0.0	0.0	0.0
	Boron (mg/L)	1970-1983	0.4	0.6	0.5
	Nitrate as N (mg/L)	1970-1970	1.5	1.5	1.5
	TDS (mg/L)	1970-1983	220.0	236.0	229.7
10N01W04D001M	Boron (mg/L)	1958-1965	0.3	0.4	0.3
	Nitrate as N (mg/L)	1958-1965	0.8	1.2	1.0
	TDS (mg/L)	1962-1965	296.0	318.0	305.0
10N01W06L001M	Arsenic (µg/L)	1981-1981	0.0	0.0	0.0
	Boron (mg/L)	1981-1981	0.3	0.3	0.3
	TDS (mg/L)	1981-1981	386.0	386.0	386.0
10N01W23B002M	Arsenic (µg/L)	1981-1981	0.0	0.0	0.0
	Boron (mg/L)	1981-1981	2.5	2.5	2.5
	TDS (mg/L)	1981-1981	495.0	495.0	495.0
10N02W01M001M	Boron (mg/L)	1961-1965	0.1	0.2	0.2
	Nitrate as N (mg/L)	1961-1965	1.2	2.1	1.7
	TDS (mg/L)	1962-1965	266.0	291.0	274.3
10N02W01M002M	Boron (mg/L)	1971-1983	0.1	0.1	0.1
	Nitrate as N (mg/L)	1971-1971	3.4	3.4	3.4
	TDS (mg/L)	1971-1983	270.0	330.0	300.0
10N02W14A001M	Arsenic (µg/L)	1953-1953	0.0	0.0	0.0
	Boron (mg/L)	1953-1960	0.5	1.5	1.3
	Nitrate as N (mg/L)	1953-1960	1.0	1.3	1.1
11N01W18F001M	Arsenic (µg/L)	1981-1981	0.0	0.0	0.0
	Boron (mg/L)	1981-1981	1.1	1.1	1.1
	TDS (mg/L)	1981-1981	559.0	559.0	559.0
11N02W12K001M	Arsenic (µg/L)	1981-1981	0.0	0.0	0.0
	Boron (mg/L)	1981-1981	0.2	0.2	0.2
	TDS (mg/L)	1981-1981	409.0	409.0	409.0
11N02W14H001M	TDS (mg/L)	1981-1981	266.0	266.0	266.0
11N02W35E002M	Arsenic (µg/L)	1981-1981	0.0	0.0	0.0
	Boron (mg/L)	1981-1981	0.2	0.2	0.2
	TDS (mg/L)	1981-1981	282.0	282.0	282.0
11N02W35E003M	Boron (mg/L)	1981-1981	1.4	1.4	1.4
	TDS (mg/L)	1981-1981	442.0	442.0	442.0
11N02W35J001M	Boron (mg/L)	1957-1965	0.1	0.3	0.2
	Nitrate as N (mg/L)	1957-1965	3.8	7.0	5.0
	TDS (mg/L)	1962-1965	296.0	306.0	301.0
AGW080018750-SDOM	Nitrate as N (mg/L)	2021-2023	4.5	4.6	4.6
AGW080018751-DIBB	Nitrate as N (mg/L)	2021-2023	0.1	18.5	9.0
AGW080022257-WEL1	Nitrate as N (mg/L)	2022-2023	0.1	0.3	0.2
CA5700730_001_001	Arsenic (µg/L)	2019-2022	3.1	4.5	3.8
	Hexavalent Chromium (µg/L)	2016-2022	10.0	10.0	10.0
	Nitrate as N (mg/L)	2016-2025	0.1	0.4	0.3
	TDS (mg/L)	2016-2016	393.0	393.0	393.0
CA5700730_008_008	Arsenic (µg/L)	2021-2025	9.3	64.0	15.1
	Hexavalent Chromium (µg/L)	2022-2025	10.0	10.0	10.0
	Nitrate as N (mg/L)	2022-2025	0.1	1.2	0.3
	TDS (mg/L)	2022-2022	503.0	503.0	503.0
CA5700737_001_001	Nitrate as N (mg/L)	2019-2024	0.2	1.3	0.6
CA5700828_001_001	Nitrate as N (mg/L)	2002-2024	0.9	4.5	3.3
	TDS (mg/L)	2020-2020	595.0	595.0	595.0
CA5700828_002_002	Nitrate as N (mg/L)	2004-2006	0.0	2.5	1.0
CA5700828_003_003	Nitrate as N (mg/L)	2007-2013	2.3	2.7	2.5
Road 13 D	Arsenic (µg/L)	2024-2024	3.5	3.5	3.5
	Boron (mg/L)	2024-2024	0.8	0.8	0.8
	TDS (mg/L)	2024-2024	423.0	423.0	423.0
Road 13 M	Arsenic (µg/L)	2024-2024	44.3	44.3	44.3
	Boron (mg/L)	2024-2024	1.9	1.9	1.9
	TDS (mg/L)	2024-2024	854.0	854.0	854.0
Road 13 S	Arsenic (µg/L)	2024-2024	4.0	4.0	4.0
	Boron (mg/L)	2024-2024	0.3	0.3	0.3
	TDS (mg/L)	2024-2024	382.0	382.0	382.0
USGS-384214121561101	Arsenic (µg/L)	1981-2006	1.3	2.0	1.7
	Boron (mg/L)	1981-2006	2.3	2.5	2.4
	Hexavalent Chromium (µg/L)	2006-2006	7.3	7.3	7.3
	Nitrate as N (mg/L)	2006-2006	13.0	13.0	13.0

GAMA Well ID	Constituent	Sample Year Range	Minimum	Maximum	Average
	TDS (mg/L)	1981-2006	495.0	584.0	539.5
USGS-384257121564901	Arsenic (µg/L)	1979-1979	2.0	2.0	2.0
	Boron (mg/L)	1979-1979	2.2	2.2	2.2
	Hexavalent Chromium (µg/L)	1979-1979	10.0	10.0	10.0
	TDS (mg/L)	1979-1979	693.0	693.0	693.0
USGS-384303121572401	Boron (mg/L)	1979-1979	1.6	1.8	1.7
	TDS (mg/L)	1979-1979	570.0	605.0	587.5
USGS-384324122002401	Arsenic (µg/L)	1979-1979	1.0	1.0	1.0
	Boron (mg/L)	1979-1979	1.6	1.6	1.6
	TDS (mg/L)	1979-1979	314.0	316.0	315.0
USGS-384414121565201	Arsenic (µg/L)	1981-1981	5.0	5.0	5.0
	Boron (mg/L)	1981-1981	1.6	1.6	1.6
	TDS (mg/L)	1981-1981	300.0	300.0	300.0
USGS-384416121562501	Arsenic (µg/L)	1981-1981	7.0	7.0	7.0
	Boron (mg/L)	1970-1981	0.5	0.6	0.5
	TDS (mg/L)	1981-1981	236.0	236.0	236.0
USGS-384420121595301	Boron (mg/L)	1979-1979	1.2	1.2	1.2
	TDS (mg/L)	1979-1979	338.0	338.0	338.0
USGS-384439121591501	Arsenic (µg/L)	1979-1979	2.0	2.0	2.0
	Boron (mg/L)	1979-1979	0.5	0.5	0.5
	Hexavalent Chromium (µg/L)	1979-1979	10.0	10.0	10.0
	TDS (mg/L)	1979-1979	318.0	318.0	318.0
USGS-384439122005701	Arsenic (µg/L)	1981-1981	3.0	3.0	3.0
	Boron (mg/L)	1981-1981	0.3	0.3	0.3
	TDS (mg/L)	1981-1981	386.0	386.0	386.0
USGS-384439122023001	Boron (mg/L)	1971-1971	0.1	0.1	0.1
USGS-384535122031201	Arsenic (µg/L)	1981-1981	2.0	2.0	2.0
	Boron (mg/L)	1981-1981	0.2	0.2	0.2
	TDS (mg/L)	1981-1981	282.0	282.0	282.0
USGS-384535122033301	Boron (mg/L)	1981-1981	1.4	1.4	1.4
	TDS (mg/L)	1981-1981	442.0	442.0	442.0
USGS-384812122023501	TDS (mg/L)	1981-1981	266.0	266.0	266.0
USGS-384822122010201	Arsenic (µg/L)	1979-1981	4.0	9.0	6.5
	Boron (mg/L)	1979-1981	0.5	1.1	0.8
	TDS (mg/L)	1979-1981	388.0	559.0	473.5
USGS-384858122020001	Arsenic (µg/L)	1981-1981	5.0	5.0	5.0
	Boron (mg/L)	1981-1981	0.2	0.2	0.2
	TDS (mg/L)	1981-1981	409.0	409.0	409.0
WSAC-15	Arsenic (µg/L)	2006-2006	1.3	1.3	1.3
	Boron (mg/L)	2006-2006	2.3	2.3	2.3
	Hexavalent Chromium (µg/L)	2006-2006	6.0	6.0	6.0
	Nitrate as N (mg/L)	2006-2006	13.0	13.0	13.0
	TDS (mg/L)	2006-2006	584.0	584.0	584.0

Figure 14 shows that two wells have experienced an exceedance of the Maximum Contaminant Level (MCL) of 10 µg/L for arsenic in the last few years. Arsenic is a naturally occurring constituent that's stable in well oxygenated (oxic) groundwater conditions, but in deeper aquifers where low oxygen (reducing) conditions may exist, extraction of groundwater that contains sulfide minerals or dissolved iron may result in elevated concentrations of arsenic.

Figure 15 shows that several wells at one point in time had boron concentrations above the Notification Level (NOL) of 1 mg/L. Some landowners in the Working Group have noted what concentrations of boron they have experienced in their wells throughout the area. It's important to note that boron is generally present in the aquifer throughout Hungry Hollow. However, it's highly dependent on the location, depth, or presence of naturally occurring boron within the aquifer. Generally, boron is found within wells near Cache Creek, shallow wells where excessive quantities of boron are applied to the soil that has leached through the soil zone over time, or from geologic materials naturally containing boron that has dissolved into the groundwater. Boron was found in some wells in 1981 near county roads 15B and 12A, and in 2024 near county road 13. Boron was likely found in these wells due to possible excessive application of boron to the soil or naturally occurring boron in groundwater from geologic materials.

Figure 16 shows that three wells have experienced an exceedance of the MCL of 10 mg/L for nitrate (as N). Nitrate is a common component of fertilizer that is applied to soils and overapplication of fertilizers that may negatively impact groundwater. Nitrates are closely monitored and regulated by the State Water Resources Control Board through the Irrigated Lands Regulatory Program (ILRP).

Figure 17 shows that only one well sampled had detectable hexavalent chromium present, but it was less than the MCL of 10 µg/L.

Figure 18 shows that no wells sampled had TDS concentrations greater than the MT of 1,000 mg/L and only one well sampled has TDS concentration greater than the MO of 750 mg/L in 2024.

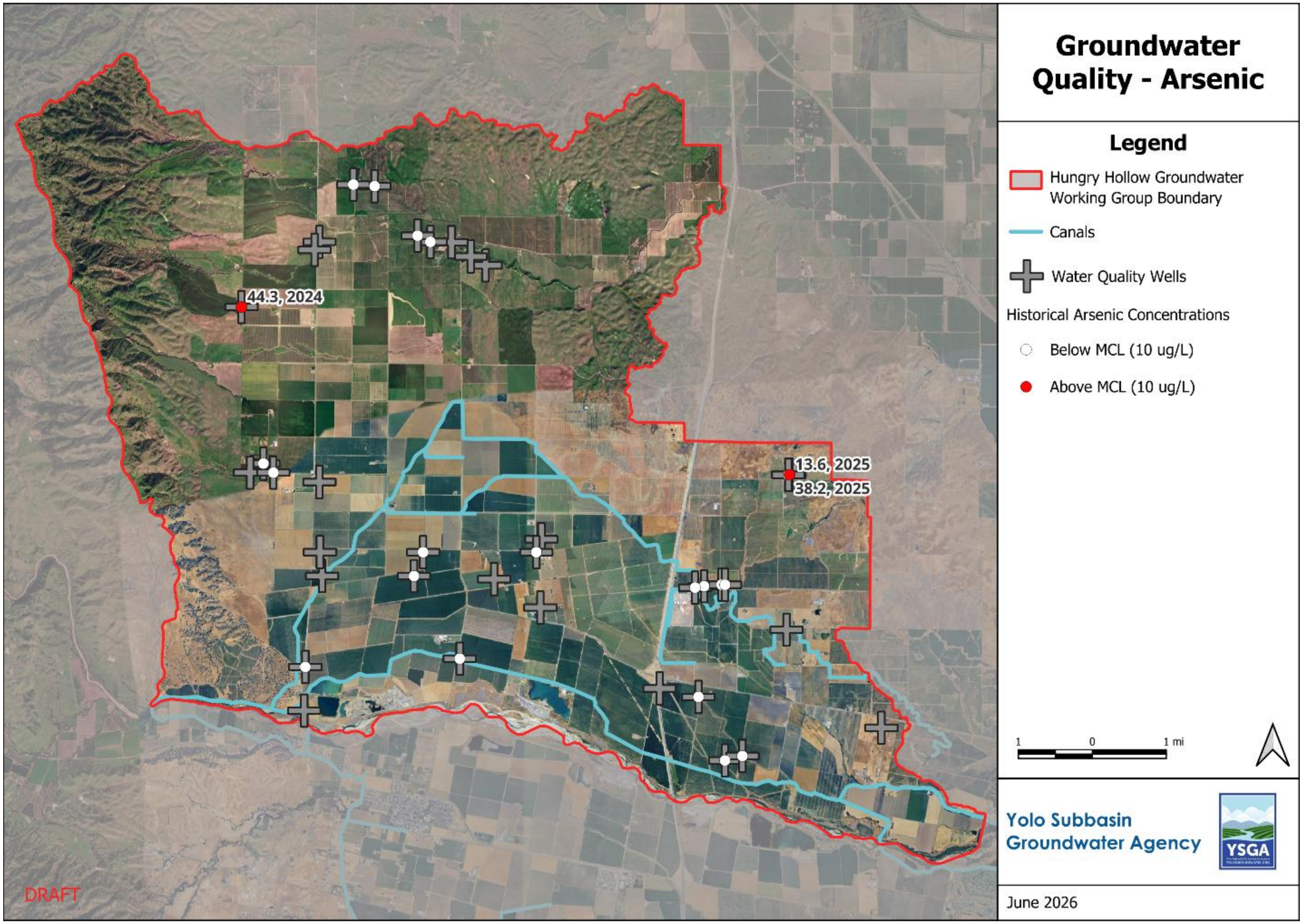

Figure 14. Historic groundwater quality for Arsenic in Hungry Hollow.

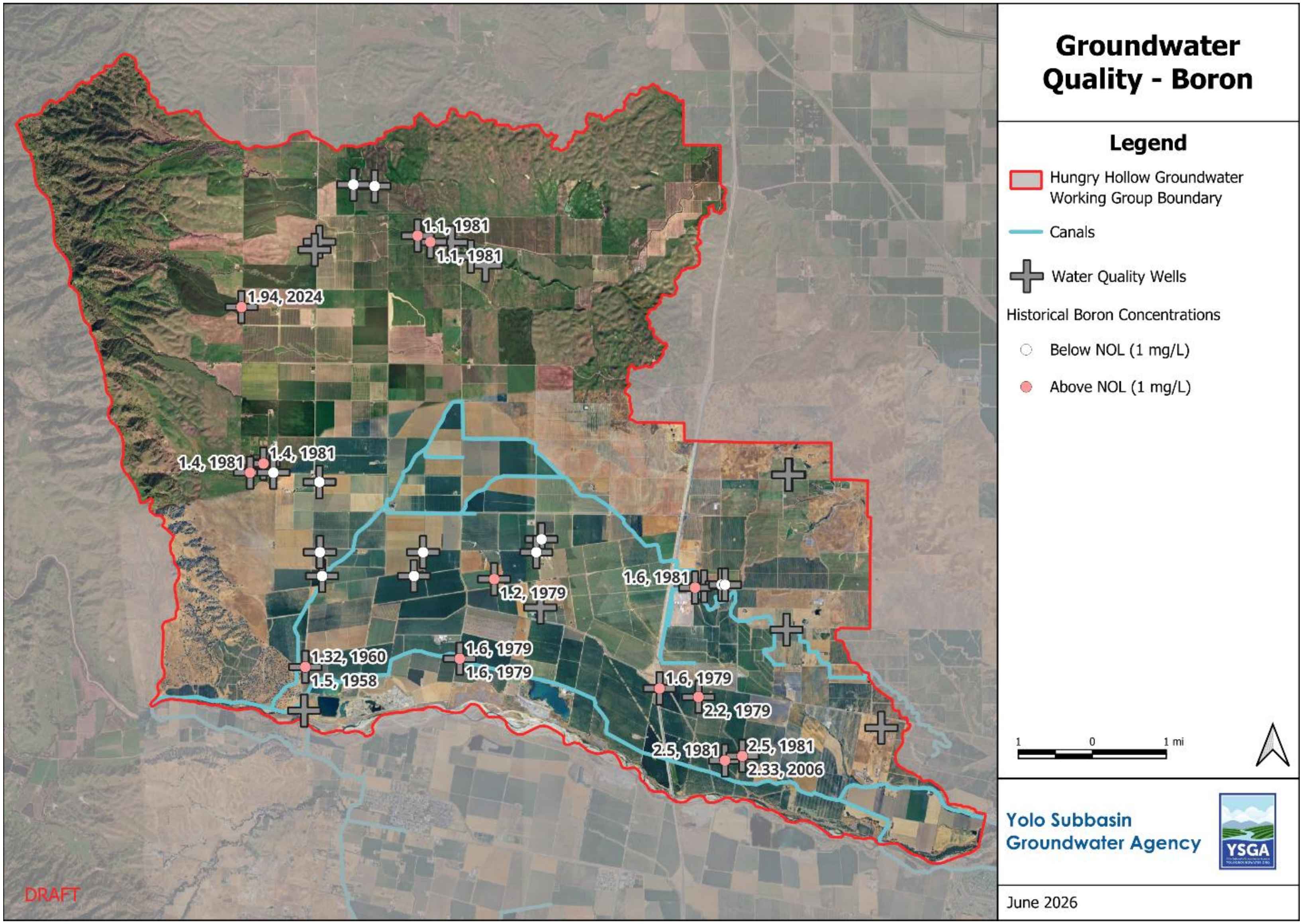

Figure 15. Historic groundwater quality for Boron in Hungry Hollow.

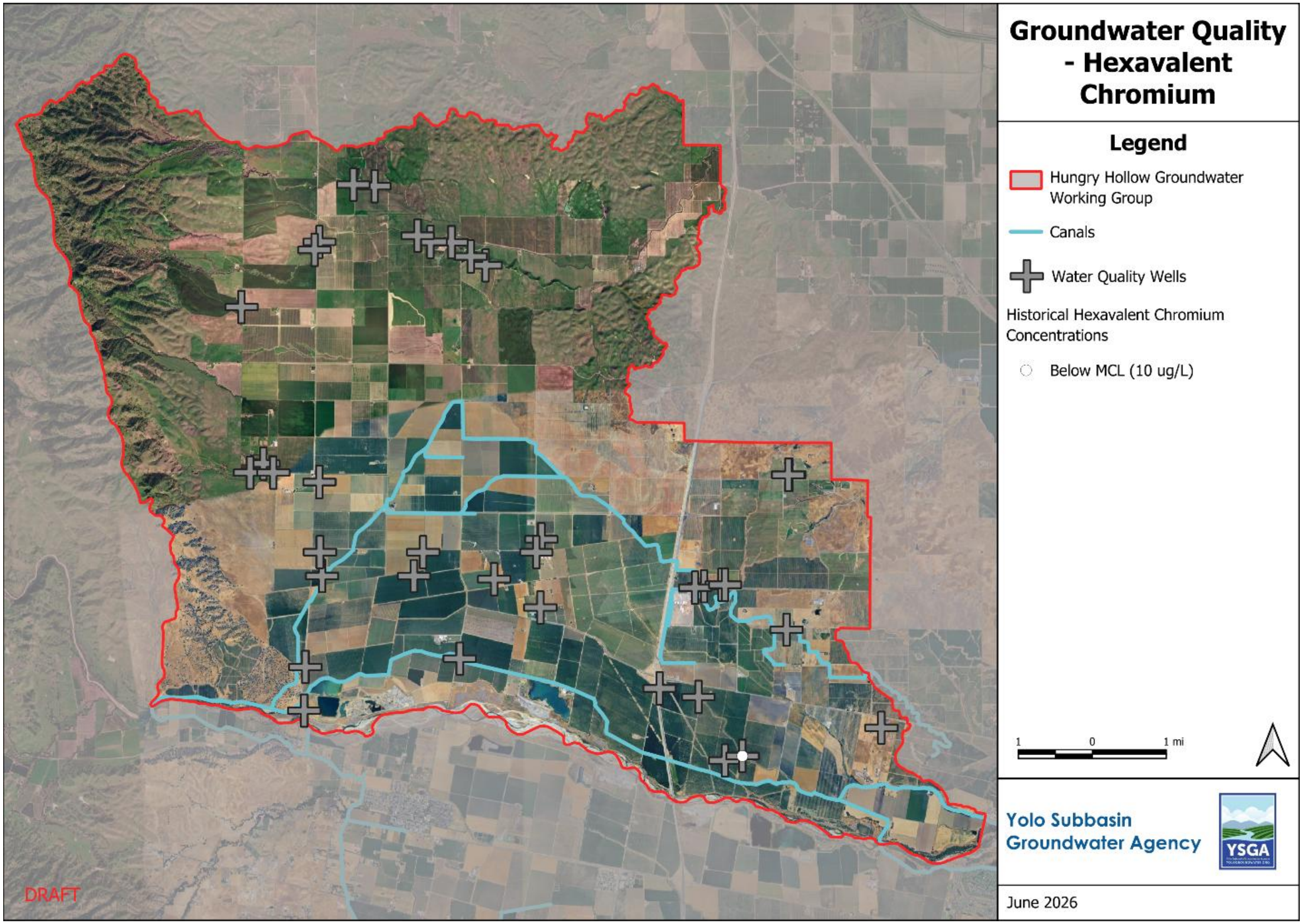

Figure 16. Historic groundwater quality for Hexavalent Chromium in Hungry Hollow.

