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A newsletter from the University of California Cooperative Extension seeking to support productive and judicious use of limited water and land resources in the Northern Sacramento Valley.

IN THIS ISSUE

The Future of the Irrigated Lands Regulatory Program

Bruce Houdesheldt, Sacramento Valley Water Quality Coalition and Northern California Water Association

The Central Valley Regional Water Quality Control Board adopted an initial program to regulate non-point source discharges from irrigated agricultural land a decade ago. At that time, the *Conditional Waiver of Waste Discharge* adopted by the Regional Water Board only dealt with surface water quality.

In March 2006, the Regional Water Board took the first major step towards describing the existing regulatory setting, surface and groundwater conditions, and management practices within the Central Valley Region. This served as a foundation to develop alternatives for a long-term water quality regulatory program to address discharges from irrigated agriculture which focused on both surface water and groundwater. Seven (7) workshops were held throughout the Central Valley to introduce, describe and summarize the Draft Existing Conditions Report, receive initial feedback from the public, and explain the process to provide written public review and comments.

In 2008 the Regional Water Board began to develop a range of alternatives for the "Long Term Irrigated Lands Regulatory Program (ILRP)." These alternatives were developed by engaging agricultural stakeholders in a series of workshops and scoping sessions. Recommendations from this scoping process were sent to the Board in 2010. In April 2011 the Regional Board adopted the Programmatic Environmental Impact Report (PEIR) and in June 2011 adopted a *Short-Term Renewal of the Coalition Group Conditional Waiver of Waste Discharge Requirements for Discharges from Irrigated Lands, Order R5-2006-0053. This to allowed time for the Board to develop and approve seven (7) to ten (10)Waste Discharge Requirements (WDR) for uniquely different agricultural areas within the Central Valley including the Sacramento Valley.*

The first WDR was released for the Eastern San Joaquin River Watershed in April 2012. The Draft WDR for the Sacramento Valley is expected by the end of 2012 or early in 2013. The Board's schedule to release the WDR for the other areas of the Central Valley are available at the following web page: http://www.waterboards.ca.gov/centralvalley/water_issues/irrigated_lands/long_term_program_development/ilrp_wdrs_sched.pdf

Below is a summary of each element of the Long Term ILRP.

Waste Discharge Requirements (WDR)

After approval by the Regional Board, the WDR will list the requirements and reports of both the third-party entity (e.g. Sacramento Valley Water Quality Coalition) and members enrolled in the Coalition. These requirements may include a Farm Evaluation, Sediment and Erosion Control Plan, and Nitrogen Budget templates. These templates will be developed and administered by the Coalition after approval by the Central Valley Regional Water Quality Control Board Executive Officer. The WDR establishes milestones for when and where the templates must be provided to Coalition members and deadlines for those templates to be completed and returned to the Coalition.

Information Sheet (Attachment A)

This document is watershed specific. It describes the land use, geology, existing surface water quality conditions and past efforts to implement water quality management plans. It also summarizes past groundwater quality monitoring by numerous state and federal agencies. They

include the State Water Resources Control Board (SWRCB), United States Geological Survey (USGS), and California Department of Pesticide Regulation (DPR), Department of Water Resources (DWR), Department of Public Health (DPH), and Lawrence Livermore National Laboratory . A map of the watershed showing DPR Groundwater Protection Areas and Hydrogeologically Vulnerable areas in the specific watershed will also be included. This document will provide information and justification for where and how the WDR for the Sacramento Valley is administered. Not all areas within a watershed will require the same intensity of implementation.

Monitoring and Reporting Program (MRP) – Attachment B

The MRP, is an attachment to the WDR that can be modified by the Regional Water Board Executive Officer based upon input from the Coalition. It sets out the surface and groundwater quality monitoring requirements and strategy the Coalition will employ on behalf of members.

For surface water the MRP details three types of monitoring required – assessment, core and management plan monitoring—the location of monitoring sites, monitoring parameters to be analyzed, toxicity testing requirements, and the frequency of monitoring. This is very similar to the surface water quality monitoring that has been conducted over the past decade.

