

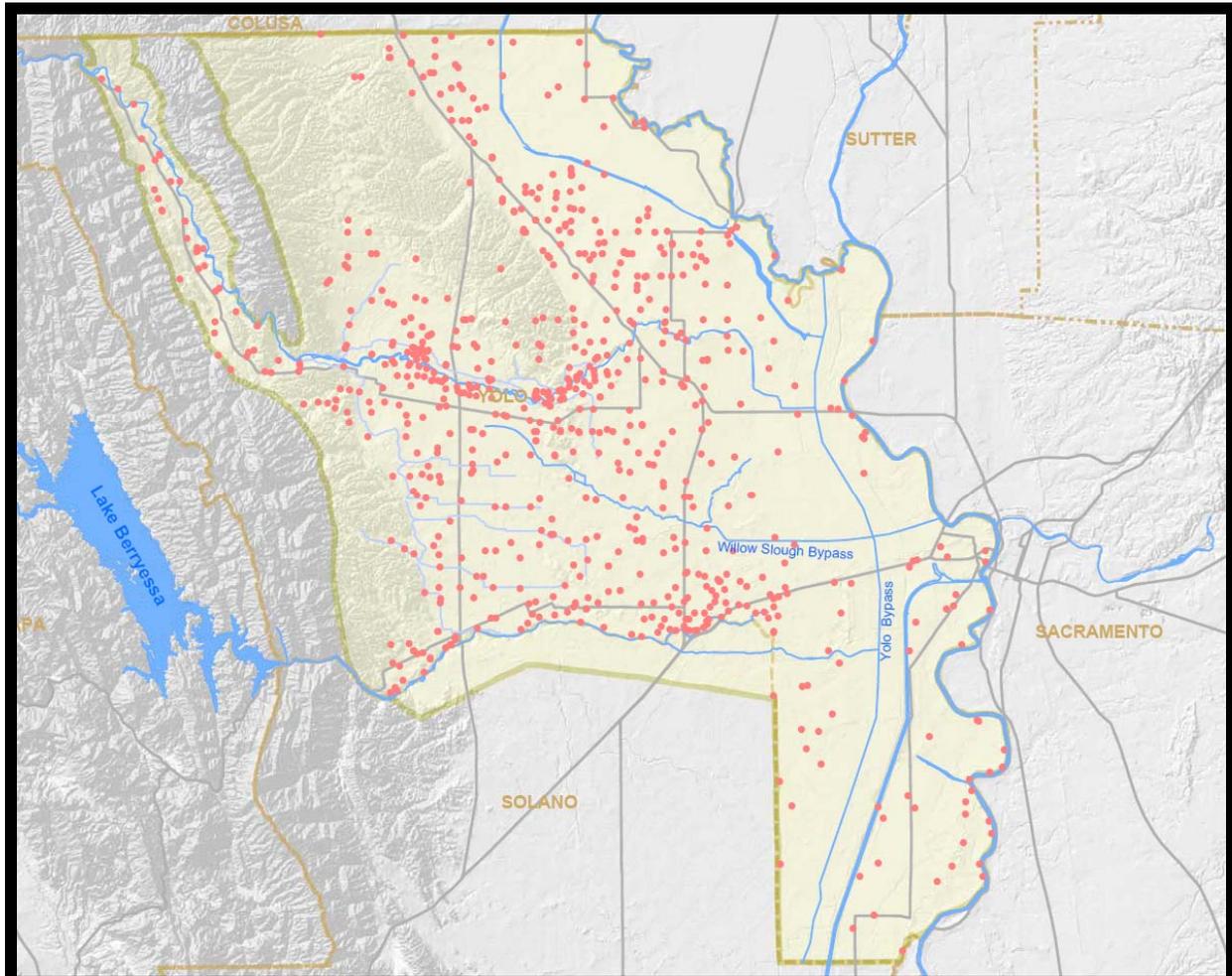
# Yolo County Groundwater Monitoring Program

## *A Budget Report and Proposal to the Water Resources Association of Yolo County*

*Draft Proposal: January 7, 2009*

*WRA Board Adopted: May 4, 2009*

*Revised: March 1, 2010*



*Locations of monitoring wells in Yolo County*

# 1. Introduction

This report describes the current structure of the Groundwater Monitoring Program (the “Program”) and presents a budget to support continuation of the Program. This budget describes the transition from an ad-hoc and grant funded process, to an established program with dedicated funding.