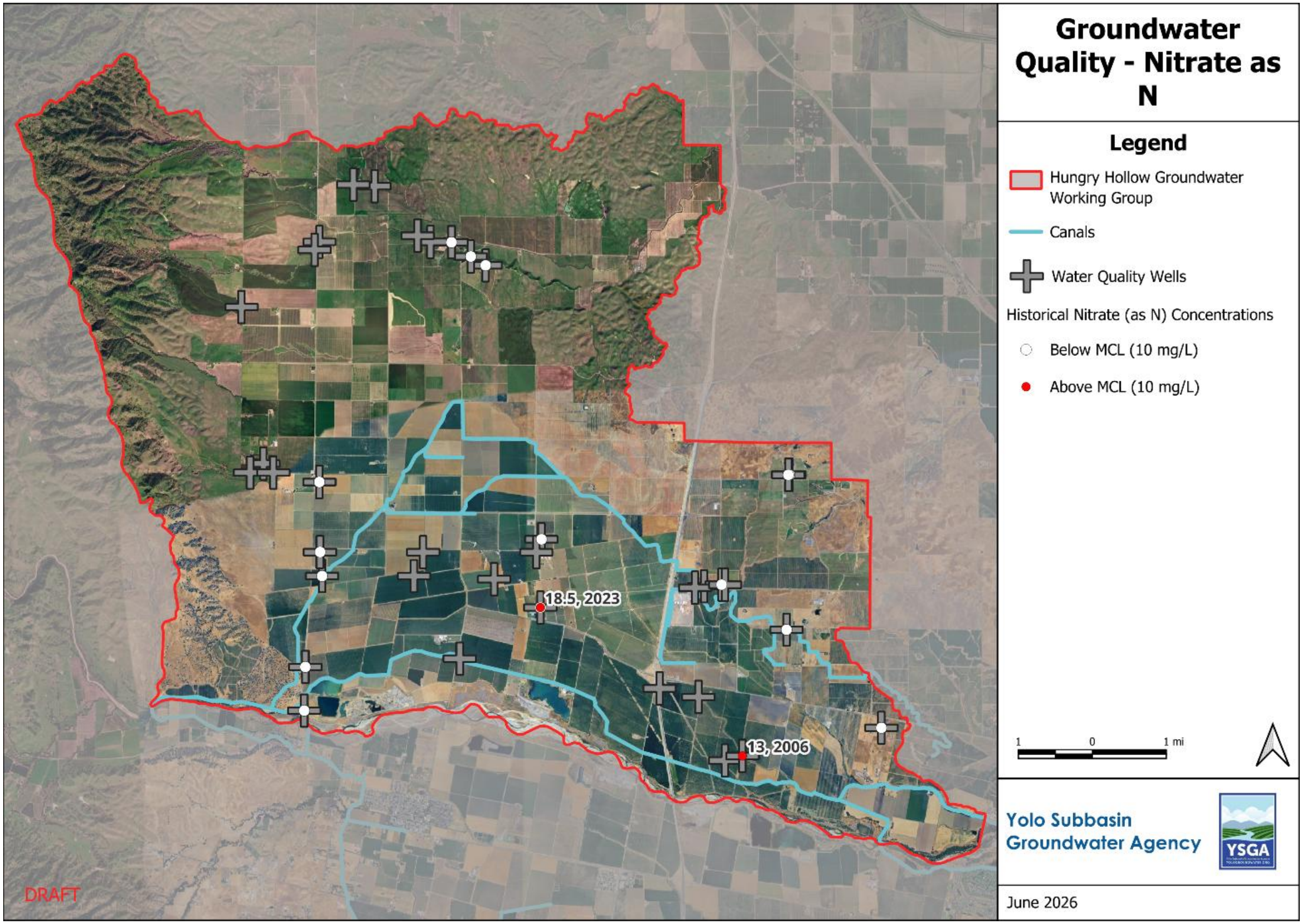

Figure 17. Historic groundwater quality for Nitrate (as N) in Hungry Hollow.

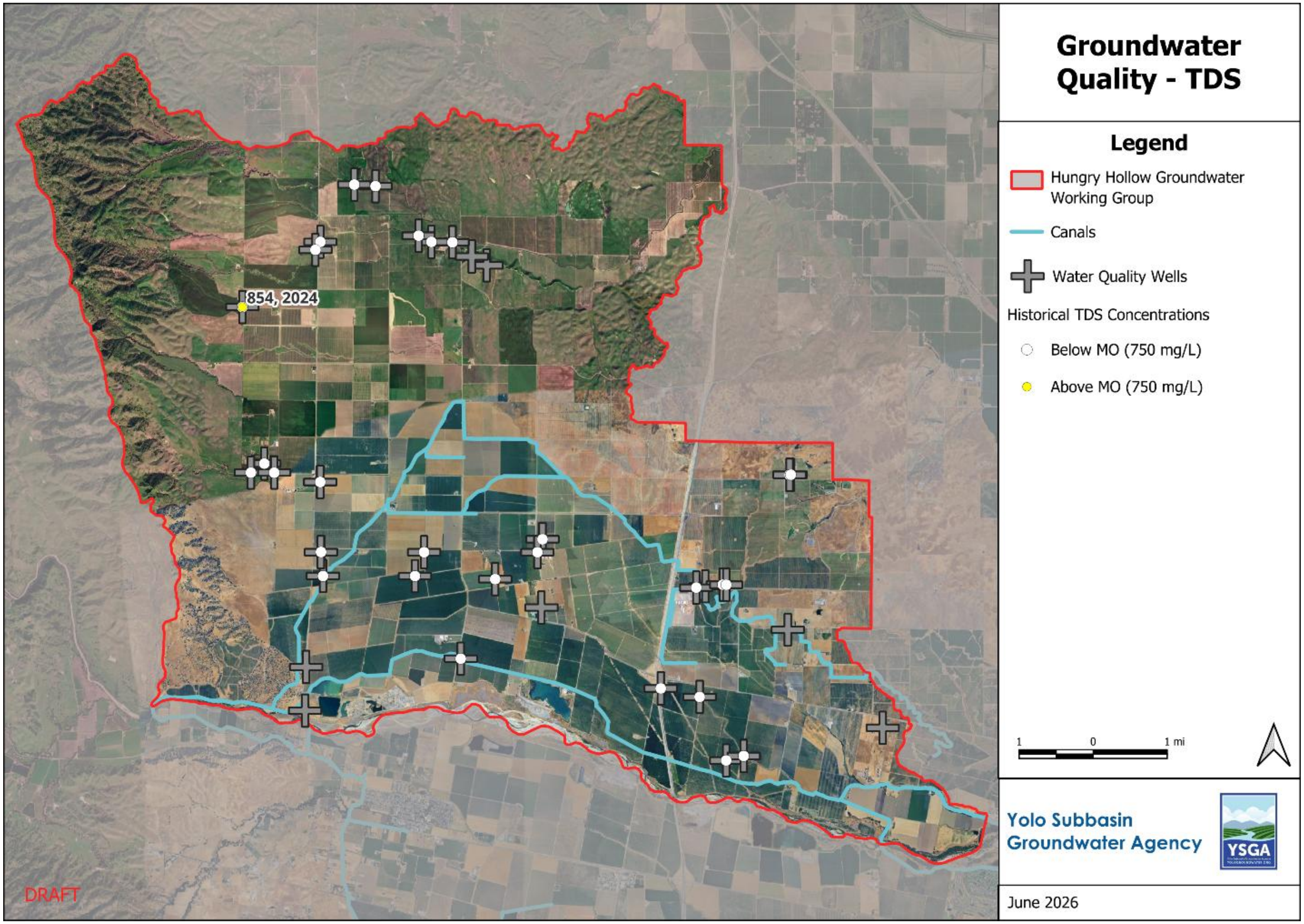

Figure 18. Historic groundwater quality for Total Dissolved Solids (TDS) in Hungry Hollow.

5.6 Land Use & Crop Change

Figures 19 through 21 show land use data from LandIQ for 2008, 2016, and 2024 and how it has changed over time. The most notable difference has been the expansion of tree crops on previously cropped land and planting of crops on lands west and east of I-505 and the western portion of Oat Creek that was previously resident non-vegetation on uncropped land. Table 4 shows the percent change from 2008 to 2024 of each crop type. Figures 19 through 21 and Table 4 illustrate a pronounced shift in Hungry Hollow (and in California agriculture in general) between 2008 and 2024, with a stark pivot from lower-value, more flexible field and forage crops toward higher-value perennial specialties. This mirrors broader industry trends in the Sacramento Valley, where farmers converted land primarily to almonds, walnuts, and wine grapes during periods of strong export demand and elevated prices, as these perennials delivered superior returns per acre compared to water-intensive alfalfa (tied to dairy feed) or commodity grains. Yolo County's 2024 crop report reinforces this pattern, with almonds rising to the top commodity by value despite overall county production value declining 8.6%, alongside vineyard removals due to contract shortages and softer grape prices. Looking forward, moderate- to long-term pressures are likely to level out or partially reverse these expansions as global supply growth and input costs rise and in turn, further stress grower margins. This is consistent with grower feedback provided to YSGA staff in the last year.

Table 4. Land use and crop change between 2008 and 2024.

Crop	2008 (acres)	2024 (acres)	% Change
Alfalfa	5,461	1,096	-80%
Tree Crops	2,727	11,416	319%
Misc. grain and hay	7,900	6,245	-21%
Idle	1,051	1,960	86%
Mixed pasture	516	518	0%
Annual Crops	4,458	3,102	-30%
Vineyards	3,432	5,619	64%
Native Vegetation	24,075	19,663	-18%

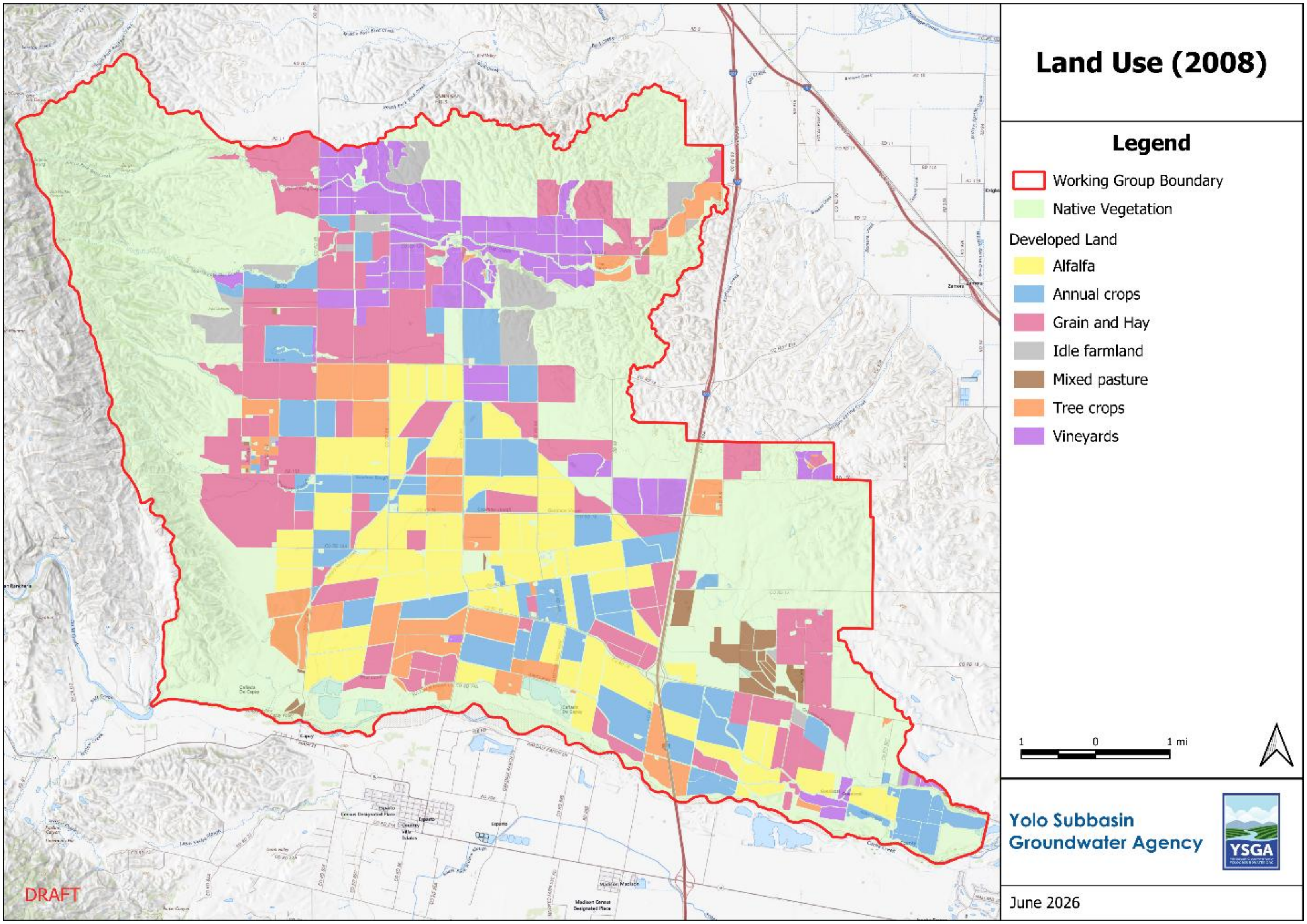

Figure 19. 2008 land use in Hungry Hollow.

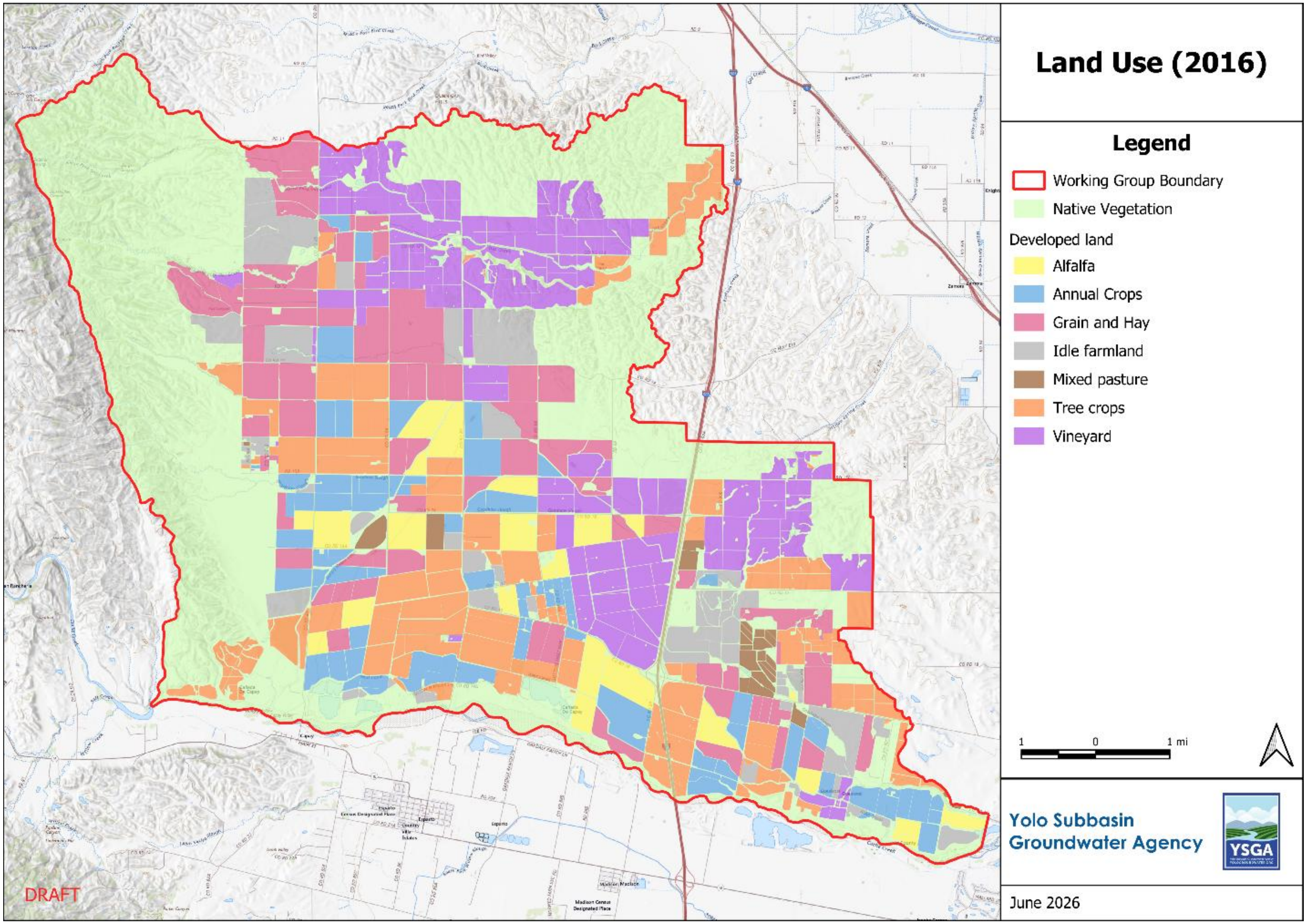

Figure 20. 2016 land use in Hungry Hollow.

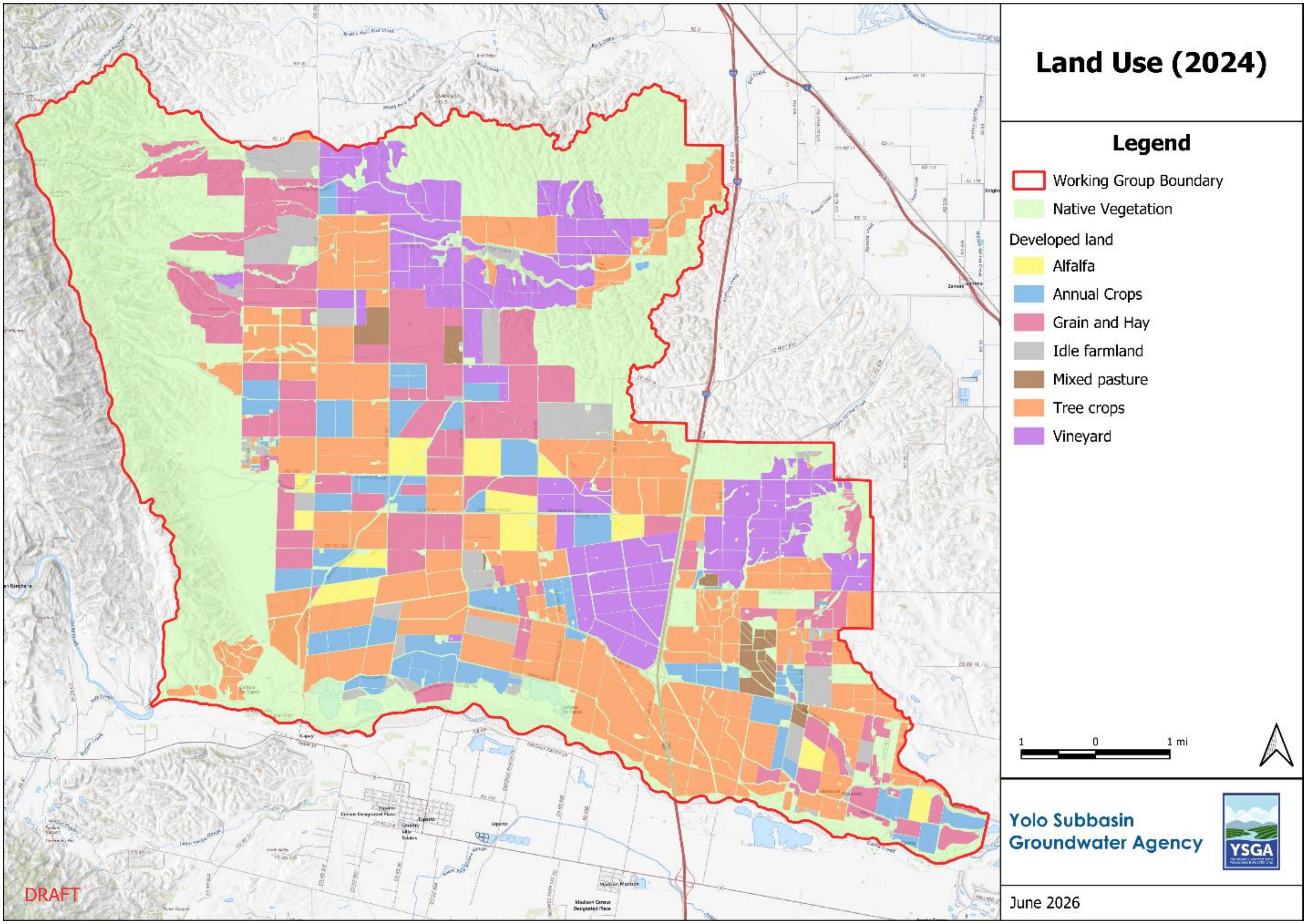

Figure 21. 2024 land use in Hungry Hollow.

5.7 Water Budget

The water budget for the Working Group area was calculated using the existing Yolo Subbasin Model for two catchments of the model: YCFC Hungry Hollow and YCFC Dunnigan Hills, which are 23,872 and 16,728 acres, respectively. Figure 22 shows the catchment areas relative to the Working Group area. Although the catchment boundaries are not a 1:1 comparison to the Hungry Hollow, it does provide a reasonable dataset for analysis to better understand changes in groundwater storage. Using the model results, Figure 23 shows the average change in groundwater storage and the modeled uncertainty since 1970 for both YCFC Hungry Hollow and YCFC Dunnigan Hills model catchments. Table 5 shows estimates of change in storage in both AFY and AFY/acre and modeled uncertainty (AF) since 1970, 1984, 1994, 2004, and 2014 to present.

Figure 23 and Table 5 show that when evaluating changes in groundwater storage, the time frame evaluated strongly dictates the estimated groundwater deficit that's occurring. For the Hungry Hollow catchment, the average change in groundwater storage ranges from -139 AFY to -2,260 AFY with an uncertainty range between +-25 to +- 191 AF. For the Dunnigan Hills catchment, the average change in groundwater storage ranges from -1,280 AFY to -4,308 AFY with an uncertainty range between +-39 to +- 182 AF, or roughly double the change in groundwater storage deficit of the Hungry Hollow catchment with the same uncertainty estimate. Taking these values and estimating the AFY/acre estimates, they range from -0.01 AFY/acre to -0.09 AFY/acre in Hungry Hollow and -0.08 AFY/acre to -0.26 AFY/acre in Dunnigan Hills.

For the purposes of planning projects and management actions to offset an annualized groundwater storage deficit to stabilize and raise groundwater levels, the Working Group chose to be conservative and use the 2014 to 2024 period to calculate the combined groundwater storage deficit value as the offset target value. The offset target value is estimated to be approximately -6,600 AFY. In the next section, we'll discuss the role of precipitation, surface water, land use and crop change, and groundwater-surface water interaction and their role in aquifer system dynamics in Hungry Hollow.