For groundwater quality monitoring, a key element is for the Coalition to develop and submit a Groundwater Assessment Report (GAR) within 15 months after the Regional Board approves the WDR. Groundwater vulnerability will be detailed in the report, as well as the two types of groundwater quality monitoring – trend (baseline) and representative (assessment of efforts by irrigated land owners to protect and improve water quality). A workplan based on the findings of the GAR will be submitted within two (2) years of Executive Officer approving the Coalition as the entity to represent members.

The MRP will also includes technical reporting requirements, a Quality Assurance Project Plan (QAPP) and most importantly the numeric water quality objectives previously established by the Board that are specific to the Sacramento River Basin.

Management Plan Requirements – Appendix MRP-1

As the title indicates this document details the elements required for surface and groundwater quality management plans. This includes source identification evaluation requirements, approvals of management plans and the process for determining when implementation of the management plan is complete. Not all areas within a watershed will require implementation of management plans, only those areas where water quality objectives are not being achieved.

The Regional Board's website (provided earlier) offers other documents associated with the WDR:

Monitoring Well Installation/Sampling Plan and Completion Report – Appendix MRP-2

CEQA Mitigation Requirements – Attachment C

Findings of Fact and Statement of Overriding Considerations- Attachment D

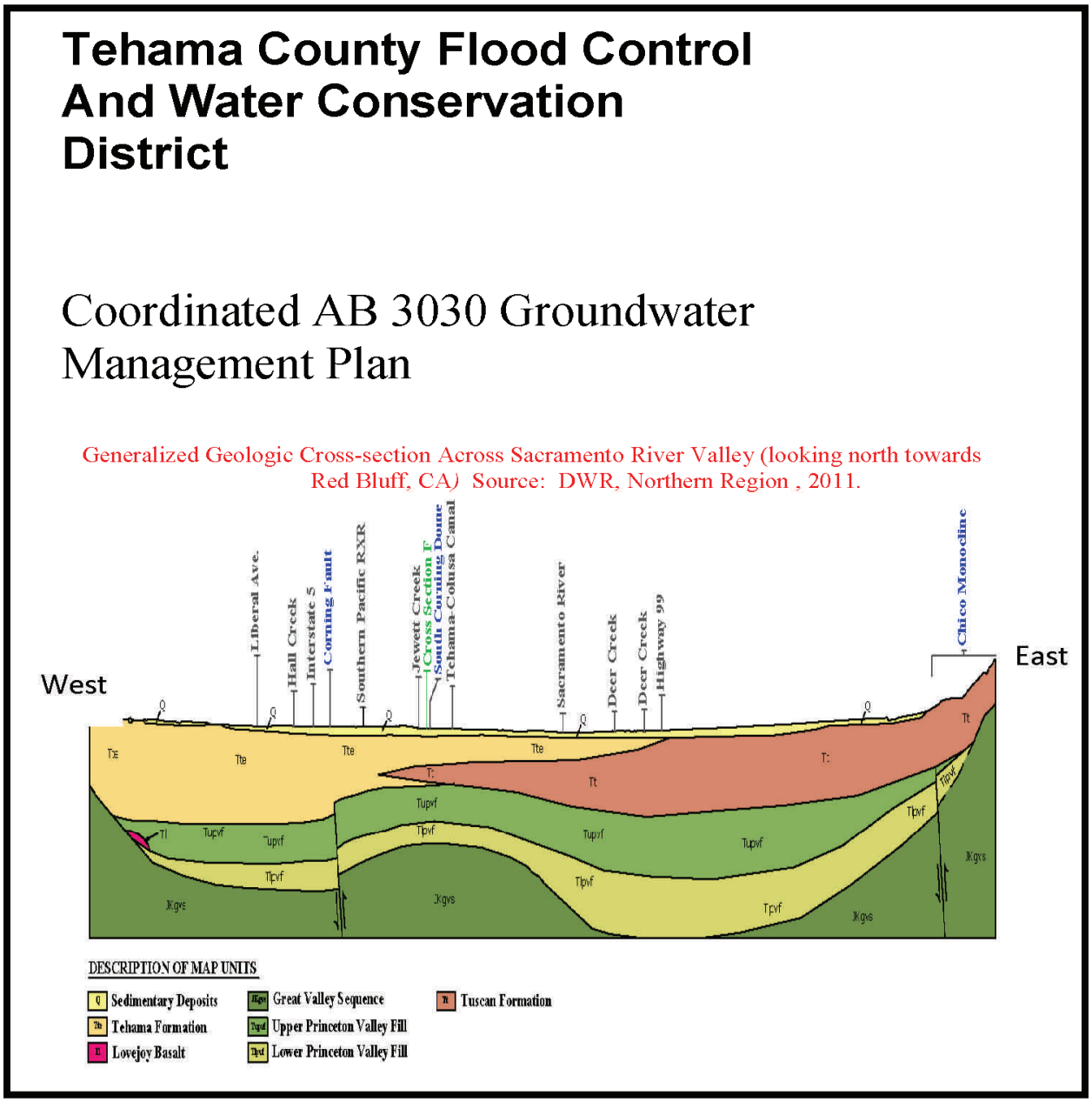
Definitions, Acronyms and Abbreviations- Attachment E