Groundwater provides much of the lifeblood of Yolo County. It sustains our agriculture and our cities. Managing this resource in a sustainable way is critical to the vitality of our communities and our landscape. The importance of groundwater has been recognized in the Yolo County Integrated Regional Water Management Plan (IRWMP), a collaborative plan of the water managers and interested community members that provides a blue print for working together on key water issues. Groundwater monitoring and management was identified in the IRWMP as a foundational action, work needed to be undertaken to allow for continued stewardship of the resource. A fledgling groundwater program was in place and the IRWMP endorsed continuing and expanding this program under the leadership of the Yolo County Flood Control and Water Conservation District (District). All members of the Water Resources Association of Yolo County (WRA) are active participants in the groundwater program. The aggregate industry along Cache Creek and the Rumsey Tribe are non-WRA participants.

The District implements the Program under the authority of its adopted AB3030 Groundwater Management Plan and through working agreements with cooperating agencies and private well owners. The Program is comprised of seven elements:

1. Monitoring
2. Modeling
3. Data and Information Management
4. Cooperator Coordination
5. Special Projects
6. Reporting and Decision Support
7. Administration

Five AB3030 Groundwater Management Plans in Yolo County use the Program to develop and implement management strategies. Monitoring data, maps, and for some, the structure of the monitoring database are incorporated in these plans. The five plans are:

- District’s plan (2006)
- City of Davis/UC Davis Joint Plan (2006)
- Dunnigan Water District’s Plan (2007)
- City of Woodland’s Plan (2008)
- Groundwater Management Plan Update for Reclamation District 2035 (Conaway Ranch, 2008)

Program data is placed in the State Water Data Library managed by the State Department of Water Resources (DWR) and available to the public through the internet. Many plans and projects have used and continue to use Program data. Table 1. provides a list of many of these efforts. The Districts also gets frequent inquiries from individuals and businesses interested in

groundwater features. These questions span the gamut from farmers wanting to know about groundwater levels to realtors inquiring about water quality, to local, state and federal agencies trying to gain information for specific projects. The Program is now championed by the DWR as one of the premier non-urban monitoring programs in the State.

**Table 1.** List of projects and activities using data from the Yolo County Groundwater Monitoring Program. (Additional simple data requests, not listed here, are usually from landowners and farmers looking for boron concentration or water level data for individual wells.)