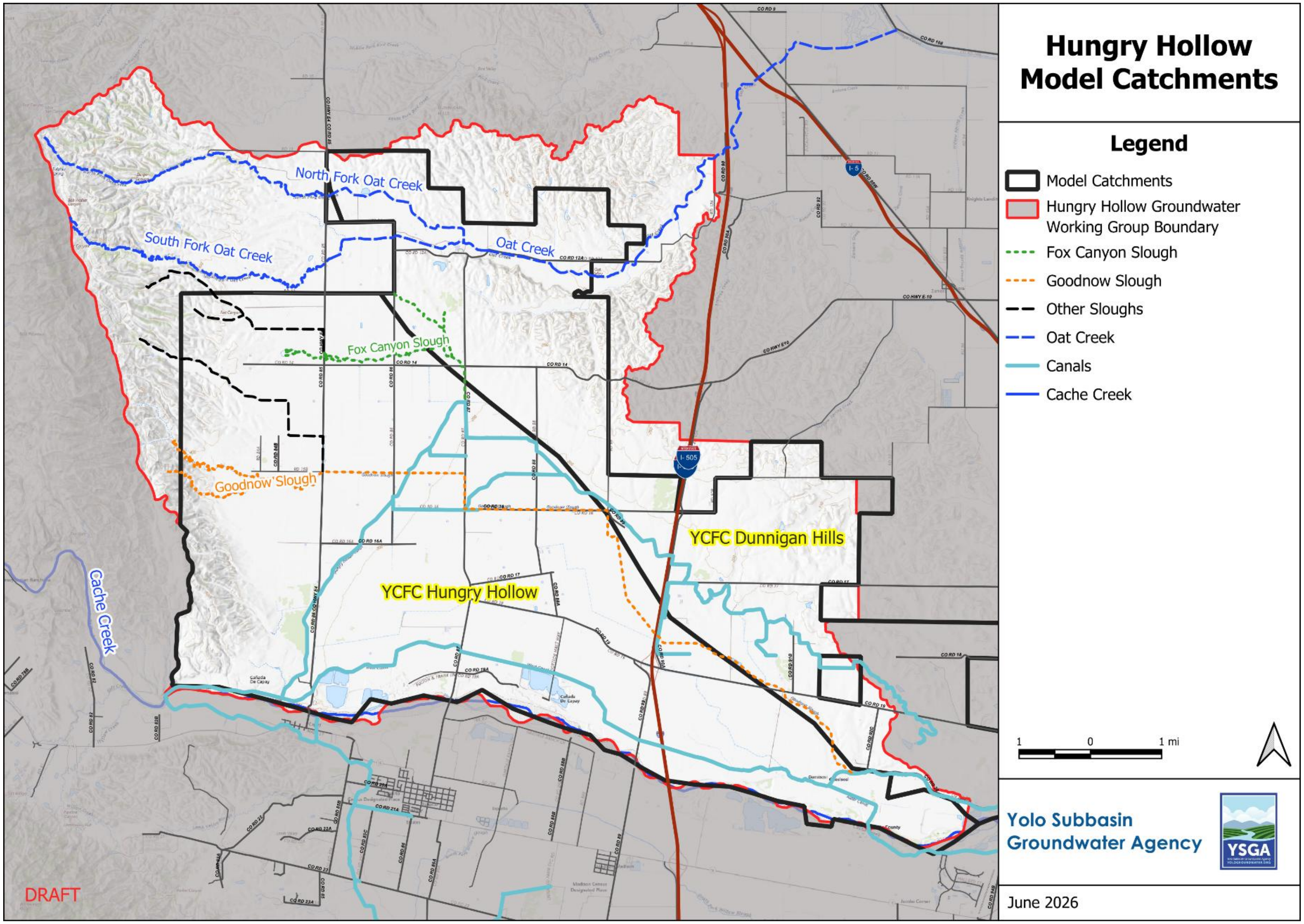

Figure 22. Model catchments used for water budget estimation for Hungry Hollow.

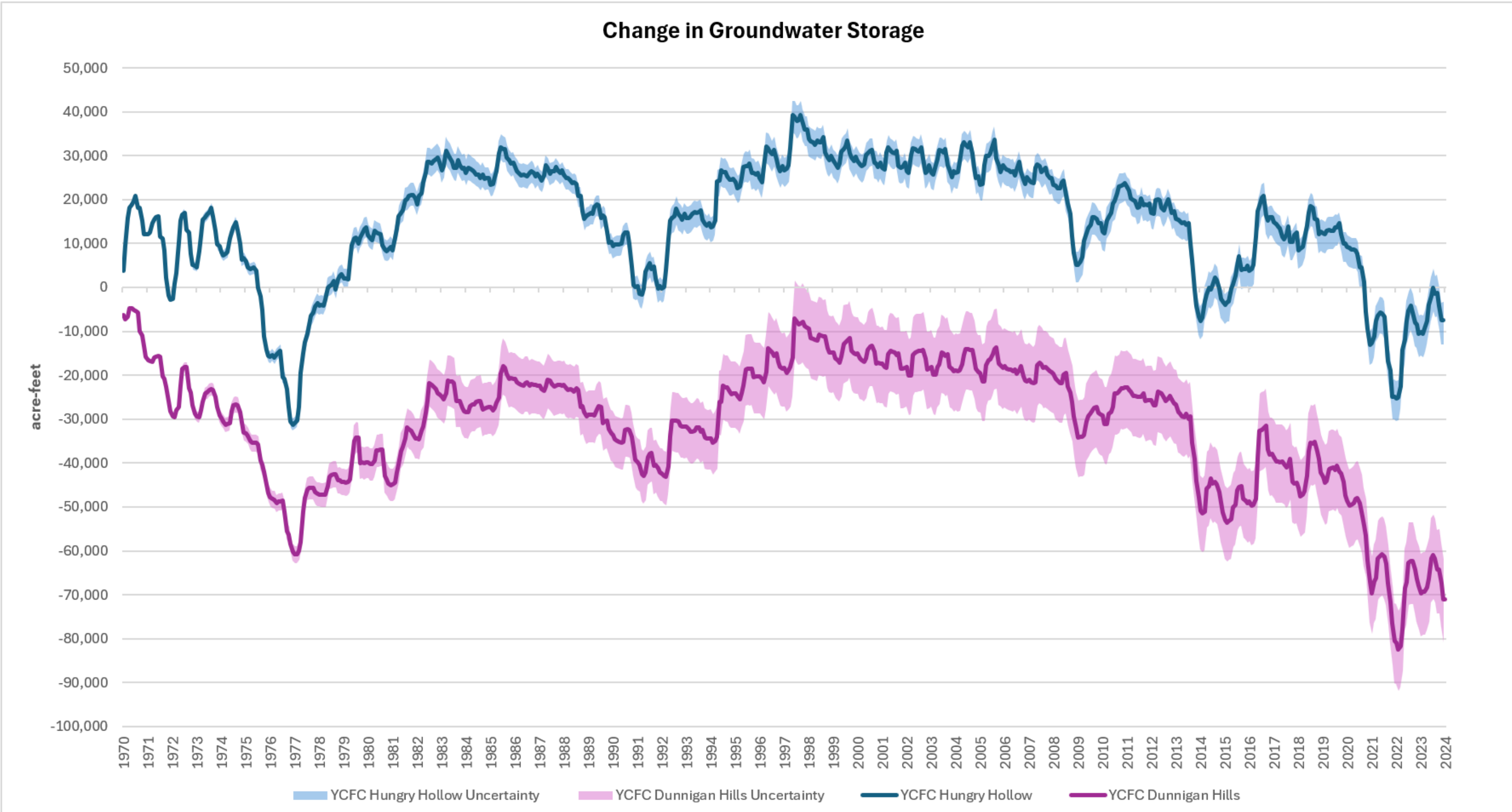

Figure 23. Modeled change in groundwater storage (AF) for YCFC Hungry Hollow and YCFC Dunnigan Hills from 1970 to 2024.

Table 5. Modeled averaged change in groundwater storage (AFY and AFY/acre) and uncertainty (AF) for five discrete time periods.

Model Catchment	Acres	Modeled Period	Average Change in Groundwater Storage (AFY)	Uncertainty (AF)	Avg. Change in Groundwater Storage (AFY/acre)
YCFC Hungry Hollow	23,872	1970-2024	-139	+-78	-0.01
		1984-2024	-880	+-25	-0.04
		1994-2024	-781	+-55	-0.03
		2004-2024	-1,679	+-78	-0.07
		2014-2024	-2,260	+-191	-0.09
YCFC Dunnigan Hills	16,728	1970-2024	-1,280	+-182	-0.08
		1984-2024	-1,202	+-100	-0.07
		1994-2024	-1,356	+-93	-0.08
		2004-2024	-2,690	+-39	-0.16
		2014-2024	-4,308	+-146	-0.26

5.8 Aquifer System Dynamics

To evaluate aquifer system dynamics in Hungry Hollow, this section will discuss:

1. Aquifer response to groundwater pumping during a historic drought between WY 2020 and WY 2022 and the subsequent recovery between WY 2023 and WY 2024
2. The role of precipitation, surface water availability, and groundwater-surface water exchange on groundwater levels and groundwater in storage
3. The role of land use and crop change, conjunctive use, and groundwater recharge
4. Summary of Hungry Hollow Groundwater System Dynamics

5.8.1 WY 2020 – WY 2024 Drought and Recovery

Leading up to the peak of the 2020 - 2022 drought, the following occurred within the Yolo Subbasin and the Hungry Hollow Area:

Water Year 2020

- Classified as Dry for the Sacramento Valley
- Precipitation within the Hungry Hollow area was lower (11.03 inches) than the historical average (19.69 inches)
- District surface water supply was available.

Water Year 2021

- Classified as Critical for the Sacramento Valley
- Precipitation within the Hungry Hollow area was significantly lower (6.44 inches) than the historical average (19.69 inches)
- District's surface water supply was limited and landowners were placed on a surface water allocation.

Water Year 2022

- Classified as Critical for the Sacramento Valley for second year in a row. Marked 3rd year of drought period.
- Precipitation within the Hungry Hollow area was 17.64 inches, just below the historical average (19.69 inches)
- District's surface water was not available to any landowners. Sacramento River Settlement Contractors experienced a low surface water allocation of 15%, the first in recorded history.

The Water Years 2020 – 2022 drought resulted in progressively increasing groundwater pumping throughout the Yolo Subbasin, including the Hungry Hollow area, with groundwater withdrawals generally peaking during the fall of 2022. During Water Year 2022, virtually all landowners within Hungry Hollow relied exclusively on groundwater wells to meet domestic and agricultural water demands. The subsequent recovery of groundwater levels between Fall 2022 and Fall 2024 provides an opportunity to evaluate aquifer-system response under conditions analogous to a large-scale aquifer recovery test, in which an extended period of intensive pumping is followed by substantially reduced groundwater withdrawals and water-level recovery. Although not a controlled pumping test, analysis of the recovery period is valuable because it demonstrates the response of the aquifer system after pumping stresses largely diminish.

Figure 24 shows the regional geology, fall 2022 groundwater elevation (dashed), fall 2024 groundwater elevation (line), and the locations of well completion reports classified by their depth weighted coarse material percentage. In this figure, you can see that in Fall 2022, towards the peak of the drought and irrigation season, we observe distinct locations of groundwater elevations points of interest:

- Point A1: 175-foot contour extends to the northwest at Oat Creek and near County Road 13
- Point B1: 150-foot elevation contour extends to the northwest near Fox Canyon Slough and County Road 14
- Point C1: 125-foot elevation contour extends up above Goodnow Slough and Country Road 15B near the Capay hills
- Point D1: 100-foot elevation contour extends to the northwest near Goodnow Slough and County Road 85

Compare the Fall 2022 to Fall 2024 (recovery period), we can observe significant recovery of groundwater levels due to the rise in groundwater elevations:

- Point A2: 175-foot contour extends to the northwest between Fox Canyon Slough and Goodnow Slough and east of Point C1
- Point B2: 150-foot elevation contour extends to the northwest well below Point B1 and near Point D1.
- Point C2: 125-foot elevation contour extends only to the east of the Reiff lateral and much further to the southeast compared to Point C1
- Point D2: 100-foot elevation contour is further to the east compared to D1 and just south of Hayes

What do the changes in location for each point mean? The change in locations between points for A, B, C, and D show that during droughts, groundwater levels can lower over a large area from Cache Creek and extend up into the hills and when we experience more plentiful surface water supplies and local precipitation, groundwater levels rise back to pre-drought levels over the same large area.

Another observation that can be made in the figure is how the groundwater contour axis generally follows the western edge of the Dunnigan Hills and the eastern edge of the Capay Hills where the Tehama Formation neighbors the Upper Modesto and Lower Modesto Formations. In addition, we can observe from the depth weighted coarse material percentage at each well completion report location that there’s a progressively increasing course material percentage to the southeast from Point B1 and Point C2 to Cache Creek. This presents a basis for a hydrogeological conceptual model. Fall 2022 to Fall 2024 groundwater elevation recovery aligns well with the hydrogeologic conceptual model and indicates that the aquifer system is most sensitive to changes in precipitation, groundwater recharge, and groundwater extraction within the area between the groundwater contour axis in the southern half of the Hungry Hollow. It also indicates that following a severe three-year drought period, increased precipitation, full surface water supply, and increased groundwater recharge can result in significant recovery within an equal (or less) amount of time that the drought occurred.

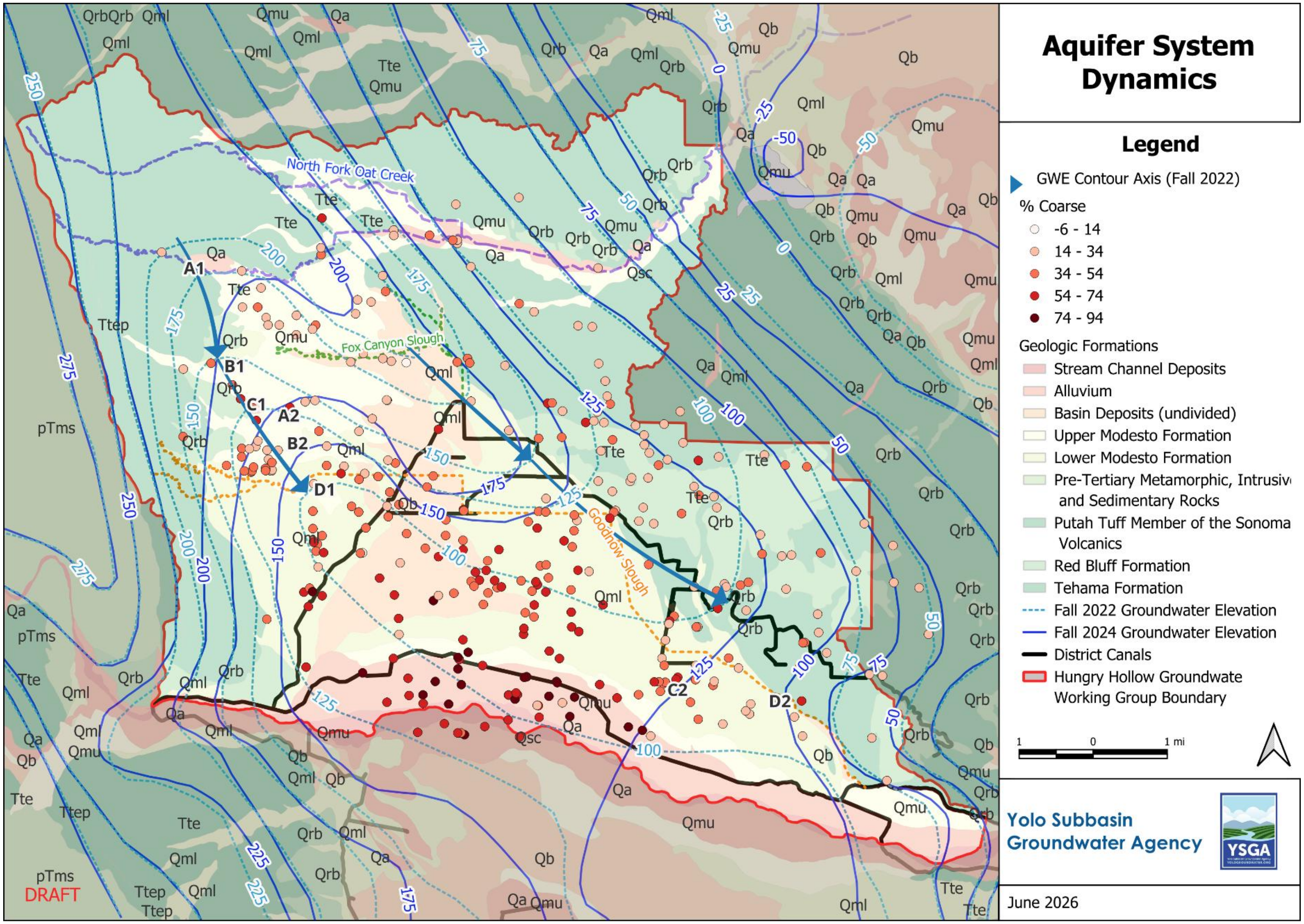

Figure 24. Aquifer system dynamics in Hungry Hollow.

5.8.2 Role of Precipitation, Surface Water Availability, and Groundwater-Surface Water Exchange on Groundwater Levels and Groundwater in Storage

Figure 25 shows the CDFM of precipitation relative to Hungry Hollow specific Representative Monitoring Wells (RMW) wells and the subbasin-wide averaged groundwater level (comprised of data from all 62 RMWs), surface water availability, and water year type. From 1970 to 1998, the precipitation pattern had a positive trend higher. From 1998 to 2012, the precipitation pattern flattened out. From 2013 to 2024, the precipitation pattern transitioned to a negative trend of a lower magnitude compared to the 1970 to 1998 trend. Groundwater level highs and lows typically mirror surface water availability and drought periods in both Hungry Hollow and the subbasin. This figure suggests that precipitation patterns and surface water availability are likely the primary drivers of groundwater level changes through changes in percolation of precipitation, runoff, and managed aquifer recharge.

Figure 26 shows the modeled change in groundwater storage and annual groundwater-surface water exchange along Cache Creek for the YCFC Hungry Hollow catchment (Figure 22). Bars above the zero-line show groundwater flowing into Hungry Hollow and bars below the zero-line show groundwater flowing out of the Hungry Hollow catchment to Cache Creek. This figure shows that between groundwater storage of +10,000 and +20,000 AF range is a zone of equilibrium for the aquifer underlying the Hungry Hollow catchment. When groundwater in storage drops below +10,000 AF, there is annual net inflow from Cache Creek to groundwater. When groundwater in storage rises above +20,000 AF, there is annual net outflow of groundwater to Cache Creek.

What this means in practical terms is that when groundwater levels in wells around Hungry Hollow were relatively high (approximately 1982–1989 and again from 1994–2009), hydraulic heads were high enough to create a groundwater gradient that caused groundwater to flow out of Hungry Hollow toward Cache Creek. Conversely, when groundwater levels declined seasonally and during drought and recovery periods (approximately 1972–1979, 1991–1993, 2014–2016, and 2021–2024), the hydraulic gradient reversed, causing groundwater from the Cache Creek corridor to flow into Hungry Hollow.

Another way to think about these model results is to imagine the Hungry Hollow aquifer as a pond equipped with a level-control system. Let's assume the pond is allowed to have a pond level that is between 80% full (4-feet) and 50% full (2.5-feet). When the water level rises above that range, water begins to discharge through an overflow outlet, although the outlet can only convey a limited amount of water. If inflows exceed the outlet capacity, the water level continues to rise. Conversely, when the water level drops below the target range, a pump begins supplying water from another source to replenish the pond. If withdrawals or other outflows exceed the available inflow, however, the water level continues to decline. While the aquifer is not literally controlled by a pump and overflow, it behaves in a similar way, with groundwater gradients and groundwater-surface water interactions acting as natural feedback mechanisms that moderate changes in groundwater levels.

Figure 26 illustrates that groundwater levels in the Hungry Hollow aquifer fluctuate over time in response not only to recharge from precipitation, runoff, and surface-water infiltration, but also to changing groundwater gradients with surrounding areas and groundwater-surface water exchange along Cache Creek. These hydraulic interactions allow the aquifer to alternately receive groundwater from, or discharge groundwater to, the Cache Creek corridor as groundwater levels rise and fall.

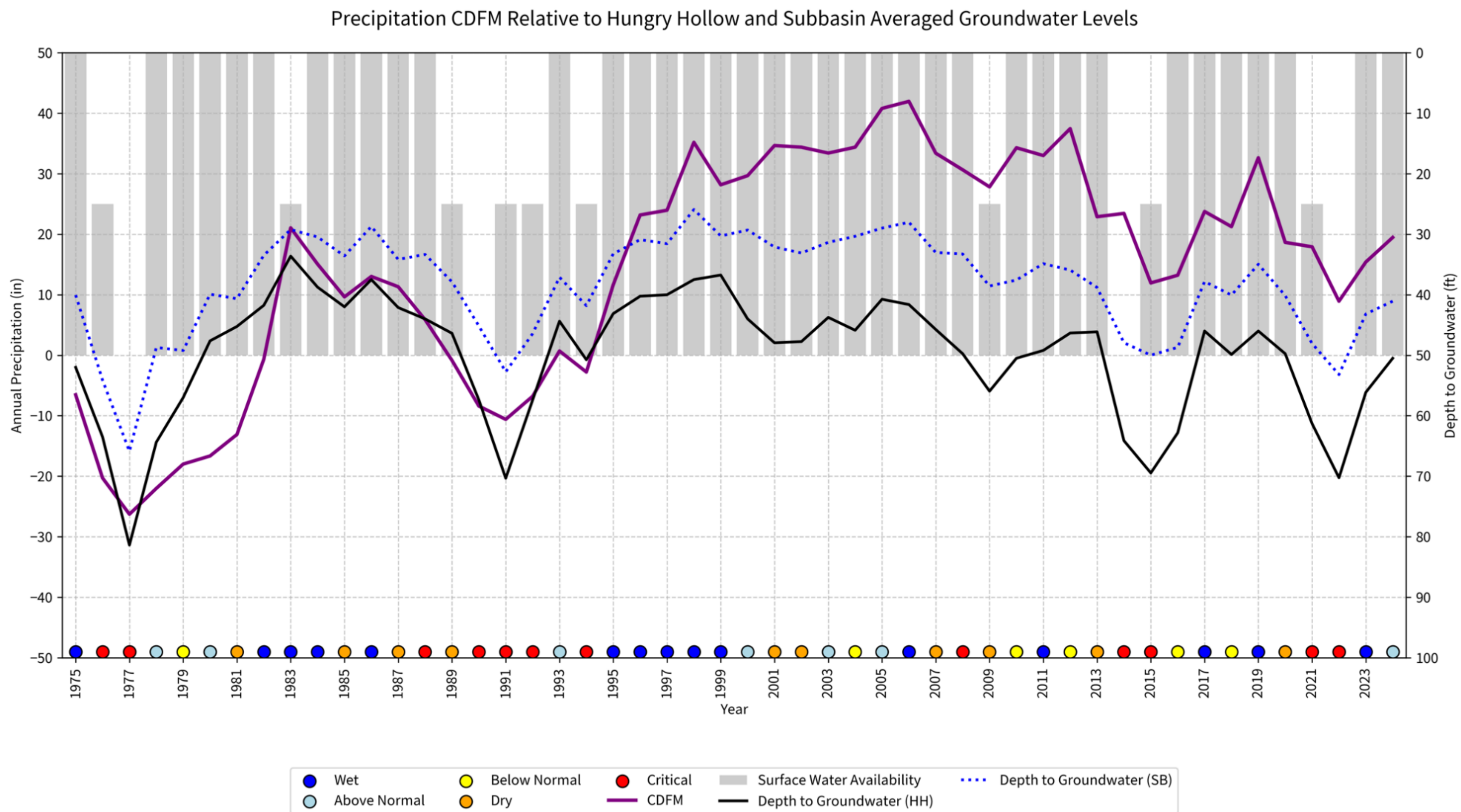

Figure 25. Precipitation CDFM relative to Hungry Hollow (HH) and subbasin-wide (SB) averaged groundwater levels.