Tehama County Groundwater Management Plan Update

Allan Fulton, UC Irrigation and Water Resources Farm Advisor and Gary Antone, Executive Director Tehama County Flood Control and Water Conservation District

In 1996, over fifteen years ago, the Tehama County Flood Control and Water Conservation District adopted a Coordinated AB3030 Groundwater Management Plan. A "Plan Update" has been drafted through the collaborative efforts of the Tehama County Flood Control and Water Conservation District, the Tehama County AB3030 Technical Advisory Committee, and the University of California Cooperative Extension in Tehama County.

The Plan Update should be available for public review and comment in the next 60 to 90 days. Once the Plan Update is released, the public review and comment period will be open for approximately 30 days. Parties interested in the Plan Update should watch for the official release of the latest draft for public review and comment. The cover page for the Plan Update is shown below. It will be available for review and download at the Tehama County Flood Control and Water Conservation District's website: http://www.tehamacountypublicworks.ca.gov/Flood/ in the near future.



A Different Concept “Irrigation System Design by Soil Type”

Allan Fulton, UC Irrigation and Water Resources Farm Advisor and Brian Bassett, H2O-Optimizer

Striving for Crop Uniformity

Crop uniformity is a big deal for most growers. Some of the benefits include lower labor costs, lower input costs, more efficient harvests, and increased crop quality and yields. All of these benefits add up to higher profits.

Growers go to great lengths to achieve uniformity in their crops. Yet, they often still have to cope with weak production areas in their fields and orchards. The reason for non-uniform crops is often attributed to “poor soil” or “bad dirt”.

“Bad Dirt” versus Variable Soil

Truth is “bad dirt” is actually variable soil. The degree of the variation will be different in each field or orchard. The challenge is that all of the soil within a field or orchard is potentially good soil – it just has areas that are different in how they affect water and nutrients to plants and influence the environment for plant pests. Chances are good, that variable soil will become more apparent over time and once-uniform crops will become less uniform with every application of water, fertilizer, and amendments.

What is Soil Variability

Variable soil occurs everywhere. It is the result of natural physical and chemical processes that have occurred over thousands of years to form the soils that are farmed. Soils will vary in their texture (sand, silt, and clay content), structure (porosity and density), mineralogy (type of clay), chemistry (types and quantity of nutrients and salts adsorbed), and organic matter content. Soil variability occurs randomly across a field or orchard and vertically within the soil profile. The soil profile throughout a field or orchard is likely to have more variability than might be observed by only evaluating the topsoil.