<b>Project</b>	<b>Agency/Entity</b>	<b>Year</b>
Yolo County Subsidence Monitoring Program	WRA (City of Davis lead agency)	2005
Yolo County Integrated Ground and Surface Water Model (IGSM)	YCFCWCD, WRA, DWR	2005
Groundwater Ambient Monitoring and Assessment (GAMA)	CVRWQCB/USGS GAMA Program	2005
West Sacramento Interceptor (LNWI) Dewatering Lawsuit	City of West Sacramento / SRCSD	2005
AB3030 Groundwater Management Plan	City of Davis/UC Davis	2006
AB3030 Groundwater Management Plan	YCFCWCD	2006
Yolo County Landfill Groundwater Study	University of Delaware (commissioned by the Landfill)	2006
South Fork of Oat Creek Hydrologic Study	Metcalf & Eddy	2006
Monthly Groundwater Monitoring in the Capay Valley (2004-2006)	YCFCWCD (funded through the County's Tribal Mitigation Funds)	2006
AB3030 Groundwater Management Plan	Dunnigan Water District	2007
Data Request for unidentified project	URS Corporation	2007
Data Request for unidentified project	Analytical Corporation	2007
Integrated Regional Water Management Plan	WRA	2007
Dissolved Organic Carbon Study on Willow Slough	UCD/USGS	2004-2008
Yolo-Solano Water Quality Coalition Management and Reporting Plans	Ag Waiver – Irrigated Lands Program CVRWQCB	2005-2008
Upper Cache Creek Geomorphology Study	Yolo RCD	2008
California Central Valley Simulation Model	DWR, Bay Delta Office	2008
Rodgers Pond Restoration Plan	Yolo County CCRMP / WRA	2008
City of Woodland abandoned well abatement activities	City of Woodland	2008
Canal Pilot Pump Program	YCFCWCD	2008
Sacramento Valley Subsidence Monitoring Program	DWR	2008
AB3030 Groundwater Management Plan	City of Woodland	2008
Sacramento Valley Water Management Agreement Phase 8 Modeling	Northern California Water Association	2008
Data Requests for unidentified projects	West Yost Associates, Davis	Regular/Annual
Data Requests for unidentified projects	Luhdorff and Scalmanini, Woodland	Regular/Annual
DWR Water Data Library (on-line)	DWR	Annual

## 2. Program Elements

### Program element 1: Monitoring Water Levels and Water Quality

Water held in the ground is called an aquifer and lies within a groundwater basin. The Program recognizes six basins in Yolo County. A basin may contain one or more aquifers separated by impermeable layers. In Yolo County we generally recognize 3 aquifer zones, a shallow zone down to 220 ft., an intermediate zone between 221 and 600 ft., and the deep aquifer below 600 ft.

Tracking the levels of water in each aquifer is important for several reasons. In general, deeper water is of higher water quality and is better for drinking water sources. However, deeper water is more costly to acquire. Deeper wells are more expensive to construct and it takes more energy to lift the water out of the ground. For agriculture, when both surface and ground water are available, knowing the costs of each allows the water manager to use water in the most cost efficient manner. Water levels also indicate the amount of water available. Tracking levels allows conservation practices to be triggered when water is becoming scarce. If aquifers are over tapped, the now dry ground can compress and subsidence can occur. With good monitoring, management thresholds can be put in place that prevent this ground compression and preserve our ability to refill the aquifers.

The Program tracks water levels in more than 380 wells throughout the County. About 180 are monitored by the District, while the rest are monitored by cooperating agencies (Table 2). Some of these wells are used solely for monitoring purposes while others are actively used as water sources. Most of the wells are privately owned and are included in the program through voluntary agreements with the well owners to allow the program to monitor the wells.

**Table 2.** List of agencies and number of wells active in the Yolo County Groundwater Monitoring Program (between 2004 and 2010).

Agency	# of wells in program for water level
YCFCWCD	180
Aggregate Industry / County	114
Rumsey Band of Wintun Indians	19
City of Woodland	18
City of Davis	17
RD 2035	15
UC Davis	14
City of Winters	6
Dunnigan Water District	4
<b>Total</b>	<b>387</b>

One of the first steps of the Program was to use water level data to establish an “overdraft early warning system”. By assembling and analyzing water level data for past years the Program was able to show that water levels dropped appreciably during the 1977 drought, but recovered in the following years. This showed that levels could be taken down to the ones experienced in that drought without causing damage to the aquifers. A threshold was established and conservation practices defined to prevent drawing on the aquifer beyond the 1977 levels. This collection of information, rules, and actions is collectively called the overdraft early warning system. This system is formalized in the District’s Groundwater Management Plan as a Basin Management Objective (<http://www.ycfwcd.org/documents/GWMP2006FINAL.pdf>).

Currently water levels are monitored at least twice a year, at the height of the wet season (when the aquifers are most full) and after the heaviest use in the dry season (when the aquifers are at their low points), in all wells monitored by the District. Other agricultural wells are monitored similarly. Municipal wells are monitored monthly.