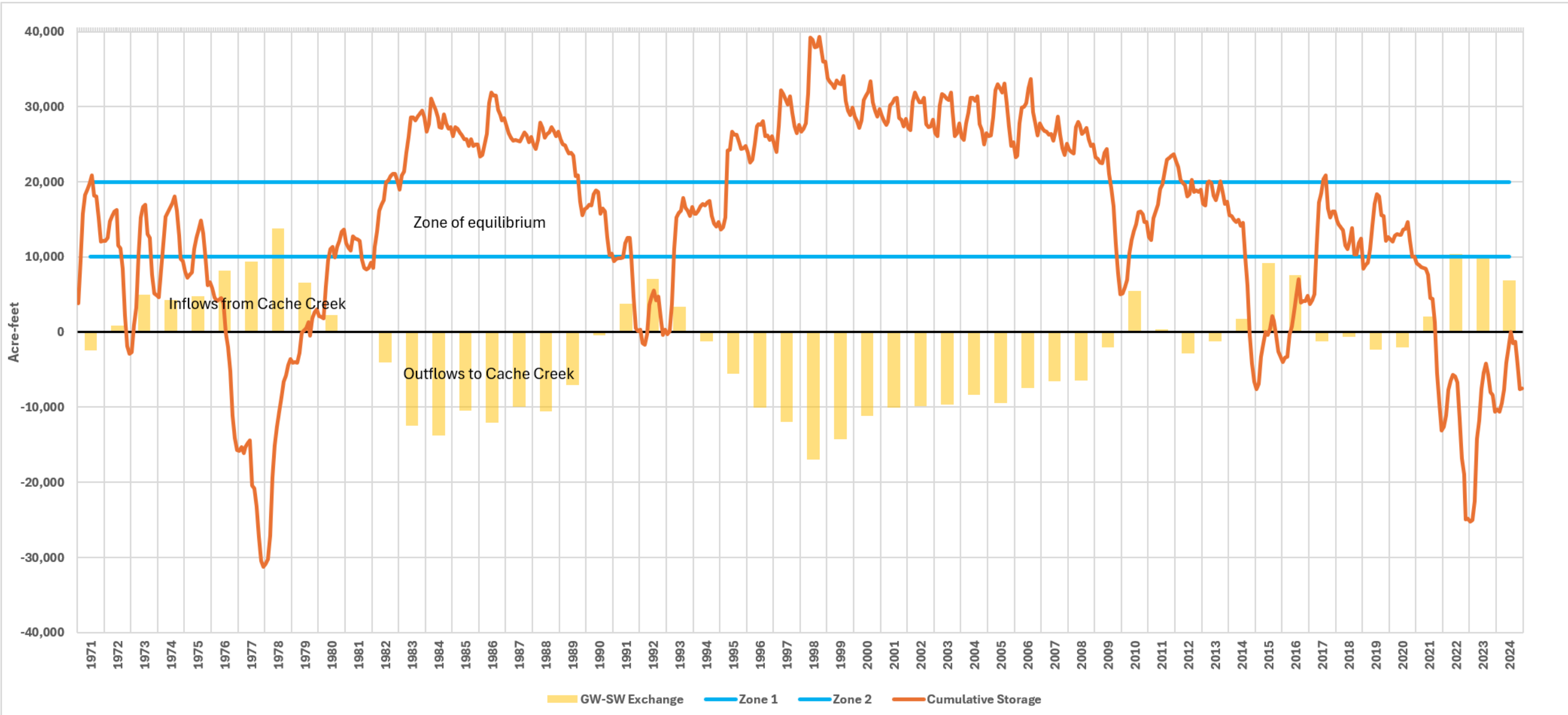

Figure 26. YCFC Hungry Hollow modeled change in groundwater storage relative to annual groundwater-surface water exchange.

5.8.3 Role of Land Use and Crop Change, Conjunctive Use, and Groundwater Recharge

Table 6 shows the change in crop acreage and estimated applied water use between 2008 and 2024. The transition away from alfalfa (a water intensive perennial crop), grain and hay, and annual crops to permanent crops (tree crops and vineyards) driven by commodity prices has resulted in a hardening of overall demand by +7%. The overall hardening of demand from crops that must be irrigated during droughts has increased by up to 25%. This hardening of demand may result in larger magnitude groundwater level declines during droughts when surface water is limited or unavailable compared to 16 years ago.

Despite this hardening of demand, percolation of precipitation and surface water availability play a dominant role in dictating groundwater levels and the timing and magnitude of recovery after droughts (as noted above in Sections 5.8.1 & 5.8.2). Figure 27 shows where lands are currently able to conjunctively use surface water and groundwater and represent over 73% of the cropped acres within the Hungry Hollow. These areas that can access surface water provide an opportunity to amplify the magnitude of and shorten the time to increase groundwater levels after a drought. In addition, proactively managing to maximize precipitation recharge and optimizing conjunctive use through managed aquifer recharge, land management practices, and other methods are likely to lead to building a buffer that can lessen the magnitude of groundwater level decline during the next drought. Table 7 shows the modeled potential impact the six projects may have to collectively offset groundwater level declines and reductions in groundwater storage if they were fully implemented and operational between 2016 and 2024. Table 7 uses historical data related to the YCFCWCD groundwater recharge activities and irrigation season surface water allocations to calculate which of the projects were active each year over three different scenarios: low, medium, and high potential. The low potential estimate can offset over half of the -6,600 AFY target while the medium and high potential estimates greatly exceed that target highlighting the fact that the six proposed and adopted projects have the potential to resolve concerns expressed by the Working Group.

Table 6. Land use and applied water change estimates between 2008 and 2024.

Crop	Est. Applied Water (AF/acre)	2008 Acreage	2024 Acreage	Change in Acreage (%)	2008 Est. Applied Water (AF)	2024 Est. Applied Water (AF)	Change in Est. Appli Water (%)
Alfalfa	4.5	5,461	1,096	-80%	24,573	4,932	-80%
Tree Crops	2.8*	2,727	11,416	319%	7,613	31,870	319%
Misc. grain and hay	1.4	7,900	6,245	-21%	10,863	8,587	-21%
Idle	-	1,051	1,960	86%	-	-	0%
Mixed pasture	3.5	516	518	0%	1,806	1,813	0%
Annual Crops	2.3*	4,458	3,102	-30%	10,442	7,267	-30%
Vineyards	2.5	3,432	5,619	64%	8,580	14,048	64%
Native Vegetation	-	24,075	19,663	-18%	-	-	0%
Total	**2.1**	**49,620**	**49,620**	**0%**	**63,877**	**68,517**	**7%**

*Average of all crop types

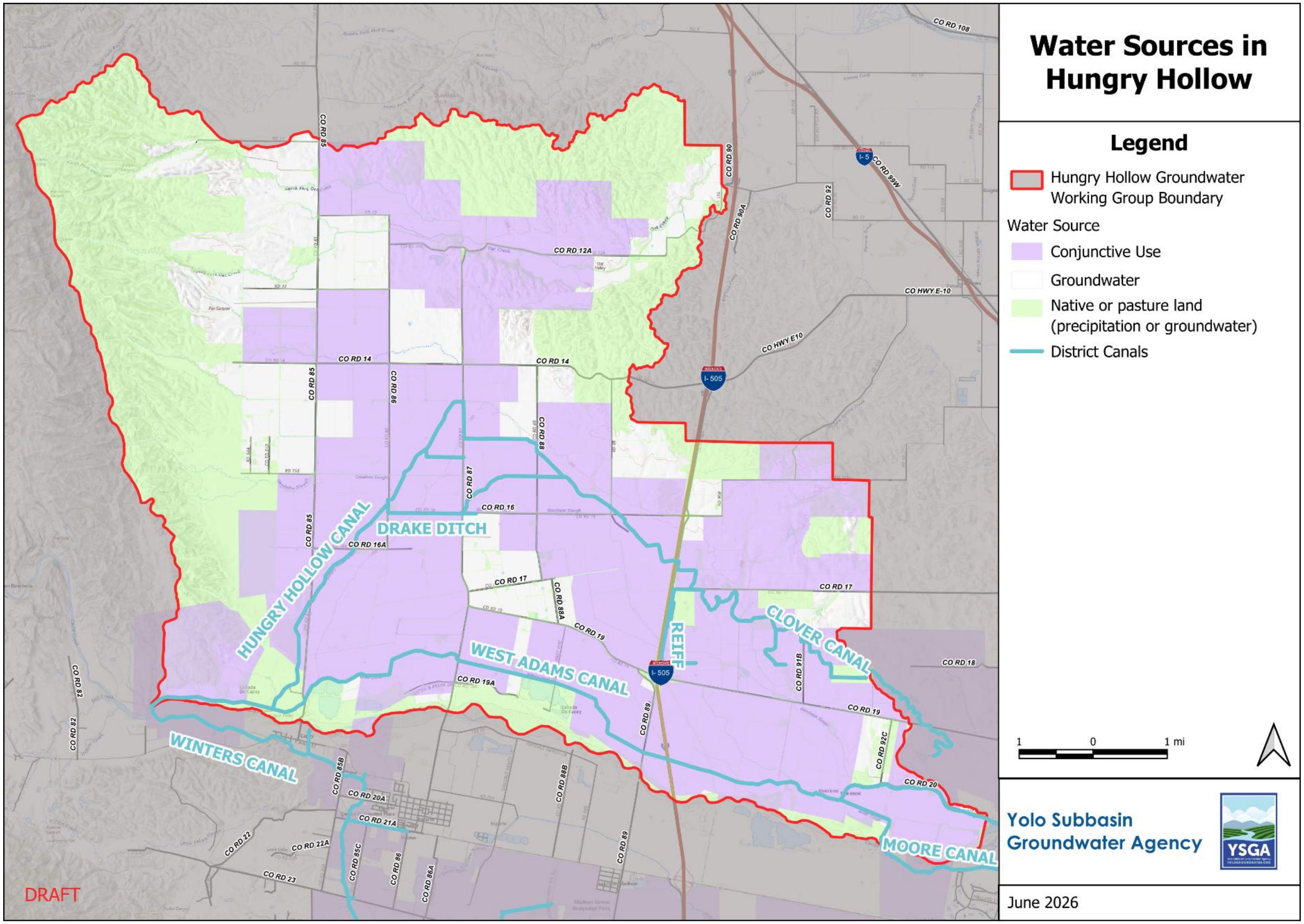

Figure 27. Water sources in Hungry Hollow.

Table 7. Potential impact from implementation of all projects on groundwater levels and groundwater storage from 2016 to 2024.

			Low		Medium		High	
Model Catchment	Acres	Year	Change in Storage from Projects (AFY)	Change in Storage (AFY/acre)	Change in Storage from Projects (AFY)	Change in Storage (AFY/acre)	Change in Storage from Projects (AFY)	Change in Storage (AFY/acre)
YCFC Hungry Hollow	23,872	2016	3,234	0.14	7,955	0.33	12,671	0.53
		2017	3,234	0.14	7,955	0.33	12,671	0.53
		2018	2,058	0.09	5,015	0.21	7,967	0.33
		2019	3,234	0.14	7,955	0.33	12,671	0.53
		2020	2,058	0.09	5,015	0.21	7,967	0.33
		2021	2,058	0.09	5,015	0.21	7,967	0.33
		2022	2,058	0.09	5,015	0.21	7,967	0.33
		2023	3,234	0.14	7,955	0.33	12,671	0.53
		2024	3,234	0.14	7,955	0.33	12,671	0.53
Averaged Subtotal			**2,711**	**0.11**	**6,649**	**0.28**	**10,580**	**0.44**
YCFC Dunnigan Hills	16,728	2016	2,266	0.09	5,575	0.23	8,879	0.37
		2017	2,266	0.09	5,575	0.23	8,879	0.37
		2018	1,442	0.06	3,515	0.15	5,583	0.23
		2019	2,266	0.09	5,575	0.23	8,879	0.37
		2020	1,442	0.06	3,515	0.15	5,583	0.23
		2021	1,442	0.06	3,515	0.15	5,583	0.23
		2022	1,442	0.06	3,515	0.15	5,583	0.23
		2023	2,266	0.09	5,575	0.23	8,879	0.37
		2024	2,266	0.09	5,575	0.23	8,879	0.37
Averaged Subtotal			**1,900**	**0.08**	**4,659**	**0.20**	**7,414**	**0.31**
Total			**4,611**	**0.19**	**11,308**	**0.47**	**17,994**	**0.75**

5.8.4 Summary of Hungry Hollow Groundwater System Dynamics

Based on the data presented in Sections 5.8.1 through 5.8.3, groundwater levels fluctuate between periods of drought and recovery primarily driven by precipitation, surface water availability, and aquifer mechanics. Groundwater declines and recovery behave differently in Hungry Hollow relative to the Dunnigan Hills or Oat Creek areas due to the differences in hydrologic and geologic properties. The frequency of drought versus wet periods plays a significant role in whether landowners with access to surface water use in lieu of groundwater or not. With a moderate hardening of demand and flattening to declining trend in precipitation since 1998, drought induced groundwater level declines and post-drought recovery periods play an important role in dictating groundwater gradients and inflows and outflows. The 1980s and late 1990s and the 2000s were periods of historically high groundwater levels that created groundwater gradients causing groundwater to flow out of Hungry Hollow to Cache Creek. Conversely, the 1977, 1992, 2009, 2014, and 2022 drought periods had pronounced declines in groundwater levels that created groundwater gradients resulting in groundwater flowing into Hungry Hollow from Cache Creek and the surrounding hills. Proactive groundwater management through changes in land management practices to increase natural deep percolation and soil water retention, managing precipitation recharge, runoff, and erosion to scale groundwater recharge, and optimization of conjunctive use within Hungry Hollow can make significant impacts to stabilize groundwater levels and groundwater in storage in the short-term and increase them over the long term. This will support maintaining the aquifer’s natural state of equilibrium.

5.9 Data Gaps

Currently, the YSGA monitors groundwater levels in over 60 wells and evaluates groundwater quality data from over 42 wells within Hungry Hollow. Groundwater levels are monitored at least twice a year, but the YSGA recognizes that increasing the frequency of data collection to quarterly, or even monthly intervals, would support a better understanding of groundwater level changes over time. In addition, the YSGA intends to coordinate with landowners to increase groundwater quality sampling to better understand water quality trends over time. Figure 28 shows the locations and well types that are monitored. Figure 29 and 30 shows the data gap areas which were calculated using a 1-mile buffer around the wells monitored for groundwater levels and water quality, respectively. There are irrigated areas with existing wells that could be added to the network which would fill almost all the data gap areas identified in Figures 29 and 30.

YSGA also monitors land subsidence using InSAR data provided by DWR. Figure 31 shows points where the total magnitude of subsidence from April 2015 to April 2026 has been calculated using satellite data. Active land activities like farming and grazing may alter the landscape, which can lead to data gaps in the satellite data. Since the majority of Hungry Hollow is actively farmed or grazed, those lands do not show up as colored points on the map. There may be an opportunity to fill in the main data gap shown in Figure 30 with a satellite corner reflector or GPS station on a willing landowner’s property that has the appropriate space to accommodate these devices.

The YSGA estimates groundwater extraction (i.e. applied water) within Hungry Hollow using remote sensing and modeling methods but does acknowledge that this can be made more robust over time by doing surface water and groundwater infrastructure mapping and farm field operations analysis to better understand how landowners use surface water and groundwater on their lands. This additional data would provide valuable context when estimating applied water.

Another data gap identified is if and to what extent faulting and folding in Hungry Hollow and the Dunnigan Hills may explain low well yields, differences in water quality, and model calibration deviations. This will be explored further by the YSGA as part of its planned subbasin-wide hydrogeologic conceptual model update planned over the next five years.

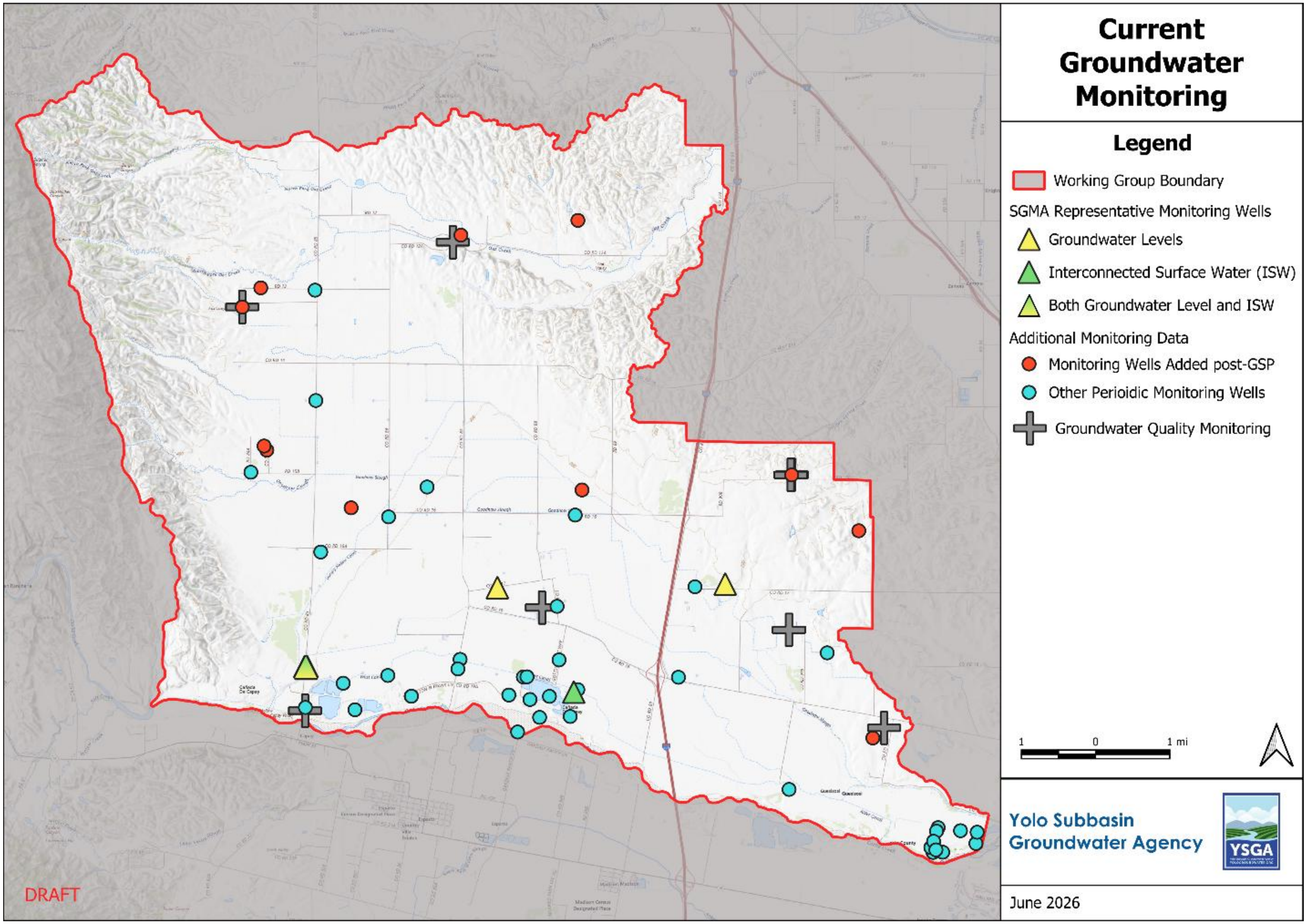

Figure 28. Current groundwater monitoring wells in YSGA monitoring program.

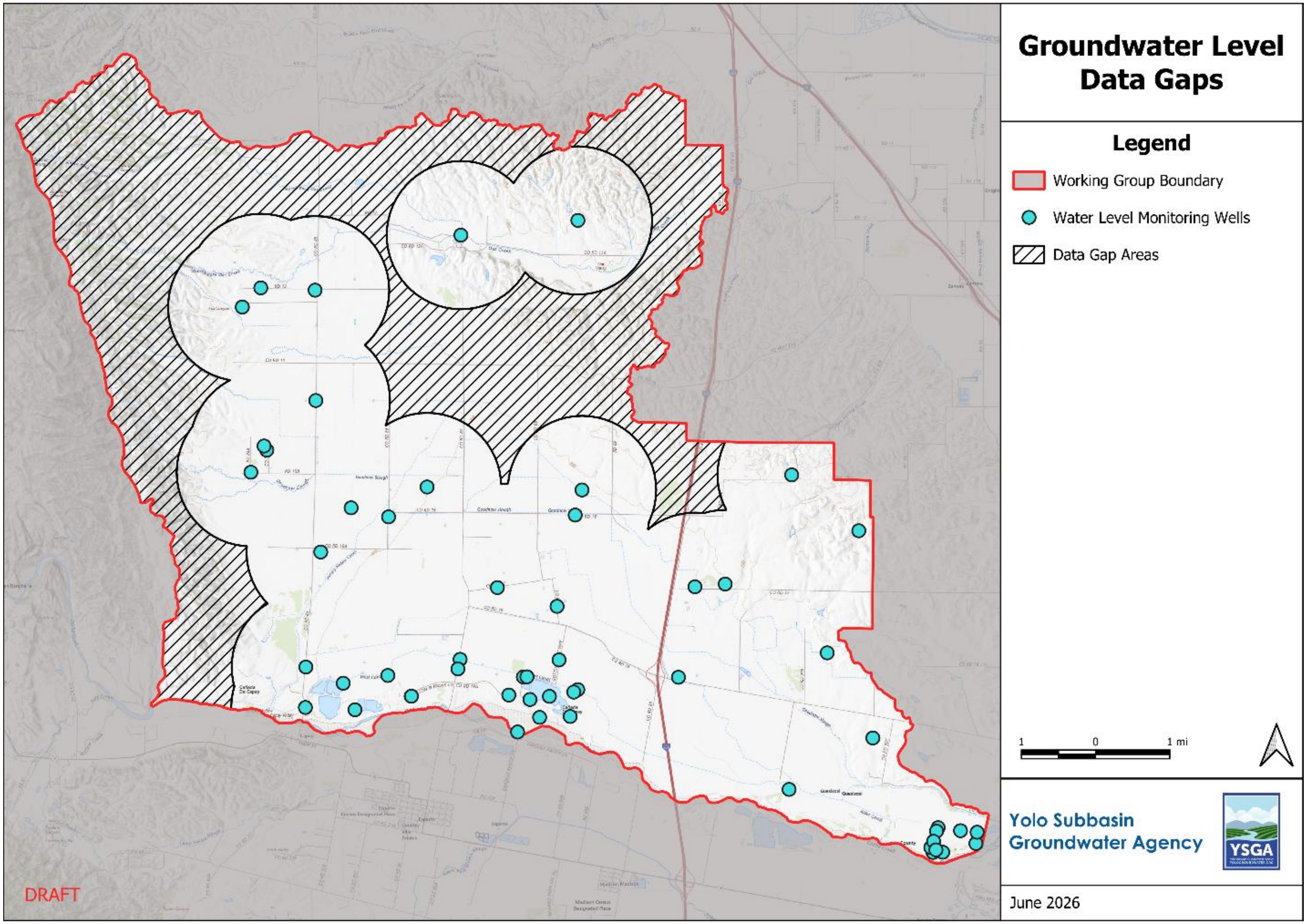

Figure 29. Groundwater level monitoring data gaps.