How Does Soil Variability Affect Crops?

Variable soils influence the distribution and availability of water and air within the root zone and in turn whether they foster root diseases, nematodes, and affect root system development. Soil variability influences the retention and availability of essential nutrients and potentially harmful salts within the root zone. All of these sources of variability add up to non-uniform crops.

How to Manage Soil Variability?

Pre-plant tillage, fumigation, seed and plant selection for vigorous, tolerant or resistant varieties, and even clonal traits are all management steps that may be employed to grow uniform crops and manage soil variability. Varieties are selected and planted that can tolerate the effects of soil variability or better yet, excel in it. Drip or microsprinkler irrigation coupled with fertigation applied at high frequency and low rates more precisely provide water and nutrients when and where they are needed. These actions also help overcome or minimize the effects of variable soil on crop uniformity, but variable soil still often shows up as non-uniform crops.

Irrigation System Design by Soil Type

Can more be done? It's not feasible to haul in soil to replace the "poor soil" or "bad dirt" on a large scale. But, is it feasible to design an irrigation system by soil type and further enhance the benefits of drip or microsprinkler irrigation and fertigation? Is it realistic to design, install, and operate an irrigation system that more effectively accounts for the natural soil variability in a field or orchard?

Variable Rate Irrigation (VRI)

Variable rate irrigation is a different concept of irrigation system design and operation that is gaining interest in the Central Valley of California. It involves: 1) mapping a field or orchard to understand the extent of variable soil and its potential affect on crop production; 2) site-specific soil sampling and analysis to identify soil zones with significantly different water holding and distribution properties, soil fertility and salinity characteristics, and environment for diseases and pests; 3) designing and installing an irrigation system in zones to improve capacity and flexibility to irrigate, fertilize, and fumigate as dictated by different soils; and 4) crop and soil monitoring in each irrigation zone to optimize the application of water, fertilizers, pesticides, and production.

The VRI concept utilizes the same drip emitter or microsprinkler (product) and the same drip or microsprinkler emitter spacing throughout the field or orchard so that maintenance needs for the system are consistent throughout the orchard. A single valve is used to control when and how much water or fertilizer is applied to each irrigation zone in the field or orchard. It also uses a variable frequency drive to manage the power requirement needed to pump different flow rates of water into different irrigation zones with different acreage.

VRI Field Experiment Planned to Begin in 2013

An 80 acre field experiment that will explore the merits of a Variable Rate Irrigation system is planned to be in place for the 2013 irrigation season. It will be located on the westside of Tehama County among some of the more commonly planted orchard soils (Tehama, Arbuckle, and other soil series). An almond orchard will be planted on land that has not been planted in orchard crops before. A common orchard design and minisprinkler system will be used. The experiment will be designed to allow replicated, side-by-side comparisons of almonds irrigated with a traditionally designed system where the irrigation sets cross soil types and with VRI where the irrigation sets conform to the variable soils.

Invitation to Learn from this Field Experiment

Groundbreaking for this multi-year experiment is expected to commence later this summer and fall. It will provide opportunities along the way to learn more about VRI. Topics will include: methods of mapping soil variability; evaluation of soil variability to identify irrigation zones; additional costs of designing and installing a VRI system, experiences with operating and managing VRI, effects on water, fertilizer, and energy use, and crop responses with VRI.

I am interested in learning more about Variable Rate Irrigation (VRI). Please notify me of opportunities to visit the field experiment as it progresses.

To sign up online go to:

- **http://ucce.ucdavis.edu**
- **Water and Irrigation program** tab to the left
- **Variable Rate Irrigation** tab, left side, near the bottom
- Complete the brief survey by providing your preferred method of contact

-OR– sign up by indicating how you would prefer to be contacted

- Notify me by **Email**, my email address is: _____
- Notify me by **Fax**, my fax number is:_____
- Notify me by **U.S. Mail**, my postal address is:

  Name: _____

  Address: _____

  City and Zip Code: _____

Mail this request to:

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