Water quality is also critical to the usefulness of groundwater. Providers of drinking water, like the cities in Yolo County, have been monitoring water quality in urban areas for many decades. However, water quality monitoring in the countryside, comprising most of the acreage of the County and where most of the groundwater recharge occurs, has been sporadic over the years. In 2004, the Program began reporting on water quality throughout the coordinated regional area. A new grant from DWR will provide improved monitoring of the agricultural areas near cities and further improve our understanding of the relationships between groundwater lying under the rural agricultural aquifers that the cities depend on for municipal supply. Currently about 100 wells are regularly monitored for water quality. It is hoped that in the near future the Program can increase the number of wells where water quality is routinely measured.

## Program Element 2: Modeling

The Program has developed a countywide groundwater simulation model called the Integrated Groundwater and Surface water Model(IGSM). Several other management areas outside of the county use versions of this model, including DWR. This model was finished in 2006 with nearly \$450,000 in grant funds from the State. The WRA and, independently, WRA member agencies, contributed additional funds to the development of the model as part of the Yolo County IRWMP. The IGSM is designed to:

- provide better understanding of groundwater flow in the county;
- analyze the benefits and impacts of Cache Creek groundwater recharge and recovery;
- evaluate the effects of groundwater management plans and the projects they contain;
- evaluate the benefits and tradeoffs in regional water management programs that are part of Integrated Regional Water Management.

The main outputs of the model are groundwater levels and groundwater contours. The model covers the entire County and results can be summarized by any combination of 22 subregions. Modeling scenarios include extended drought, active recharge of canals and gravel pits along Cache Creek, and effects of the Joint Surface Water Treatment project for Davis, Woodland, and

University of California, Davis. The IGSM is a useful planning tool that provides a good picture of the groundwater basins and how our management may affect them.

### Program Element 3: Data and Information Management

A significant amount of work has gone into developing systems which ensure the quality of the data collected and allow for ready access to the information generated by the Program. The Program strives to ensure the broadest access to information and to present specific data and interpretive information in readily available locations. Maintaining the integrity of the raw data is an essential component of this work and requires constant attention. Details matter in monitoring programs and the data management processes need to ensure that the detail is accurate, otherwise the data and all the effort which has gone into collecting it are compromised. The Program maintains a Water Resource Information Database (WRID) that is linked to the DWR Water Data Library. The WRID provides a format to ensure that the data recorded and stored is of high quality. The Water Data Library ensures ready access by the public to all the data collected by the Program.

### Program Element 4: Cooperator Coordination

The Program depends on a larger number of cooperators. Ensuring good communication among the participants is a key to success of the Program. The Program operates various workgroups to ensure the technical appropriateness and accuracy of all work. Workgroups involve participants and outside experts such as DWR, Water Resources & Information Management Engineering, Inc, Wood Rodgers, Inc. and other consulting firms. The information assembled by the Program is provided by the various participants. The coordination element includes developing and maintaining common formats and tools to collect, transfer, and store data and information. Conducting this work requires working with several different computer systems and administrative structures, so significant time is involved to ensure compatibility across the various platforms. Coordination also involves connecting to other programs such as the WRA Technical Advisory Committee. Currently the WRA TAC meetings provide a regular opportunity for keeping parties apprised of progress in the Program.

### Program Element 5: Special Projects

Special projects are used to expand the use, understanding, and technical capabilities of the Program. For example, the IGSM and WRID were both first developed as special projects under grant funding and then handed off to the other program elements for continued use. Special projects are usually grant funded. Often, data from the Groundwater Monitoring Program is the backbone of the special project. Currently, the District is managing a regional conjunctive use special project between the District, City of Davis, UC Davis, and the City of Woodland. Activities include assessing recharge capacity of the canal system, pilot canal pump program, active recharge into gravel pits, groundwater quality analysis focusing on the nitrate problem near cities, and four simulation runs of the IGSM. Between 2004 and 2007, the Program completed more than \$1 million in grant funded special projects.