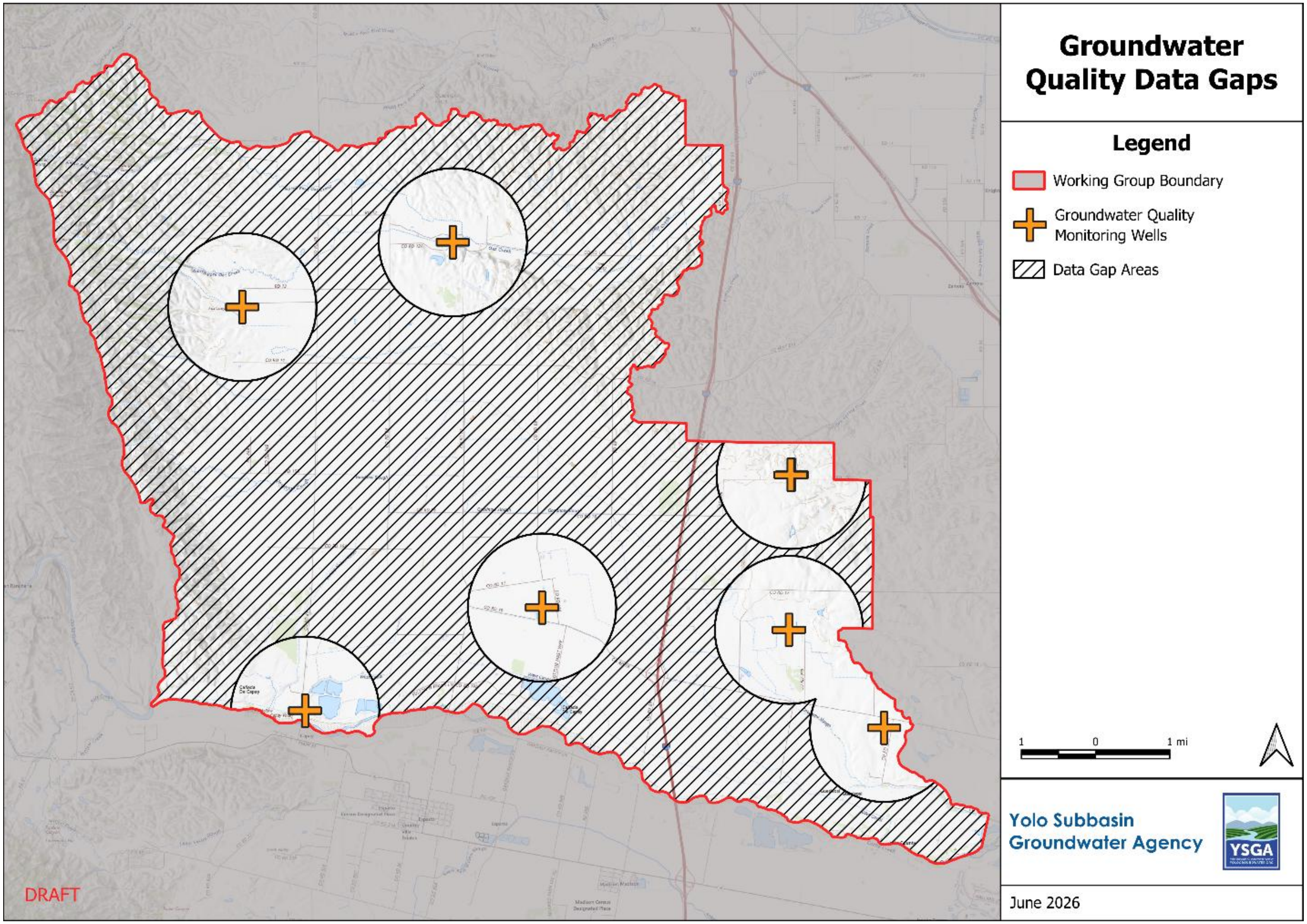

Figure 30. Groundwater quality monitoring data gaps.

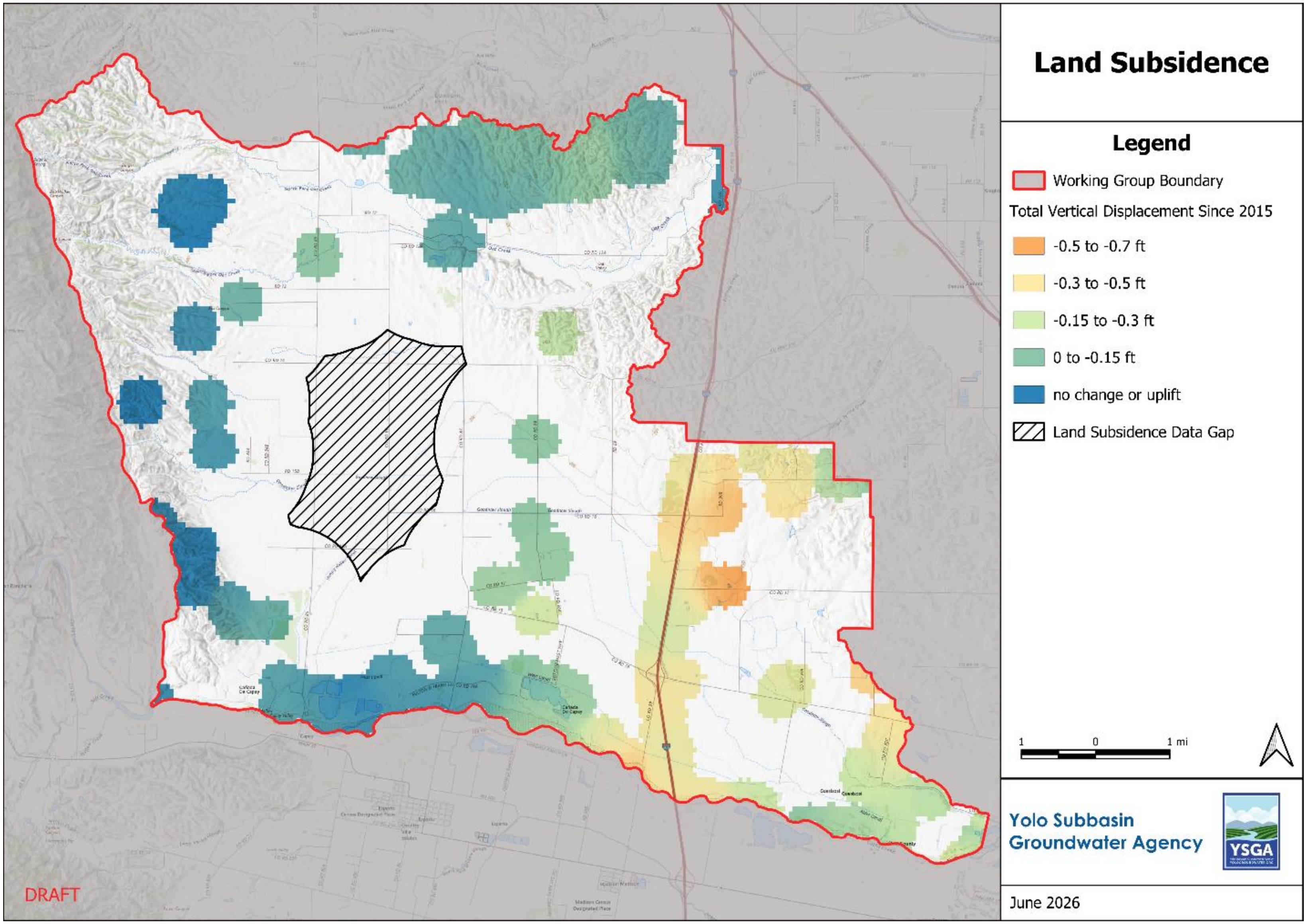

Figure 31. Land subsidence monitoring data gap.

6. PROJECT SELECTION

6.1 PMA Selection Process

YSGA staff, with support from West Yost Associates and Consero Solutions, prepared a list of implementation options, eligibility, and prioritization criteria to evaluate projects and management actions that would be considered by the Working Group. The implementation options, eligibility, and prioritization criteria, and selection of top 5 ranked projects were approved by the Working Group on November 14, 2025 and the YSGA Board approved the top five ranked projects on January 12, 2026.

6.1.1 Implementation Options

Implementation options were developed in collaboration with the Working Group to identify discrete project concepts that aim to address Working Group and historical concerns within Hungry Hollow. Twenty-five (25) discrete project concepts were developed and were grouped into four categories: (1) Recharge Groundwater, (2) Reduce Groundwater Use, (3) Improve Communication and Governance, and (4) Build on Existing Data. These measures are intended to support compliance with the Groundwater Sustainability Plan (GSP), facilitate conjunctive use, protect agricultural viability, and enhance overall basin resilience, particularly during drought periods. The options emphasize voluntary, incentive-based, and collaborative approaches where feasible, while incorporating targeted regulatory tools and infrastructure investments. The Implementation Options Table used to develop project concepts is summarized below and can be found in **Attachment E**.

SUMMARY OF IMPLEMENTATION OPTIONS

A. Recharge Groundwater (Options 1–7)

This category focuses on increasing aquifer storage through diversion, capture, and infiltration projects:

- **Winter Flow Diversions (Options 1–3)**: Divert available winter flows for spreading on fallow or dormant agricultural fields and identified basins (Option 1); convey flows at low rates through the Hungry Hollow Canal (Option 2); or acquire land/easements and construct dedicated recharge basins and berms on willing agricultural lands (Option 3). All actions are to be coordinated with YSGA and willing landowners.
- **Local Stormwater Capture (Options 4–6)**: Construct shallow dry wells (Option 4), injection wells for targeted recharge (Option 5), or sand dams (Option 6) on lands identified by YSGA and willing landowners to enhance infiltration.
- **Land Management Practices (Option 7)**: Implement upper-watershed best practices including hillslope restoration, sediment traps, farm/rangeland/ponds, and cover cropping to increase infiltration and reduce runoff.

B. Reduce Groundwater Use (Options 8–17)

This category seeks to decrease reliance on groundwater extraction through efficiency, substitution, and regulatory measures:

- **Conjunctive Use (Options 8–9)**: Expand surface water utilization among existing and new users connected to the system (Option 8) and secure additional surface water rights or storage capacity (Option 9).

- **Land Management Practices (Options 10–12)**: Improve soil health via cover cropping to reduce bare soil (Option 10), no-till planting methods (Option 11), and shifts to less water-intensive crops (Option 12).
- **Incentive Programs (Option 13)**: Assist landowners in accessing grants such as SWEEP and similar programs to fund drip/micro/sub-surface irrigation, leak reduction, and related efficiency upgrades.
- **Regulations (Options 14–16)**: Impose drought-period extraction limits tied to the GSP Minimum Threshold Trigger (Option 14); enact temporary countywide land-use restrictions or zoning based on water availability and data gaps (Option 15); and strengthen well ordinances to restrict new wells in sensitive or data-deficient areas (Option 16).
- **Infrastructure Improvements (Option 17)**: Extend surface water delivery infrastructure to currently unserved surface water users.

C. Improve Communication and Governance (Options 18–22)

This category addresses knowledge transfer, transparency, and institutional structure:

- **Communication (Options 18–21)**: Develop landowner-to-landowner training and knowledge-sharing programs (Option 18); establish a technical assistance program for water usage assessment (Option 19); provide quarterly subbasin model updates to the Board and Public Advisory Committees (Option 20); and create a private self-assessment tool for landowners to evaluate their practices' contribution to sustainability (Option 21).
- **Governance (Option 22)**: Establish a clear governance structure specifically for the Hungry Hollow area.

D. Build on Existing Data (Options 23–25)

This category strengthens the technical and analytical foundation for future decision-making:

- **Data Collection and Monitoring (Options 23–25)**: Conduct quarterly groundwater level monitoring with consideration for provision to YSGA (Option 23); significantly update the groundwater component of the subbasin model by 2028 (Option 24); and identify high-return-on-investment areas for projects and management actions to maximize sustainability gains (Option 25).

6.1.2 Prioritization Criteria

Prioritization criteria were developed in collaboration with the Working Group to ensure that only feasible, effective, and aligned proposals advance for YSGA Board consideration. These criteria were applied consistently and transparently to promote projects that best advance groundwater sustainability, economic viability, equity, and community values within the Hungry Hollow area while ensuring efficient use of resources. The eligibility and prioritization criteria used are summarized below and can be found in **Attachment F**.

Eligibility Criteria

No project or management action shall be considered unless it satisfies **all** of the following mandatory eligibility requirements:

1. The project or management action must be located within the Hungry Hollow area;
2. It must be consistent with the Yolo Subbasin GSP, affirmatively supporting the GSP's sustainability goals and indicators;
3. The proponent must demonstrate sufficient institutional capacity to implement the project or action;
4. The proponent must be capable of completing implementation within three (3) years; and
5. The proponent must be able to quantify and measure both the quantitative and qualitative benefits of the project relative to other proposals.

Prioritization Criteria

Eligible projects and management actions shall be scored according to the nine (9) weighted criteria set forth below. Each criterion is assigned points as follows: **High (4 points)**, **Medium (2 points)**, or **Low (1 point)**. Scoring shall be conducted objectively by the Working Group and presented to the YSGA Board.

1. **Contribution to Sustainable Groundwater Levels**
2. **Secure Funding for Ongoing Operations and Maintenance**
3. **Cost-Effectiveness**
4. **Provision of Co-Benefits**
5. **Economic Benefits to Landowners and Growers**
6. **Benefits to Small Water Systems, Private Shallow Domestic Wells, and the Human Right to Water** (Cal. Water Code § 106.3)
7. **Absence of Regulatory Barriers**
8. **Benefits to Areas Heavily Reliant on Groundwater**
9. **Community Support**

6.1.3 Project Selection

Sixteen (16) project concepts were developed in collaboration with the Working Group. They are listed below in Table 8. Orange highlighted projects were determined to be more appropriate to include in a subbasin wide program. Gray highlighted projects were already in progress or completed and therefore were not ranked.

Table 8. Hungry Hollow Groundwater Working Group Project Selection.

PMA #	PMA Name
5	Hungry Hollow Winter Water On-farm Recharge
3	Oat Creek Trickle Flow Recharge
7	Increase Conjunctive Use
8	Voluntary Land Conversion and Water Management Practices
2	No Name Slough Stormwater Capture and Recharge
1	Goodnow Slough Stormwater Capture and Recharge
4	Western Hillslope Stormwater Capture and Recharge with Dry Wells
6	Irrigation Season Land Management Practices to Support Recharge
9	Voluntary Demand Management and Well SCADA Upgrades
10	Grant Funding Assistance Program
11	Landowner Technical Assistance Program
12	Historically Non-Irrigated Acreage Expansion Restrictions
13	Well Permitting Ordinance Update
14	Hungry Hollow Governance Structure Development
15	2028 Subbasin Model Update (Groundwater Portion Only)
16	Voluntary Groundwater Level Monitoring Program

The prioritization criteria described in **Section 6.1.1** (detailed in **Attachment F**) was used to narrow down the list of sixteen (16) project concepts down to five (5) that may have the most impact and success to be implemented. **Attachment G** shows the ranking agreed upon by the Working Group & **Attachment H** provides project concept descriptions and ranking values determined for each project. Following the selection process, an additional project was identified to address erosion control and flood management challenges in the western hills, which would be a barrier to the success of the chosen projects. This project, Western Hills Erosion Management and Flood Managed Aquifer Recharge (MAR), was appended to the five (5) projects chosen for implementation

7. . PROJECTS CHOSEN FOR IMPLEMENTATION

This section describes the scope of the six (6) projects that were approved by the Working Group and YSGA Board to implement in the Hungry Hollow Area. Together, the projects are intended to improve groundwater conditions in Hungry Hollow by increasing recharge, reducing groundwater pumping, improving surface water use and land management practices, addressing flooding and erosion constraints, and supporting voluntary landowner participation.

The projects are defined at the planning level. The estimated recharge, pumping offset, and applied water reduction benefits summarized in this section are intended to support comparison among projects and inform implementation planning, but should not be interpreted as design-level estimates. Actual project benefits will depend on surface water availability, landowner participation, site-specific infiltration conditions, final design, permitting, operations, and monitoring results.

Table 9 below is a summary of the six projects, including the estimates of recharge and groundwater benefits. The benefit estimates are rounded to reflect the planning-level nature of the analysis.

Table 9. Summary of planning-level recharge and groundwater benefits for selected hungry hollow projects

Project	Primary Benefit Type	Approximate Annual Benefit	Approximate Range
Hungry Hollow Winter On-Farm Recharge	Direct recharge	4,000 AFY	2,000 to 8,000 AFY
Oat Creek Trickle Flow Recharge	Direct recharge	20 AFY	5 to 75 AFY
Increase Conjunctive Use	In-lieu recharge / reduced pumping	3,300 AFY	1,600 to 6,600 AFY
Voluntary Land Conversion and Water Management Practices	Reduced applied water / improved infiltration	3,100 AFY	1,600 to 6,300 AFY
Fox Canyon Slough Stormwater Capture and Recharge	Stormwater capture and recharge	90 AFY	37 to 200 AFY
Western Hills Erosion Management and Flood MAR	Stormwater capture, recharge, and applied water savings	310 AFY	140 to 660 AFY
Total portfolio benefit		**Approximately 11,000 AFY**	**Approximately 5,400 to 21,800 AFY**

7.1 Hungry Hollow Winter On-Farm Recharge

This project would use available winter surface water conveyed through the Hungry Hollow Canal system to recharge groundwater on participating agricultural lands. Landowners would voluntarily enroll fields in the YCFCWCD's Groundwater Recharge Program and apply available winter water to their land to achieve groundwater recharge.

Figure 32 shows approximately 20,000 acres that are candidates for winter recharge ranked from low to high recharge potential. The project concept is to enroll at least 6,000 acres (30% of total acreage) that are currently connected to the YCFCWCD's canal system. The 6,000-acre target represents an initial implementation target, not the full potential acreage. Table 10 shows the planning-level recharge estimates for this project incorporating various assumptions for enrolled acreage, field recharge (infiltration) rate, recharge period, and canal capacity.

If 6,000 acres are enrolled in on-farm recharge, the estimated recharge benefit is around **1,200 AFY**, with a sensitivity range from 600 AFY (shorter recharge period, limited canal capacity) to 6,000 AFY (high infiltration rate, longer recharge period).

During 2026, no landowners signed up to participate in the YCFCWCD's Groundwater Recharge Program in Hungry Hollow due to not having enough lead time to plan for recharge on their fields. This highlights the importance of early outreach, clear program procedures, and adequate preparation time before the winter recharge season.

Successful implementation will depend on matching available winter water with willing landowners and suitable fields. Successful implementation of this project is dependent on the following factors:

- Landowner interest and early enrollment in the YCFCWCD Groundwater Recharge Program.
- Availability of winter water during the January through March recharge window.
- Suitable field conditions and compatible crop, soil, and irrigation operations.
- Adequate canal, check, turnout, and field infrastructure to deliver and manage water.
- Practical monitoring and recharge accounting procedures to document benefits.

Table 10. Hungry Hollow winter on-farm recharge planning scenarios

Table Element	Low / Constrained Case	Current Planning Case	High / Expanded Case
Candidate Acreage			
Low recharge potential acreage	7,700 acres	7,700 acres	7,700 acres
Medium recharge potential acreage	8,400 acres	8,400 acres	8,400 acres
High recharge potential acreage	4,000 acres	4,000 acres	4,000 acres
Total candidate acreage	**20,000 acres**	**20,000 acres**	**20,000 acres**
Assumption Ranges			
Field recharge rate	Default	Default	2x to 5x default
Recharge period	1/2 default	Default	2x default
Canal capacity	1/4 to 1/2 default	Default	Default
Recharge by Acres Enrolled			
500 acres enrolled	50 to 100 AFY	100 AFY	200 to 500 AFY
1,000 acres enrolled	100 to 200 AFY	200 AFY	400 to 1,000 AFY
6,000 acres enrolled	600 to 1,200 AFY	1,200 AFY	2,400 to 6,000 AFY
Full candidate acreage enrolled	2,000 AFY	4,000 AFY	8,000 AFY
Comparison to Initial 6,000-Acre Target			
500-acre scenario	500 to 1,150 AFY less than target	1,100 AFY less than target	1,900 to 5,500 AFY less than target
1,000-acre scenario	400 to 1,100 AFY less than target	1,000 AFY less than target	1,400 to 5,000 AFY less than target
Full candidate acreage scenario	800 to 1,400 AFY more than target	2,800 AFY more than target	2,000 to 5,600 AFY more than target

Notes:

1. Candidate acreages are rounded and represent lands within the Hungry Hollow boundary that may be suitable for winter on-farm recharge using the canal system.
2. Recharge estimates are rounded planning-level values and should not be interpreted as design-level estimates.
3. Enrollment scenarios assume participating acres are distributed proportionally across low-, medium-, and high-recharge-potential lands. Actual recharge will depend on which specific fields enroll.
4. The low/constrained case reflects reduced operations, including fewer recharge days and/or reduced canal capacity.
5. The high/expanded case reflects the potential for higher field-scale recharge rates and a longer recharge period, subject to water availability, canal operations, and field suitability.
6. The 6,000-acre scenario represents the initial implementation target. The full candidate acreage scenario represents the approximate upper planning case if all identified candidate lands participate.

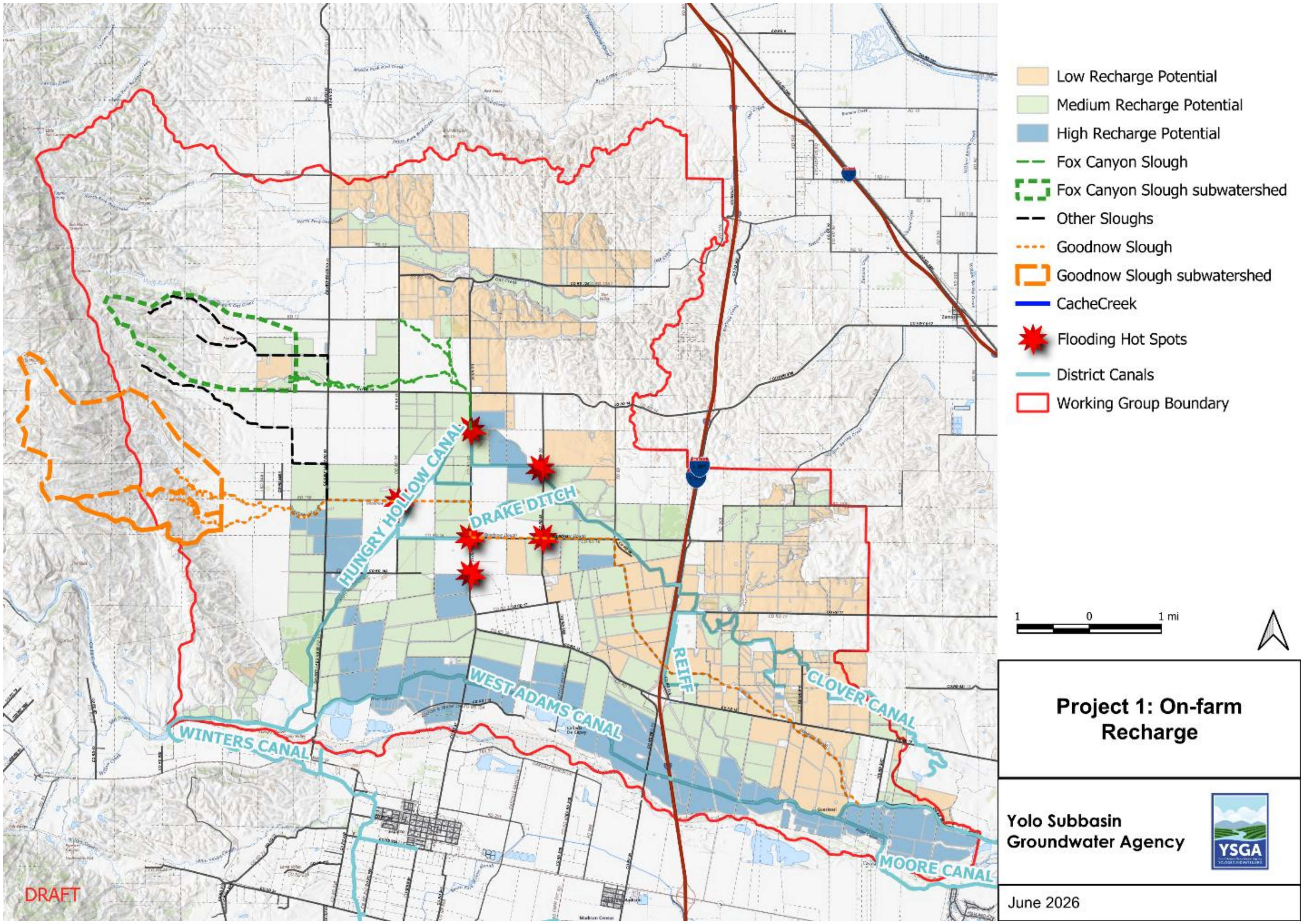

Figure 32. Project 1: On-farm Recharge.

7.2 Oat Creek Trickle Flow Recharge

This project aims to redivert available surface water from the Hungry Hollow Canal system and discharge it to Oak Creek to promote infiltration through the creek bed. The current concept is to use the HUH 525 LP turnout and existing pipeline infrastructure to deliver water to Oat Creek or to a nearby recharge feature, allowing water to move slowly and infiltrate where conditions are favorable.

Figure 33 shows the point of rediversion, pipeline alignment, discharge point into Oat Creek, and trickle flow recharge zone along Oat Creek. Table 11 provides the estimated recharge quantities that can be achieved by implementing this project.

The estimated recharge benefit is around **20 AFY**, with a sensitivity range from 5 AFY (shorter recharge period, lower infiltration rate) to 75 AFY (high infiltration rate, longer recharge period).

During 2026, AgIS Capital participated in the YCFCWCD's Groundwater Recharge Program and piloted diversions of winter water for recharge into Oat Creek. Initial observations indicated that approximately 30% of the diverted volume infiltrated at the flow rates achieved during the pilot. Flow rates were reduced to match the creek bed's apparent infiltration rate; however, time and water supply constraints prevented further testing to identify the optimal flow rate. Data from this pilot test was used to inform assumptions described in Table 11. Additional monitoring is needed to refine the estimated proportion of water infiltrating the creek bed, identify the most effective flow rates, and determine whether changes to discharge location, flow duration, or timing could improve recharge performance. Table 12 shows the dates and volumes diverted into Oat Creek during the AgIS pilot diversions. Figures 34 and 35 are photos taken during trickle flow recharge activities.

Successful implementation of this project is dependent on the following factors:

- Availability of winter water for continued pilot testing.
- Ability to divert and discharge water at flow rates that promote creek-bed infiltration.
- Sufficient recharge duration to evaluate creek-bed response.
- Monitoring of diverted volume, wetted reach, infiltration, downstream conditions, and groundwater response.
- Ability to adjust flow rates, discharge timing, or discharge location based on pilot results.

Table 11. Oat Creek Trickle Flow Recharge planning scenarios.

Table Element	Low Case	Current Planning Case	High Case
Physical Basis			
Oat Creek recharge reach length	4.7 miles	4.7 miles	4.7 miles
Assumption Ranges			
Infiltration rate	0.1 AF/mile/day	0.2 AF/mile/day	0.4 AF/mile/day
Recharge rate	0.5 AF/day	0.9 AF/day	1.9 AF/day
Recharge period	10 days/year	20 days/year	40 days/year
Estimated Recharge Potential			
Annual recharge volume	5 AFY	20 AFY	75 AFY

Notes:

1. Oat Creek length is rounded and represents the assumed active recharge reach.
2. Recharge rate is calculated as the assumed percolation rate multiplied by the active recharge reach length.
3. Annual recharge volume is calculated as the recharge rate multiplied by the assumed recharge period.
4. Values are rounded to reflect the planning-level nature of the estimate.
5. Actual recharge will depend on the discharge location, wetted channel length, flow rate, duration of available water, creek bed conditions, and monitoring results.

Table 12. Oat Creek Pilot Recharge Monitoring Summary.

Pilot Period	Volume Diverted to Oat Creek	Estimated Percent Infiltrated	Estimated Recharge
January 9 - January 21, 2026	88	35%	30.8
Total			**30.8**

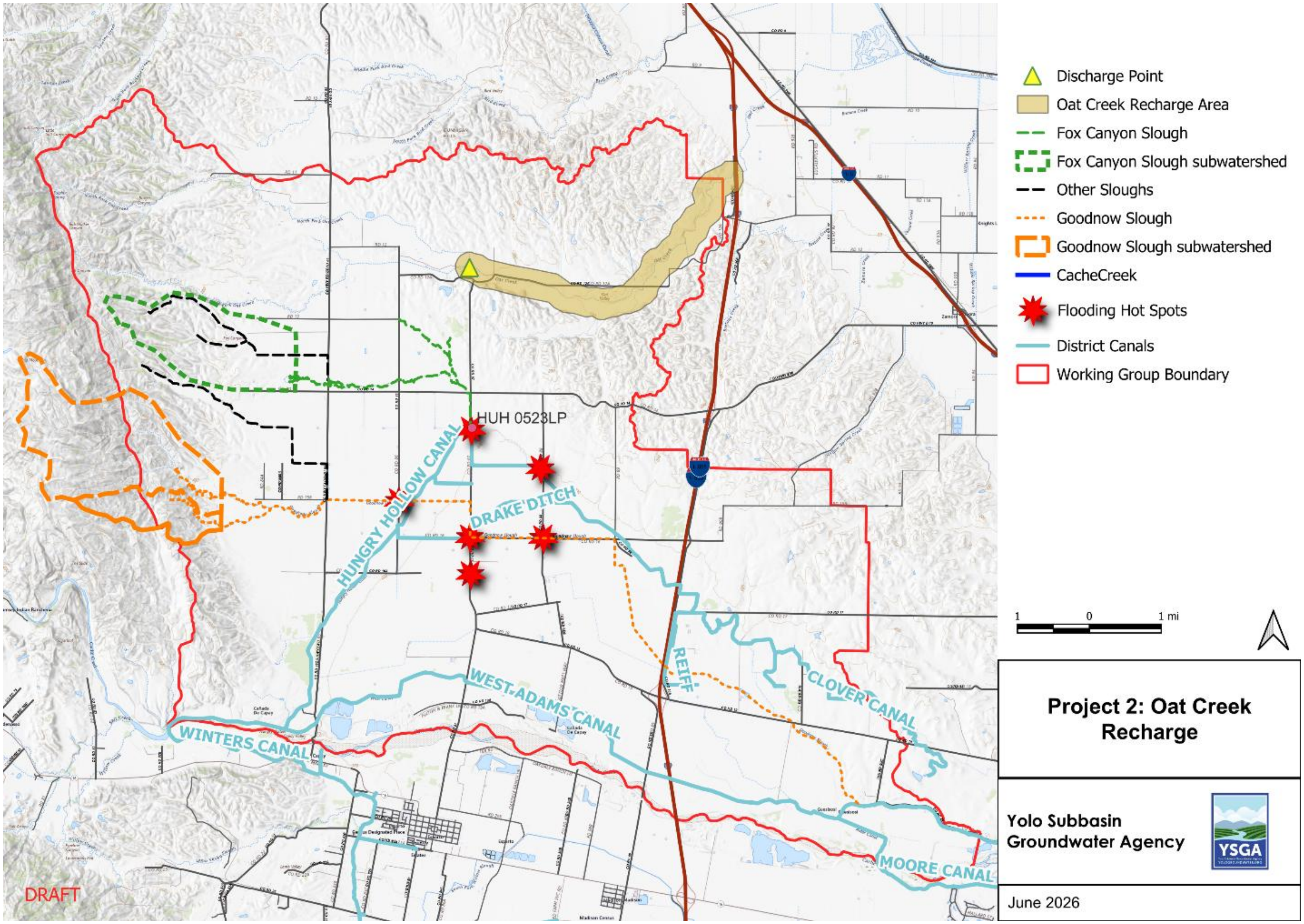

Figure 33. Project 2: Oat Creek Recharge.

Figure 34. January 2026 recharge in Oat Creek at County Road 12A bridge looking south.

Figure 35. January 2026 recharge in Oat Creek at County Road 99W bridge looking west.

7.3 Increase Conjunctive Use

This project involves connecting groundwater-irrigated lands to surface water supplies where feasible, allowing landowners to reduce groundwater pumping in seasons when surface water is available. Groundwater benefits accrue through in-lieu recharge.

Landowners and YCFCWCD's staff identified over 2,500 acres within the YCFCWCD's service area that are currently irrigated using groundwater and have no existing connection to surface water. Connecting some or all of those acres to surface water could reduce groundwater pumping during years when surface water is available and could also create opportunities to participate in the YCFCWCD's Groundwater Recharge Program to further increase groundwater recharge.

Figure 36 shows the areas identified for conjunctive use designated by priority. Table 13 provides the estimated in-lieu recharge quantities that can be achieved by implementing this project. The estimated recharge benefit is around **3,300 AFY**, with a sensitivity range from 1,600 AFY (limited pumping offset and landowner adoption) to 6,600 AFY (high pumping offset and landowner adoption).

The conjunctive use estimate does not quantify all potential benefits or constraints. For example, the estimate focuses on reduced groundwater pumping and does not quantify potential changes in incidental recharge from irrigation practices, operational losses, or rainfall infiltration. It also does not include detailed infrastructure feasibility, cost, or permitting considerations that would be borne by the landowner or YCFCWCD.

Successful implementation of this project is dependent on the following factors:

- Landowner interest in connecting to and using surface water when available.
- Proximity to existing YCFCWCD surface water infrastructure.
- Physical feasibility of turnouts, pipelines, pumps, controls, easements, or other connection improvements.
- Reliability and timing of surface water supplies during the irrigation season.
- Availability of cost-share, grant funding, or shared-conveyance opportunities where connection costs are high.
- Practical accounting of reduced groundwater pumping benefits.

Table 13. Increase Conjunctive Use Planning Scenarios.

Table Element	Low Case	Current Planning Case	High Case
Physical / Program Basis			
Conjunctive use candidate lands	1,900 acres	1,900 acres	1,900 acres
High-priority conjunctive use candidate lands	700 acres	700 acres	700 acres
Total candidate acreage	**2,500 acres**	**2,500 acres**	**2,500 acres**
Surface Water Availability Assumptions			
Full surface water availability	70% of years	70% of years	70% of years
Partial surface water availability	20% of years	20% of years	20% of years
No surface water availability	10% of years	10% of years	10% of years
Applied Water / Adoption Assumptions			
Applied water or pumping offset assumption	1/2 default	Default	2x default
Landowner adoption / participation assumption	1/2 default	Default	2x default
Estimated Groundwater Benefit			
Conjunctive use candidate lands	600 AFY	2,200 AFY	4,500 AFY
High-priority conjunctive use candidate lands	300 AFY	1,100 AFY	2,100 AFY
Total estimated pumping offset / in-lieu recharge	**1,600 AFY**	**3,300 AFY**	**6,600 AFY**

Notes:

1. Candidate acreages are rounded and represent lands that may be suitable for connection to surface water supplies.
2. The estimated benefit represents potential pumping offset, or in-lieu recharge, from using surface water instead of groundwater in years when surface water is available.
3. The current planning case assumes surface water is fully available in 70 percent of years, partially available in 20 percent of years, and unavailable in 10 percent of years.
4. The low and high cases reflect uncertainty in applied water demand, achievable pumping offset, and landowner participation.
5. Values are rounded to reflect the planning-level nature of the estimate. Actual benefits will depend on landowner participation, infrastructure feasibility, surface water availability, crop water demand, and operations.

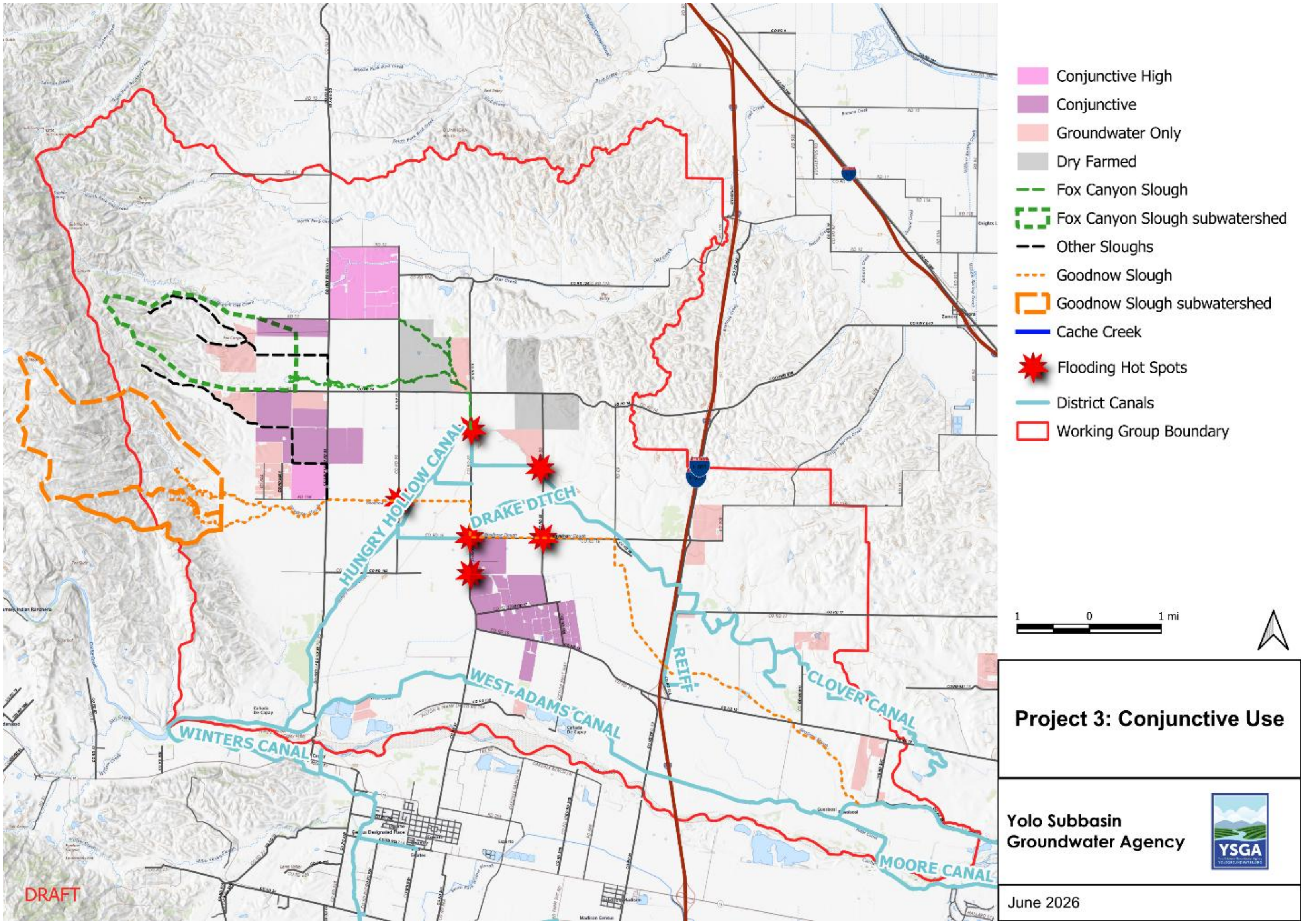

Figure 36. Project 3: Conjunctive Use.

7.4 Voluntary Land Conversion and Water Management Practices

This project would support practices that improve soil moisture retention, reduce applied water demand, and increase infiltration where feasible. Potential practices include cover cropping, changes in land management, and other voluntary approaches that reduce irrigation demand or improve the timing and retention of water in the soil profile.

The project is intended to complement direct recharge and conjunctive use projects by reducing groundwater demand and improving the ability of the landscape to retain and infiltrate precipitation and applied water. Landowners and YCFCWCD staff identified more than 3,300 acres within the YCFCWCD's service area that may be good candidates for these practices. Figure 37 shows the priority areas identified for land management practices, and Table 14 summarizes the estimated in-lieu and direct recharge benefits. The estimated groundwater benefit is around **3,100 AFY**, with a sensitivity range from 1,600 AFY (more limited water savings or infiltration benefits) to 6,300 AFY (greater effectiveness of cover cropping or related land management practices).

The current estimate assumes implementation of cover cropping or similar practices across the identified candidate acreage and applies a planning-level water savings or infiltration benefit. Actual benefits will vary by crop type, soil conditions, irrigation method, cover crop species, rainfall timing, and grower management. The estimate does not separately quantify reduced irrigation demand, increased soil moisture retention, increased infiltration, or resulting groundwater benefit, and it does not quantify related benefits such as reduced erosion, reduced runoff, improved soil health, or water quality improvements.

Successful factors include:

- Landowner and grower interest in voluntary land management practices.
- Compatibility with crop management, irrigation practices, equipment access, and field operations.
- Availability of technical assistance for practice selection, implementation, and monitoring.
- Availability of financial incentives, grant funding, or cost-share support.
- Ability to document water savings, infiltration, soil moisture, or related groundwater benefits.

This project description and estimated quantified benefits will be updated to split out grazing land, annual crop land, and perennial crop land management options to increase deep percolation and improve soil water retention in a future iteration.

Table 14. Voluntary land conversion and water management practices planning scenarios.

Table Element	Low Case	Current Planning Case	High Case
Physical / Program Basis			
Cover crop candidate lands by 2028	2,300 acres	2,300 acres	2,300 acres
Additional cover crop candidate lands by 2030	400 acres	400 acres	400 acres
Additional candidate acreage	600 acres	600 acres	600 acres
Total candidate acreage	**3,300 acres**	**3,300 acres**	**3,300 acres**
Applied Water Assumptions			
Applied water use, vineyards	2 feet/year	2 feet/year	2 feet/year
Applied water use, almonds	3 feet/year	3 feet/year	3 feet/year
Applied water savings / infiltration benefit	5%	10%	20%
Estimated Groundwater Benefit			
Cover crop candidate lands by 2028	300 AFY	600 AFY	1,100 AFY
Additional cover crop candidate lands by 2030	75 AFY	100 AFY	300 AFY
Additional candidate acreage	1,200 AFY	2,400 AFY	4,900 AFY
Total estimated applied water reduction / recharge benefit	**1,600 AFY**	**3,100 AFY**	**6,300 AFY**

Notes:

1. Candidate acreages are rounded and represent lands where voluntary land conversion, cover cropping, or related water management practices may be feasible.
2. The estimated benefit represents potential applied water reduction, improved soil moisture retention, or increased infiltration associated with voluntary management practices.
3. The current planning case assumes an approximately 10 percent applied water savings or infiltration benefit. The low and high cases assume approximately 5 percent and 20 percent, respectively.
4. Values are rounded to reflect the planning-level nature of the estimate. Actual benefits will depend on crop type, soil conditions, irrigation practices, grower participation, and field-specific management.

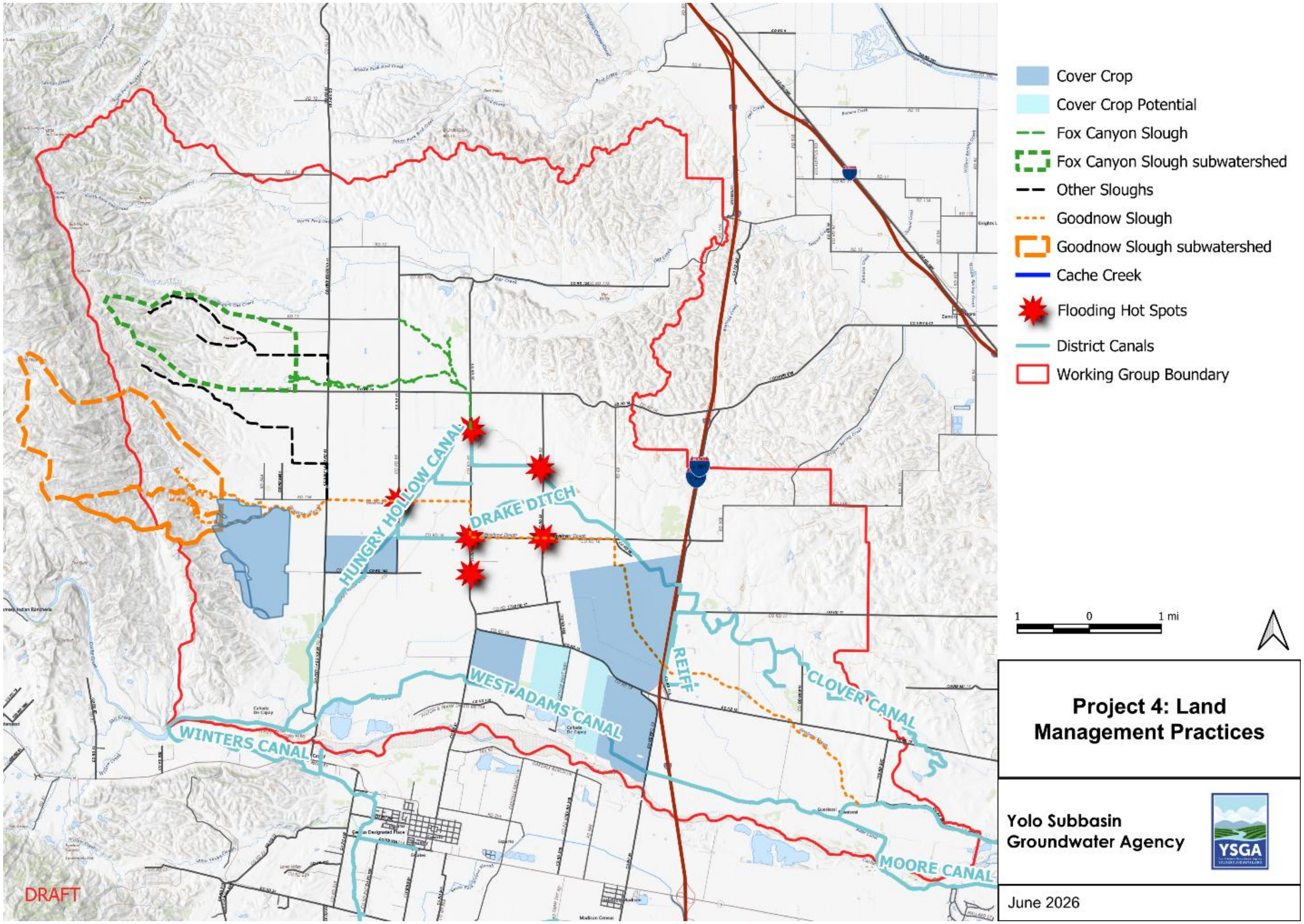

Figure 37. Project 4: Land Management Practices.