### Program Element 6: Reporting & Decision Support

Information from the Program is most valuable if people know about it. The Program has produced various specific reports dealing with development of tools such as the WRID and the IGSM. In the past, Engineering reports summarized understanding of groundwater conditions. With the expanded knowledge brought by the Program, a new format for reporting is emerging. The Program intends to produce biennial reports on the status of the Program and the county's groundwater resources in the future. In addition, during periods when monitoring indicates significant changes in the aquifers the Program will produce status reports and alerts regarding groundwater conditions. In drought periods the Program will provide regular announcements about water levels and inform all the participants if the early warning system indicates that additional use control measures are warranted. Another, emerging role is the need to provide better information to the dialogue on Integrated Regional Water Management and the effects of various land use and management decisions on the county's groundwater resources. The Program will be developing new tools and methods to improve its ability to assist decision makers in understanding groundwater conditions.

### Program Element 7: Administration

Program administration involves managing the funds for the program, ensuring each of the program elements operates successfully, and organizing the resources and personnel needed to ensure adequate performance. In the early era of the Program, the District supported program administration as an element of its regular operations. As the program has evolved it has outgrown the ability of the District to support it as a piece of other operations and requires independent administrative allocations. In the past two years some administrative costs have been provided through project grants from the WRA.

## **3. Budget**

Budget information is presented below in three parts: program costs, program revenue, and estimated allied in-kind expenditures for each participating agency. Information is presented for the immediate past fiscal year, the current fiscal year and the upcoming budget year. Past and Current year values are actual dollars. Future (or budget) year amounts are requested.

### PROGRAM COSTS

Program costs are presented in Table 3 for each Program element, and are subdivided for the water monitoring and modeling elements. The lack of expenditures noted in FY2007/08 for water modeling reflect the lack of grant funding that was available that year. The higher expenditures listed in FY2006/07 were supported by state grants. One of the reasons for switching to baseline funding is to avoid future dramatic swings in available resources as can be seen in the values list for the three fiscal years. This type of "boom or bust" funding creates significant inefficiencies in the Program and compromises some of the utility of the information produced by the Program. It also makes it more difficult to ensure ready public access to the information. Costs of reporting and program administration have previously been built into special project expenditures or absorbed by the District. As part of the shift to baseline funding the Program has called out the costs associated with these elements to ensure adequate funding on an ongoing basis. Administrative costs are 5% of the total of the other program elements.

**Table 3: Program Costs by element and activity**

<b>Program Elements</b>	<b>FY 2006/07</b>	<b>FY 2007/08</b>	<b>FY 2008/09</b>
Water Monitoring			
Water levels	\$31,000	\$31,000	\$35,000
Water quality	\$27,300	\$28,300	\$30,000
Water Modeling			
IGSM	\$68,600		\$15,000
Drought management scenarios	\$14,000		\$20,000
Basin & aquifer delineation (Mapping)	\$20,000		\$8,000
Database & Information Management	\$40,000	\$19,300	\$30,000
Cooperator Coordination	\$11,100	\$10,700	\$12,000
Special Projects			\$208,180
Reporting and Decision Support			\$5,000
Program Administration			\$18,160
<b>Total</b>	<b>\$212,000</b>	<b>\$89,300</b>	<b>\$381,340</b>

**PROGRAM REVENUE**

In the current and past year the Program has been supported by the District and grants. Local grants have come from the Water Resources Association of Yolo County. Other grants have come from the State Department of Water Resources. The Program has also been supported by in-kind services provided by the participating entities. It is proposed that each participating entity contribute to the base program in the amounts specified in the Table 4, and by specific dollar amounts for Special Projects provided as matching funds to the state grants by the District, the City of Woodland and the City of Davis. The grant funds received from the State are expected to be spent over a two year period. The Special Project revenues and their matching funds will be the same in FY 2010/11 as are listed for FY 2009/10. The \$10,340 listed as other revenue does not yet have an identified source.