7.5 Fox Canyon Slough Stormwater Capture and Recharge

This project would address flooding and erosion issues while creating opportunities to capture, temporarily store, and recharge stormwater. Fox Canyon Slough experiences erosion and flooding, which affects fields, slough conditions, canal operations, and planned infrastructure. The project includes a combination of maintenance, infrastructure improvements, and stormwater capture features. Potential project elements include:

- Annual maintenance of box culverts at County Roads 85, 86, 14, 87, and 88 to remove accumulated debris and sediment before winter storms
- Replacement and upsizing box culverts at County Roads 87 and 88
- Annual maintenance of Hungry Hollow canal from County Road 87 to County Road 16
- Construction of an approximately 49.5 AF regulating pond and migrating bird habitat along Hungry Hollow Canal in a flood-prone area as delineated in NYSCD & YCFCWCD (1966) report and Stewardship Plan (Yolo RCD, 2011).

The proposed regulating pond could provide operational flexibility along Hungry Hollow and Clover Canals during the irrigation season, temporarily hold and release stormwater for canal recharge, and provide habitat benefits.

Figure 38 shows the project area and current project concepts. Table 15 summarizes the estimated recharge benefits from this project. The estimated groundwater benefit is around **90 AFY**, with a sensitivity range from 37 AFY (fewer storm events, less available recharge capacity) to 200 AFY (more storm events, greater available recharge capacity).

The estimated recharge benefit does not include additional potential recharge that may occur in Fox Canyon Slough, Goodnow Slough, or the canal system during and after storm events. It also does not quantify reduced sediment loading, reduced culvert or canal maintenance, avoided flood damage, habitat improvements, or improved operational flexibility. These co-benefits may be important and should be evaluated further during design and implementation.

Key implementation needs include field surveys, hydraulic and drainage evaluation, coordination with landowners and County Road maintenance staff, environmental review, permitting, design of the regulating pond, and development of an operations and maintenance plan.

Key success factors include:

- Ability to capture stormwater without increasing flood risk.
- Ability to release or infiltrate captured water after peak flows.
- Coordination with road, canal, and landowner infrastructure.
- Sediment management and maintenance planning.
- Feasible design and permitting pathway.
- Ability to integrate habitat, operational flexibility, or other co-benefits.

Table 15. Fox Canyon Slough Stormwater Capture and Recharge (Fox Canyon Slough) planning scenarios.

Table Element	Low Case	Current Planning Case	High Case
Physical / Program Basis			
Fox Canyon Slough reach to retention basin	3.1 miles	3.1 miles	3.1 miles
Goodnow Slough reach below regulating pond	5.8 miles	5.8 miles	5.8 miles
Proposed regulating pond capacity	50 AF	50 AF	50 AF
Stormwater Capture / Recharge Assumptions			
Qualifying storm events	1 event/year	2 events/year	4 events/year
Percent of pond capacity recharged or released for recharge	75%	90%	100%
Recharge volume per qualifying event	37 AF/event	45 AF/event	50 AF/event
Estimated Recharge Potential			
Annual recharge volume	37 AFY	90 AFY	200 AFY

Notes:

1. The estimated recharge benefit is based on the proposed regulating pond capacity, the assumed number of qualifying storm events per year, and the portion of stored water that can be recharged or released for recharge.
2. Values are rounded to reflect the planning-level nature of the estimate. Actual recharge will depend on storm frequency, storm volume, sediment conditions, basin operations, release timing, canal operations, and downstream infiltration conditions.
3. The estimate does not quantify additional potential recharge along Fox Canyon Slough, Goodnow Slough, or the Hungry Hollow Canal during and after storm events.
4. The estimate also does not quantify reduced sediment loading, reduced culvert or canal maintenance, avoided flood damage, habitat benefits, or improved operational flexibility.

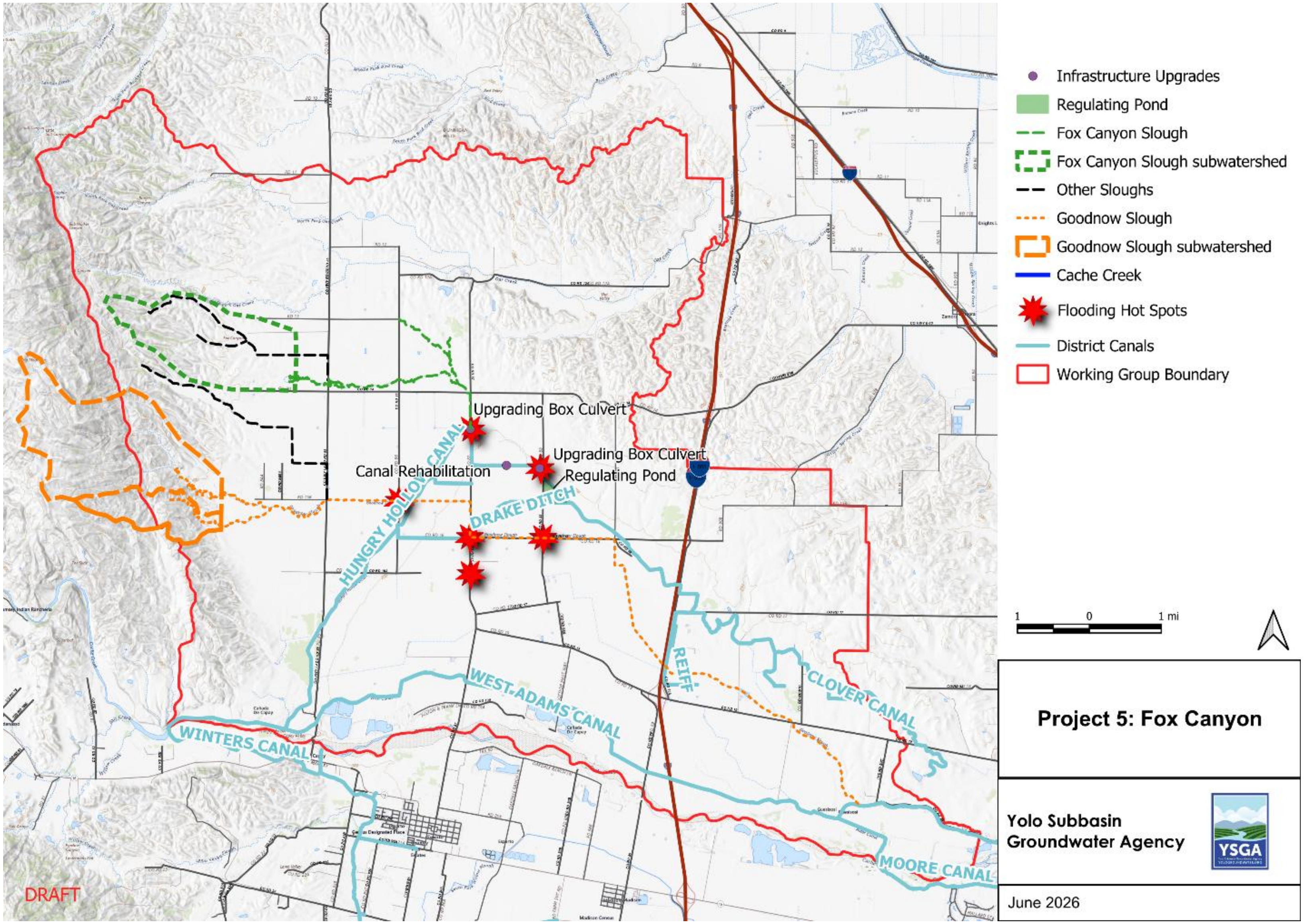

Figure 38. Project 5: Fox Canyon Slough.

7.6 Western Hills Erosion Management and Flood Managed Aquifer Recharge

This project was identified to address erosion and flood management challenges that could interfere with implementation and benefits of the other Hungry Hollow projects described in Sections 7.1 – 7.5. Runoff and sediment from the western hills can contribute to flooding, erosion, sediment deposition, and maintenance issues in downstream sloughs, roads, fields, and canal infrastructure. These issues can reduce the effectiveness of recharge and other management projects. This project aims to achieve the following:

Goodnow Slough

- Installation of "rock dams" in the upper reaches of Goodnow Slough (North and South Fork)
- Construct diversion structure to divert flows into a ~25-acre sediment trap / flood control basin on North Side of Williams Property south of County Road 15B. This basin would trap sediment and temporarily capture stormwater during peak storm events and later release back into Goodnow Slough for recharge during low flow or sunny day conditions.
- Cover crop ~600 acres on eastern side of Williams Property to pilot cover cropping as a means of increasing infiltration, reducing flooding, and increasing soil moisture retention for dry periods
- Construct 1-acre sediment trap/settling basin at County Road 86 & 15B

Fox Canyon Slough

- Installation of "rock dams" in the upper reaches of Fox Canyon Slough
- Construct diversion structure to divert flows into a 10-acre sediment trap / flood control basin. This basin would trap sediment and temporarily capture stormwater for spilling back into Goodnow Slough for recharge during sunny day conditions.

"Other" Slough

- Installation of "rock dams" in the upper reaches of the Other Slough
- Construct diversion structure to divert flows into a 10-acre sediment trap / flood control basin. This basin would trap sediment and temporarily capture stormwater for spilling back into Goodnow Slough for recharge during sunny day conditions.

Figure 39 shows the project area and current project concepts. Table 16 summarizes the estimated recharge benefits from this project. The estimated groundwater benefit is around **310 AFY**, with a sensitivity range from 140 AFY (fewer storm events, less available recharge capacity, less applied water savings) to 660 AFY (more storm events, greater available recharge capacity, more applied water savings).

The estimated benefit is based on planning-level assumptions about storm frequency, basin and pond storage, recharge or release efficiency, rock dam performance, and cover cropping benefits. The current estimate assumes approximately two qualifying storm events per year, 90 percent recharge or release efficiency for captured stormwater, and a 10 percent applied water savings or infiltration benefit from approximately 600 acres of cover cropping.

Actual benefits will depend on storm volume, sediment loads, basin design, release timing, downstream channel conditions, landowner participation, and maintenance. The estimate does not quantify reduced sediment transport, avoided flood damages, reduced culvert or canal maintenance, road and canal protection, habitat benefits, water quality improvements, or additional recharge that may occur along slough reaches during and after storm events.

Key success factors include:

- Landowner willingness to host or participate in project components.
- Ability to reduce sediment and flood impacts without shifting risk downstream.
- Feasible design and permitting pathway.
- Maintenance access and long-term O&M responsibilities.
- Ability to document recharge, sediment reduction, and flood management benefits.
- Integration with the other Hungry Hollow recharge and water management projects.

Table 16. Western Hills Erosion Management and Flood MAR (Western Hills) planning scenarios.

Table Element	Low Case	Current Planning Case	High Case
Physical/Program Basis			
Cobram Property basin area	30 acres	30 acres	30 acres
Cobram Property basin capacity	50 AF	50 AF	50 AF
No Name Slough pond area	10 acres	10 acres	10 acres
Fox Canyon Slough pond area	10 acres	10 acres	10 acres
Goodnow Slough rock dams/channel recharge features	5 features	5 features	5 features
Other Slough rock dams/channel recharge features	2 features	2 features	2 features
Cover cropping/land management area	600 acres	600 acres	600 acres
Stormwater Capture/Recharge Assumptions			
Qualifying storm events	1 event/year	2 events/year	4 events/year
Basin/pond recharge efficiency	75%	90%	100%
Cobram basin release period	30 days	30 days	30 days
Land Management Assumptions			
Cover crop applied water assumption	2 feet/year	2 feet/year	2 feet/year
Applied water savings/infiltration benefit	5%	10%	20%
Estimated Recharge/Groundwater Benefit			
Cobram Property basin	40 AFY	90 AFY	200 AFY
No Name Slough pond	10 AFY	30 AFY	70 AFY
Fox Canyon Slough pond	10 AFY	30 AFY	70 AFY
Goodnow Slough rock dams/channel recharge	10 AFY	20 AFY	40 AFY
Other Slough rock dams/channel recharge	10 AFY	20 AFY	40 AFY
Cover cropping/land management	60 AFY	120 AFY	240 AFY
Total estimated recharge/groundwater benefit	**140 AFY**	**310 AFY**	**660 AFY**

Notes:

1. Estimated benefits include stormwater capture and recharge, channel recharge associated with rock dams, and applied water reduction or infiltration benefits from cover cropping or related land management practices.
2. Values are rounded to reflect the planning-level nature of the estimate. Actual benefits will depend on storm frequency, runoff volume, sediment conditions, pond design, release timing, field conditions, grower participation, and operations.
3. The current planning case assumes two qualifying storm events per year and approximately 90 percent recharge or release efficiency for ponded stormwater.
4. The land management estimate assumes approximately 600 acres of cover cropping or related practices, with a default applied water savings or infiltration benefit of approximately 10 percent.
5. The estimate does not quantify sediment load reduction, avoided flood damages, reduced culvert or canal maintenance, reduced field damage, habitat benefits, or additional recharge that may occur along slough reaches during storm events.

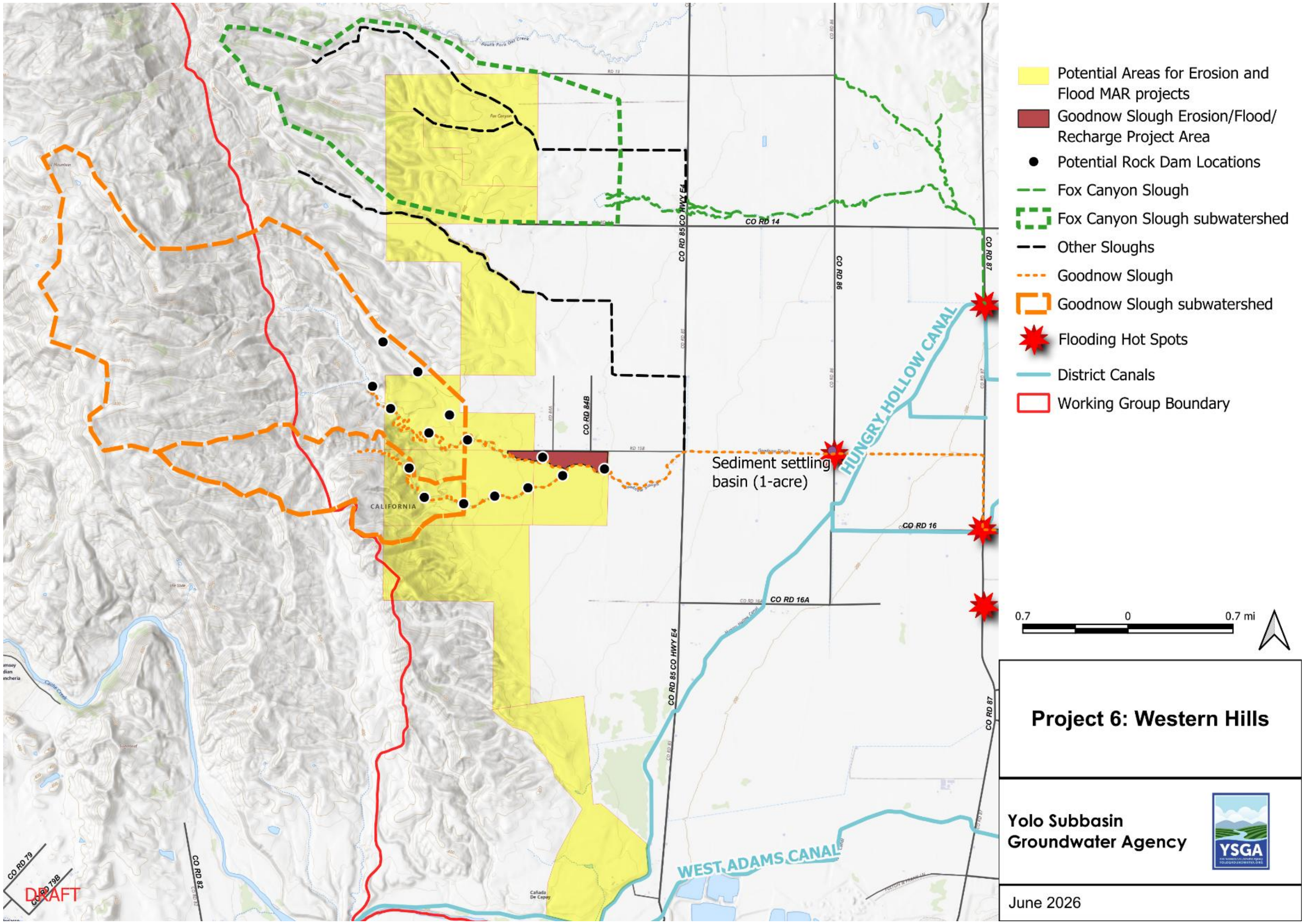

Figure 39. Project 6: Western Hills.

8. PROJECT IMPLEMENTATION & FUNDING

The six Hungry Hollow projects represent a portfolio of near-term actions that can be advanced through phased implementation. Some projects, such as Oat Creek trickle flow recharge and on-farm recharge, can begin with pilot operations and monitoring using existing infrastructure. Other projects, such as conjunctive use infrastructure, Fox Canyon Slough improvements, and Western Hills Erosion Management and Flood MAR, will require additional planning, design, landowner agreements, permitting, cost estimating, and funding before construction.

The Working Group needs cost and schedule information to help determine which projects are practical to advance, what level of landowner participation may be required, and which projects may need outside funding. However, the projects are still at a concept level, and specific costs will depend on project scale, final location, landowner participation, design requirements, permitting, and operations and maintenance responsibilities. For that reason, the cost and schedule information in this white paper is presented as planning-level decision-support information rather than final project budgets.

The purpose of this white paper is to identify practical next steps, clarify implementation needs, and position the projects for funding, design, and phased implementation.

8.1 Proposed Project Implementation

The Hungry Hollow projects are planned to advance in three phases:

- **Phase 1: Concept-Level Development and Near-Term Readiness.** This phase includes project descriptions, planning-level benefit estimates, conceptual design considerations, conceptual cost ranges, approximate schedules, landowner coordination, pilot implementation where feasible, monitoring, and refinement of key assumptions. Phase 1 is intended to clarify project concepts, identify near-term actions, and determine what information is needed before projects advance to more detailed development.
- **Phase 2: Project Development and Funding Readiness.** This phase would advance projects beyond the concept level. It may include field reconnaissance, landowner agreements, refined project footprints, preliminary design concepts, permitting review, refined cost estimates, operations and maintenance planning, and preparation of funding applications. Phase 2 is intended to focus on making selected projects more competitive for funding and ready for implementation decisions.
- **Phase 3: Final Design, Construction, and Operation.** This phase would occur after projects are selected for further implementation by participating landowners, and funding is secured. Phase 3 is intended to focus on final design, permits, construction, monitoring, operations, maintenance, and adaptive management.

Projects 1 (on-farm recharge) and 2 (Oat Creek Recharge) are transitioning from Phase 1 to Phase 2 because initial concept development and pilot activities have begun. Further advancement will depend on additional landowner participation, operational commitments, monitoring results, and decisions by landowners and coordinating entities about whether and how to expand winter recharge activities in 2027 and beyond.

Projects 3 through 6 are currently in Phase 1. The Working Group and YSGA Board have approved all six projects for further development, but advancement to Phase 2 will require one or more landowners to express interest in participating, hosting project components, providing access, or helping drive the project forward in coordination with YSGA, YCFCWCD, Yolo RCD, Center for Land-Based Learning, and other partners.

The following subsections describe the current implementation status, schedule of anticipated future actions, and planning-level cost estimates for each of the six projects. The information is meant to help landowners and growers decide whether and how to participate in each project by focusing on three questions:

1. **what participating landowners or growers would need to do?**
2. **what costs may be involved and who may be responsible for them?**
3. **what next steps are needed to advance the project?**

Costs are planning-level estimates based on currently available information, recent local experience, and assumptions about project scale. Therefore, they should be used for discussion only and not interpreted as final budgets or commitments. Costs should be refined during Phase 2 before being used in grant applications or future planning work.

Table 17 summarizes the anticipated implementation path over the next three years. The table is intended to be a starting point for Working Group discussion by identifying the likely next steps, responsible parties, timing, and high-level cost considerations for each project. The project-specific narratives below provide additional context for landowners considering whether and how to participate.

Overall, the near-term priority is to advance Projects 1 and 2 through continued pilot implementation while using landowner interest, site feasibility, and funding potential to determine which of Projects 3 through 6 should move next into more detailed development.

Table 17. 2027-2029 Project-anticipated activities and planning-level cost estimates.

Project	Current Status	Anticipated Activities			Time to Complete	Planning-Level Cost Range/Cost Basis
		2027	2028	2029		
1. Hungry Hollow Winter On-Farm Recharge	Closest to implementation; transitioning from Phase 1 to Phase 2. Candidate recharge lands and planning-level recharge estimates have been developed, but Hungry Hollow landowners did not enroll in the 2026 recharge program due to limited lead time.	YSGA and YCFCWCD conduct targeted outreach, screen interested fields, develop enrollment and recharge accounting procedures, and deliver winter water to participating landowners if water is available. Landowners identify fields available for January–March recharge, enroll before the recharge season, prepare fields, and participate in monitoring. Initial target: more than 3,000 acres enrolled.	YCFCWCD continues outreach and coordination, refines operations based on 2027 results, and evaluates whether a winter recharge water rate is needed after grant funding expires. Landowners continue or expand participation if 2027 results are positive. Target: more than 6,000 acres enrolled, depending on water availability and landowner interest.	YCFCWCD prepares a summary report documenting recharge locations, volumes, monitoring results, lessons learned, and recommended next steps. Landowners and coordinating entities decide whether to continue, expand, or modify the program.	Pilot could begin in the near term; expansion toward the 6,000-acre target could occur over approximately **1–3 years**.	**Approximately $100,000 to $250,000+ per season**, depending on acreage enrolled, water delivered, and field improvements needed.
2. Oat Creek Trickle Flow Recharge	Closest to implementation; transitioning from Phase 1 to Phase 2. Pilot diversions have occurred using existing infrastructure, but additional monitoring is needed to refine recharge assumptions and operations.	Continue pilot diversions when water is available. Improve monitoring of diverted volume, flow rate, wetted reach, downstream conditions, infiltration, and groundwater levels.	Use monitoring results to determine whether flow control, discharge improvements, erosion protection, monitoring equipment, or permitting are needed.	Continue or expand Oat Creek recharge if monitoring results support it. If results are limited, identify whether operational changes are needed or whether the project should remain a smaller pilot.	Pilot operations can continue in the near term; expansion or formalization could occur over approximately **1–2 years**.	**Approximately $10,000 to $25,000 per season** if existing infrastructure is sufficient; higher if improvements are needed.
3. Increase Conjunctive Use	Concept-level project. Candidate groundwater-irrigated lands and planning-level pumping offset estimates have been identified, but specific surface water connection projects still need to be evaluated.	YCFCWCD begins discussions with interested landowners and prioritizes potential surface water connection areas based on feasibility, benefit, willingness, and cost.	YCFCWCD and willing landowners prepare preliminary connection concepts, develop representative cost ranges, and confirm needed landowner agreements, easements, or access requirements.	Landowners, with YCFCWCD where applicable, construct initial surface water connections if design, funding, agreements, and approvals are complete.	Feasibility review can begin in the near term; construction would likely occur in phases over approximately **2–5 years**.	**Approximately $150,000 to $500,000 per nearby field connection; potentially $500,000 to $1.5 million+ for longer connections or shared conveyance.**
4. Voluntary Land Conversion and Water Management Practices	Concept-level project with near-term pilot potential. Candidate acreage has been identified, but willing growers, practice types, incentive needs, and monitoring approaches still need to be confirmed.	YSGA, Yolo RCD, Center for Land-Based Learning, and interested landowners identify willing growers, suitable fields, preferred practices, technical assistance needs, and potential cost-share or incentive funding.	Landowners implement pilot practices, potentially with support from Yolo RCD or Center for Land-Based Learning field crews. YSGA and partners support monitoring of water savings, infiltration, soil moisture, flooding, or management changes.	Landowners expand participation if pilot results, grower interest, and funding support it. YSGA and partners refine cost-share needs and monitoring approach.	Pilot practices could begin in the near term; broader participation could expand over approximately **1–5 years**.	**Approximately $80 to $460 per acre for cover cropping (non-native to native seed); approximately $100,000 per 1,000-foot hedgerow.** Total cost depends on acreage and practices selected.
5. Fox Canyon Slough Stormwater Capture and Recharge	Concept-level project. Potential stormwater capture, culvert, canal, and regulating pond concepts have been identified, but field verification, design, permitting, and costs remain to be developed.	YCFCWCD and landowners conduct field reconnaissance, confirm priority problem areas and affected parcels, and coordinate with County road/public works staff.	YCFCWCD and partners develop a conceptual design, review permitting needs, prepare a planning-level cost estimate, and confirm access, easements, construction responsibilities, and O&M responsibilities.	Advance toward funding, design, permitting, or construction if the project is selected and if agreements and funding are secured.	Planning and design are needed first; implementation could occur over approximately **2–5 years** if agreements, permits, and funding are secured.	**Approximately $200,000 to $700,000 for planning and design; approximately $1 million to $2 million+ for construction and permitting.**

Project	Current Status	Anticipated Activities			Time to Complete	Planning-Level Cost Range/Cost Basis
		2027	2028	2029		
6. Western Hills Erosion Management and Flood MAR	Concept-level project. Candidate components have been identified in Goodnow Slough, Fox Canyon Slough, and other unnamed sloughs, but sites, landowner participation, phasing, design, permitting, and costs need further development.	YSGA, Yolo RCD, Center for Land-Based Learning, YCFCWCD, and interested landowners confirm priority sites, willing landowners, and feasible near-term components.	Coordinating entities develop component-level cost estimates, conceptual designs, and permitting, access, maintenance, and funding needs by slough, landowner, or project component.	Implement smaller pilot actions if feasible, while larger components advance toward funding, design, permitting, and phased construction.	Smaller actions may proceed sooner if landowners and funding are available; larger improvements would likely require approximately **2–5+ years**.	**Approximately $150,000 to $500,000 for planning/design; implementation cost to be developed by component and likely ranges from lower-cost pilot actions to $1 million+ for larger basins or multi-site improvements.**

Notes:

1. This table is intended for Working Group planning and landowner decision-making only. It does not establish final project scopes, budgets, or commitments.
2. Costs should be refined during Phase 2 before being used for grant applications, budgeting, design, permitting, or construction.
3. “Coordinating entities” may include YSGA, YCFCWCD, Yolo RCD, Center for Land-Based Learning, participating landowners, and other partners, depending on the project.

8.1.1 Project 1: Hungry Hollow Winter On-Farm Recharge

This project is closest to near-term implementation because it relies primarily on using existing canal infrastructure and the existing YCFCWCD groundwater recharge program. In 2026, YSGA and the YCFCWCD identified candidate recharge lands and developed planning-level recharge estimates, but no Hungry Hollow landowners enrolled in the 2026 recharge program due to a lack of lead time for landowners to participate.

To implement this project, landowners will need to determine whether they have fields that can be made available for winter recharge (generally January through March) and whether they are willing to coordinate with YCFCWCD on water delivery, field preparation, monitoring, and recharge accounting. Near-term participation would focus on identifying suitable fields, confirming how water would be delivered and managed, and determining whether any field-level improvements are needed.

Anticipated future actions include targeted outreach and field screening in 2027, pilot recharge on willing fields if winter water is available, and expansion toward the 6,000-acre participation target if pilot results and landowner interest support it. YCFCWCD and participating landowners would also monitor wells and field conditions to evaluate groundwater response and improve future operations.

Planning-level costs should be separated between YCFCWCD/YSGA program costs and landowner costs. YCFCWCD costs may include outreach, field screening, recharge program administration, accounting, operations, and monitoring. Based on recent experience, these costs may be approximately $5,000 to $10,000 per year for outreach, screening, administration, and accounting, plus approximately $6,000 per year for operations and biweekly monitoring, assuming participation by approximately 10 fields. Landowner costs will depend on the field and delivery setup, but may include power at canal gates or pumps, temporary infrastructure, field preparation, and winter recharge water. Current assumptions include approximately $300 to $600 per day for power, approximately $5,000 to $50,000 per field for temporary infrastructure and field setup, and approximately $25 per acre-foot for winter recharge water. At 1,000 to 6,000 acre-feet of delivered water, water costs would be approximately $25,000 to $150,000.

These costs should be refined after landowners identify candidate fields and YCFCWCD confirms the delivery, monitoring, and accounting approach. For landowners, the key near-term decision is whether to identify and enroll candidate fields early enough for YCFCWCD to plan winter water deliveries, monitoring, and any needed field or turnout improvements. Landowners do not need to commit to full-scale participation immediately, but they do need to identify candidate fields, expected water delivery constraints, and field preparation needs before the recharge season.

8.1.2 Project 2: Oat Creek Trickle Flow Recharge

This project is also close to near-term implementation because pilot diversions have already occurred using existing infrastructure. In 2026, pilot diversions were completed and planning-level recharge estimates were developed based on creek length, percolation rate, recharge rate, and recharge duration.

To implement this project, the directly involved landowner or landowners would need to allow continued use of the existing diversion and discharge approach, provide land access as needed, and coordinate with YCFCWCD and YSGA on flow rates, timing, and monitoring. For the broader Working

Group, the main decision is whether continued pilot testing is worth supporting as a low-cost way to evaluate trickle-flow recharge performance in Oat Creek. Future work should focus on measuring diverted volume, wetted reach, infiltration, downstream conditions, and groundwater response.

Anticipated actions include continued pilot diversions and monitoring in 2027, evaluation of discharge improvements or permitting needs in 2028, and continued or expanded operation in 2029 if monitoring supports it.

Planning-level costs are expected to be relatively low if existing infrastructure remains sufficient. Based on recent experience, YCFCWCD costs may include approximately $2,000 for outreach, recharge program administration, and accounting, plus approximately $2,500 for operations and monitoring. Landowner costs may include approximately $300 to $600 per day for power, no major temporary infrastructure cost if existing facilities are adequate, and approximately $1,250 to $2,500 for water costs assuming 50 to 100 acre-feet at $25 per acre-foot. These estimates assume approximately 20 days of recharge activity and should be refined after the 2027 monitoring season.

Because this project can continue using existing infrastructure, the next participation decision is to continue pilot testing if winter water is available, monitoring can be completed, and the directly affected landowner or landowners remain willing to participate.

8.1.3 Project 3: Increase Conjunctive Use

This project could provide substantial groundwater benefits depending on the extent to which individual landowners want to connect groundwater-irrigated lands to surface water and whether those connections are physically and financially practical. For landowners, this project is most relevant if they currently rely on groundwater for irrigation, are near existing YCFCWCD surface water infrastructure, and are interested in using surface water in years when it is available. Lands farther from existing infrastructure may still be candidates, but they are likely to require higher-cost pipelines, shared conveyance, easements, or grant funding.

To implement this project, the first step for landowners is to express interest in receiving surface water and work with YCFCWCD to evaluate whether a connection is feasible. That feasibility review should consider distance to existing infrastructure, turnout needs, pipeline length, pumps or controls, easements, permitting, construction responsibilities, and whether the improvement would serve one property or multiple properties. The most practical near-term approach is to develop representative connection scenarios, such as near-canal connections, moderate extensions, and larger shared-conveyance improvements.

In 2026, candidate groundwater-irrigated lands were identified and planning-level pumping offset estimates were developed. Anticipated actions include identifying interested landowners and priority connection areas in 2027, developing preliminary connection concepts and cost ranges in 2028, and constructing initial connections in 2029 if design, agreements, and funding are complete.

Planning-level costs should be estimated by connection type rather than as one Hungry Hollow-wide cost. YCFCWCD outreach, operations, and coordination may be approximately $5,000 to $10,000 per field. Landowner infrastructure and field setup may be approximately $150,000 to $500,000 per field for nearby connections. Costs could be substantially higher, potentially up to three times that range, if a connection is more than approximately one mile from existing infrastructure and requires a pipeline or larger conveyance improvements. These estimates should be refined for representative near-canal, moderate-extension, and larger shared-conveyance scenarios.

For landowners, the key near-term decision is whether the potential benefit of using surface water justifies the time and cost needed to evaluate a connection. For YCFCWCD and YSGA, the key next step is to identify which interested landowners are close enough to existing infrastructure to make an initial project feasible.

8.1.4 Project 4: Voluntary Land Conversion and Water Management Practices

This project may be suitable for near-term pilot implementation if willing growers and cost-share opportunities are identified. In 2026, YSGA and YCFCWCD identified candidate acreage and developed planning-level estimates of applied water reduction and infiltration benefits. Unlike the direct recharge projects, this project would be implemented primarily through voluntary changes in land management practices by individual landowners or growers.

To implement this project, landowners and growers will need to determine whether practices such as cover cropping, hedgerows, or other voluntary water management practices are compatible with crop type, irrigation practices, equipment access, and farm operations. YSGA, Yolo RCD, Center for Land-Based Learning, and other partners may support outreach, technical assistance, practice design, implementation support, and monitoring of water savings, infiltration, soil moisture, flooding, or management changes.

Anticipated future actions include identifying interested growers and suitable practices in 2027, implementing pilot practices in 2028, and expanding participation in 2029 if pilot results, grower interest, and funding support it.

Planning-level costs should be developed by practice and acreage. Landowner costs may include seed, labor, equipment, field preparation, irrigation management changes, maintenance, and participation in monitoring. Based on current assumptions, cover cropping may cost approximately $460 per acre when implemented by Yolo RCD or Center for Land-Based Learning using a 15-pound-per-acre seed mix. Costs may be lower if landowners provide labor or equipment. Hedgerow implementation may cost approximately $100,000 per 1,000-foot hedgerow if implemented through the SLEWS program. Partner or grant funding may be available to reduce landowner costs for technical assistance, implementation, monitoring, or incentives.

These costs should be refined after willing growers identify preferred practices, acreage, and available cost-share funding. For landowners and growers, the key near-term decision is whether to identify fields where voluntary land management practices could be tested without creating unacceptable impacts on crop production or farm operations. Landowners do not need to commit to broad participation immediately, but they do need to identify candidate fields, preferred practices, and cost-share needs before pilot implementation can move forward.

8.1.5 Project 5: Fox Canyon Slough Stormwater Capture and Recharge

This project will require more planning, design, permitting, and funding before construction. In 2026, YSGA and YCFCWCD identified priority flooding, erosion, culvert, canal, and stormwater capture concepts, including a potential regulating pond. The project footprint, design requirements, permitting pathway, construction responsibilities, and operations and maintenance needs still need to be confirmed.

To implement this project, affected landowners will need to determine whether they are willing to support additional field review and development of a site-specific stormwater capture and recharge concept. Near-term participation may include providing access for field reconnaissance, helping confirm problem areas, identifying affected parcels and infrastructure, discussing potential project footprints, and coordinating with YCFCWCD, YSGA, and County road or public works staff. If the project advances, landowners may also need to consider easements, construction access, long-term maintenance responsibilities, and potential impacts or benefits to their property.

Anticipated future actions include field reconnaissance and coordination with affected landowners, YCFCWCD, YSGA, and County staff in 2027; development of a conceptual design, permitting review, planning-level cost estimate, and access or maintenance assumptions in 2028; and advancement toward funding, design, permitting, or construction in 2029 if the project is selected and if agreements and funding are secured.

Planning-level costs should be developed by component because the project could include several different types of improvements. Current assumptions include approximately $30,000 to $120,000 for an automated check with gate structures and SCADA automation, depending on size and setup; approximately $50,000 to $250,000 for culvert or bridge upsizing, depending on structure; approximately $100,000 to $200,000 for conceptual design; approximately $250,000 to $500,000 for final design; and approximately $1 million to $2 million for construction and permitting. Costs may be lower if portions of the work are completed by landowners, but outside funding will likely be needed for capital implementation.

These costs should be refined after the project footprint, affected structures, permitting pathway, construction approach, and maintenance responsibilities are better defined. For affected landowners, the key near-term decision is whether there is enough support to advance field reconnaissance and conceptual design for a specific project footprint. Landowners do not need to commit to construction immediately, but they do need to indicate whether they are willing to participate in site review, access discussions, and evaluation of potential stormwater capture, culvert, canal, or regulating pond improvements.

8.1.6 Project 6: Western Hills Erosion Management and Flood MAR

This project includes several distributed components and will likely need to be phased. In 2026, candidate components were identified in Goodnow Slough, Fox Canyon Slough, and other unnamed sloughs, including rock dams, sediment traps, flood basins, cover crop pilots, and controlled release concepts. Because the project is still at an early concept level, it will require additional landowner coordination, site confirmation, phasing, design, permitting review, cost estimating, and funding strategy before larger components can be implemented. To implement this project, landowners will need to determine whether they are willing to host or participate in erosion control, sediment capture, flood detention, cover cropping, or controlled release features on their property. Near-term participation may include providing access for field reconnaissance, helping identify priority erosion or flooding locations, confirming whether proposed components are compatible with farm operations, and discussing maintenance access and responsibilities. Because the project includes multiple components across multiple locations, it will likely need to advance by willing landowner, slough reach, or project component rather than as one single project.

Anticipated future actions include confirming priority sites, willing landowners, and feasible near-term components in 2027; developing component-level cost estimates, conceptual designs, permitting considerations, access needs, maintenance needs, and funding needs in 2028; and implementing smaller pilot actions in 2029 if feasible, while larger components advance toward grant funding, design, permitting, and phased construction.

Planning-level costs should be developed by component because costs will vary widely among cover cropping, rock dams, sediment traps, diversion structures, flood basins, permitting, and maintenance. For Working Group discussion, planning and design may be assumed to require approximately $150,000 to $500,000, while implementation costs should be developed by slough, landowner, or project component. Cover cropping and smaller erosion-control actions may be lower cost, while flood basins, sediment traps, diversion structures, and multi-site improvements may require substantial capital funding and outside grant support.

These costs should be refined after priority sites, participating landowners, project components, and implementation responsibilities are identified. For landowners, the key near-term decision is whether they are willing to help identify and evaluate specific erosion, sediment, or flood management features that could be piloted on or near their property. Landowners do not need to commit to large capital improvements immediately, but they do need to indicate whether they are willing to participate in site review, access discussions, and development of smaller first-phase components.

8.2 Funding Options

Implementation of the Hungry Hollow projects and management actions will likely require a mix of landowner contributions, local agency support, grants, and in-kind assistance. Landowner funds may be needed for various costs, such as field-level improvements, equipment use, project maintenance, and landowner employee participation. Outside funding may help reduce the amount that individual landowners must contribute, especially for projects that provide broader groundwater, flood management, erosion control, habitat, or public infrastructure benefits. To organize and prepare to secure adequate funding to implement priority projects and management actions, the YSGA and Hungry Hollow landowners should collaboratively develop a three-year funding strategy.

The three-year funding strategy will include project and management action descriptions, project and management action priorities, and information about eligible funding sources. Project descriptions will help project proponents match funding opportunities to projects and management actions. These project descriptions include identification of the project or management action proponent, partners, project deliverables, the project budget (including matching funds if available), and other critical information. Once the project descriptions are fully developed, the project proponent can match funding opportunities to projects. Examples of potential funding matches include:

- On-farm recharge, Oat Creek recharge, and conjunctive use may be good candidates for groundwater sustainability or SGMA implementation funding because they directly support recharge or reduced groundwater pumping.

- Voluntary land management practices may be good candidates for agricultural conservation, soil health, irrigation efficiency, or climate resilience funding.
- Fox Canyon Slough and Western Hills Erosion Management and Flood MAR may be better suited to flood, watershed, habitat, or multi-benefit resilience funding because they address stormwater, sediment, erosion, and infrastructure protection in addition to recharge.

In addition, YSGA and local landowners need to determine which projects and management actions can advance with available local resources, and which projects require grant funding. Smaller pilot projects may be possible with limited local funding, landowner participation, and in-kind support from the Yolo County Flood Control and Water Conservation District or YSGA. Larger projects, such as new conveyance improvements, regulating ponds, sediment basins, or multi-site erosion control improvements, will likely require outside funding (and potentially permitting) before implementation.

The three-year funding strategy would include the following steps:

- Confirm landowner interest in conceptual projects.
- Identify the minimum practical pilot or first phase for each conceptual project.
- Develop project descriptions, including project proponents, partners, deliverables, measurable benefits, budget (including landowner in-kind and matching contributions), and schedule.
- Identify funding sources available: grant funding, local cost share, or in-kind contributions from landowners Prioritize projects
- If grant funding is needed, match projects to funding opportunities based on measurable benefits

8.3 Summary of Project Costs and Anticipated Benefits

The six projects proposed in this White Paper aim to achieve multiple benefits when fully implemented. The anticipated benefits include mitigation and flexibility to manage flooding and erosion, improve water quality and habitat, and stabilize and increase groundwater levels. As described in Section 2.4, the Hungry Hollow area floods in 2 out of every 3 years; the average annual area inundated can span between approximately 1,000 and 10,000 acres. The annual cost of flood damage documented in 1966 was estimated to be greater than $16.80/acre and these costs could be offset by implementing projects that use land treatment and structures in sloughs to manage flooding and erosion in Hungry Hollow. To demonstrate project costs relative to the benefits, we estimated a range of implementation costs and known challenges relative to anticipated benefits over a 10-year amortization period.

Table 18 shows the project costs relative to the anticipated benefits. Projects 1, 2, and 5 are cheaper relative to the ‘Do Nothing’ scenario and provide all six anticipated benefits. Projects 3, 4, and 6 are within the range of the ‘Do Nothing’ scenario and provide all six anticipated benefits. It’s important to note that Projects 5 and 6 possess the majority of the flood protection and erosion control benefits which are key to reap the anticipated benefits identified for Projects 1, 3, and 4. It’s also important to highlight that these projects would have provided substantial cost savings if fully implemented in the 1960s when accounting for the costs accrued since 1966 from doing nothing. **In conclusion, the ‘Do Nothing’ scenario would be more costly and yield no additional benefit compared to implementing one or all six projects.**

Table 18. Project costs and anticipated benefits.

	Annualized cost		2036 Cost Estimate		Benefits					
Scenario	Low	High	Low	High	Flood protection	Erosion control	Habitat & wildlife	Water quality	Groundwater levels	Groundwater in Storage (AFY)
Do Nothing[1]	$44,000	$440,000	$440,000	$4,400,000						
Project 1	$100,000	$200,000	$1,000,000	$2,000,000	X	X			X	2,000 - 6,000
Project 2	$10,000	$25,000	$100,000	$250,000			X		X	5 - 75
Project 3	$150,000	$500,000	$1,500,000	$5,000,000				X	X	1,600 - 6,600
Project 4	$50,000	$500,000	$500,000	$5,000,000	X			X	X	1,600 - 6,300
Project 5	$500,000[2]	$2,000,00[2]	$750,000[3]	$3,000,000[3]	X	X	X	X	X	37 - 200
Project 6	$500,000[2]	$3,000,00[2]	$750,000[3]	$4,500,000[3]	X	X	X	X	X	140 - 660

Notes:
1. Do Nothing costs do not account for the total flooding and erosion costs that have been incurred since 1966.
2. Project cost estimate if fully implemented today
3. O&M costs over 10 years assuming project implementation completed

8.4 Working Group Member Updates

On September 2, 2026, the Working Group Members informed YSGA staff and those who attended the Working Group meeting that they would like to proceed with the following projects below to start.

Project 1: On-farm Recharge (Leads: TBD. Support from District/YSGA where needed)

- Includes recruiting landowners/growers to participate in on-farm recharge
- Timing: Immediately

Project 3: Conjunctive Use (Leads: TBD. Support from District/YSGA where needed)

- Objective: Increase conjunctive use
- Includes: assessment of Boron concentrations in surface water & groundwater quality to help landowners/growers understand connectivity between areas & decide on if surface water is an acceptable water source for their operations.
- Timing: Immediately

Project 4: Land Management Practices (Leads: Bullseye Farms, Cobram Estate Olives, and Durst. Support from District, YSGA, Yolo RCD, & Center for Land Based Learning where needed)

- Includes increasing rainfall infiltration on farms & ranches to absorb > 1.25" of extra rainfall into soil each year
- Timing: Immediately

Management Action (New): Community Drought Response

- Includes developing a community driven drought response plan of action to mitigate drought impacts for Hungry Hollow
- Timing: complete and agree on response framework and plan by October 2027

Bullseye Farms, Durst, California Olive Ranch, and Good Humus Produce agreed to be the primary lead and will draw upon Yolo RCD, Center for Land Based Learning, YSGA, and YCFCWCD staff support when applicable. Updates will be provided and documented in meeting minutes from future Working Group and YSGA Board meetings.

9. REFERENCES

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10. ATTACHMENTS

ATTACHMENT A. YSGA Hungry Hollow Groundwater Working Group - Engagement Strategy

ATTACHMENT B. YSGA Hungry Hollow Groundwater Working Group - Charter

ATTACHMENT C. Draft Hungry Hollow Geologic Cross Sections

ATTACHMENT D. Hungry Hollow Groundwater Elevations Hydrographs of Representative and Nonrepresentative Wells

ATTACHMENT E. YSGA Hungry Hollow Groundwater Working Group – Implementation Options Table

ATTACHEMNT F. YSGA Hungry Hollow Groundwater Working Group – Prioritization Criteria

ATTACHMENT G. YSGA Hungry Hollow Groundwater Working Group – Projects Summary Ranking Results

ATTACHMENT H. YSGA Hungry Hollow Groundwater Working Group – Projects Summary Ranking Results Detail

ATTACHMENT I. Field Guide to Conduct On-Farm Recharge

Attachment A - Hungry Hollow Groundwater Working Group Engagement Strategy

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Attachment C - Hungry Hollow Geologic Cross Sections

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Attachment E - Hungry Hollow Project Implementation Options

Attachment F - Hungry Hollow Project Selection Prioritization Criteria

Attachment G - Hungry Hollow Project Ranking Summary

Attachment H - Hungry Hollow Project Ranking Detail

Attachment I - Field Guide to Conduct On-Farm Recharge