**Table 4: Program Revenue**

Agency	FY	FY	FY	FY 2009/10		FY 2010/11
	2006/07	2007/08	2008/09	<i>Base</i>	<i>Special Projects</i>	<i>Base</i>
YFCWCWCD	\$32,000	\$59,300	\$59,300	\$49,000	\$93,000	\$49,000
City of Davis				\$8,500	\$25,000	\$8,500
City of Woodland				\$8,500	\$10,000	\$8,500
Yolo County				\$8,500		\$8,500
Rumsey Band Wintun Indians				\$8,500		\$8,500
UC Davis				\$5,000		\$5,000
RD 2035				\$5,000		\$5,000
Aggregate Industry (Yolo County)				\$2,500		\$2,500
City of Winters				\$2,500		\$2,500
Dunnigan Water District				\$1,000		\$1,000
West Sacramento				\$1,000		\$1,000
Reclamation District 108						\$1,000
Local Grants	\$20,000	\$20,000	\$15,000	\$9,000		
Other Grants	\$160,000				\$128,000	
Other revenue				\$10,340		
<i>Sum of Program revenue</i>	<i>\$212,000</i>	<i>\$79,300</i>	<i>\$74,300</i>	<i>\$119,340</i>	<i>\$256,000</i>	<i>\$101,000</i>
Partner in-kind expenses	\$236,000	\$236,000	\$278,000	\$278,000		\$278,000
<b>Estimated Total Program Resources</b>	<b>\$448,000</b>	<b>\$315,300</b>	<b>\$352,300</b>	<b>\$397,340</b>	<b>\$256,000</b>	<b>\$379,000</b>

**IN-KIND EXPENDITURES**

In addition to the direct program expenditures, each participating agency undertakes work to relate the program information and data to their own internal work related to groundwater. These direct linkages between the collaborative program and individual entity program needs are estimated below in Table 5 as in-kind expenses. These in-kind expenses do not come through the Program, they are managed wholly by each individual entity. They do however, contribute to the overall utility and need for the collaborative program and are therefore identified as part of the total resources of the Program. Total program resources listed in Table 2 include both direct Program revenues and in-kind expenses.

**Table 5:** Estimated In-Kind Expenses for Past Years

<b>Budget Source</b>	<b>FY 2006/07</b>	<b>FY 2007/08</b>	<b>FY 2008/09</b>
YCFCWCD	\$75, 000	\$75,000	\$75,000
City of Davis	\$30, 000	\$30,000	\$50,000
City of Woodland	\$30, 000	\$30,000	\$50,000
Rumsey Band Wintun Indians	\$30, 000	\$30,000	\$30,000
UC Davis	\$25, 000	\$25,000	\$25,000
Aggregate Industry (Yolo Co.)	\$25, 000	\$25,000	\$25,000
RD 2035	\$15, 000	\$15,000	\$15,000
City of Winters	\$3, 000	\$3,000	\$3,000
Dunnigan Water District	\$1,500	\$1,500	\$4,000
West Sacramento	\$1,000	\$1,000	\$1,000
Reclamation District 108			
<b>Total</b>	<b>\$235,500</b>	<b>\$235,500</b>	<b>\$278,000</b>

RECENT DEVELOPMENTS FOR GRANT FUNDS AND SPECIAL PROJECTS

Due to the State budget crisis, our \$250,000 AB303 grant for special projects has been put on hold. It is unknown how long this delay may last. Therefore the opportunity to share overhead of maintaining the Program with these grant funds is currently not available. Base funding from Program participants is the only revenue to support the program. The District has expended \$346,000 from 12/1/07 to 8/25/09 in Program costs. The AB303 grant will reimburse \$165,000 of this amount to the District. Payment is still pending due to State budget issues.