

CGA/GGA Joint Technical Advisory Committee Meeting  
Agenda Packet



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## **Transmittal**

**To:** CGA and GGA Joint TAC Members  
**From:** Colusa Subbasin Technical Team  
(Davids Engineering, Woodard & Curran, West Yost Associates, and ERA Economics)  
**Date:** April 1, 2021  
**Subject:** **April 9, 2021 CGA/GGA Joint Technical Advisory Committee Meeting Agenda and PowerPoint Presentation**

### **Overview**

The agenda and PowerPoint presentation for the April 9 Joint TAC meeting are provided for preview by TAC members over the week leading up to the meeting. The technical team reserves the right to make minor changes to the PowerPoint up to the time of the meeting to enhance the presentation but will not add or delete any substantial items.

### **Notes on the PowerPoint Slides**

- 1) To date, there has been good discussion at Joint TAC meetings, but few advisory decisions have been made, particularly in relation to Sustainable Management Criteria. In view of the overall schedule for preparing and adopting the Groundwater Sustainability Plan, the next three (April, May and June) Joint TAC meetings will of necessity be decision oriented. A proposed TAC recommendation timeline is shown on Slide 3.
- 2) In addition to being asked to approve minutes, the TACs will be asked to approve two recommendations to the CGA and GGA Boards: one related to Water Quality Monitoring (Slide 8) and another related to Land Subsidence Minimum Thresholds and Measurable Objectives (Slide 13).
- 3) To date, discussion of Minimum Thresholds (MTs) has been primarily in relation to the Groundwater Levels sustainability indicator. However, MTs related to other indicators, notably Depletions of Interconnected Surface Water, also need to be considered because they might be different and potentially more constraining on groundwater operations than those related to Groundwater Levels. Similarly, considerations related to Groundwater Dependent Ecosystems as related to groundwater level management need to be applied simultaneously. This broadened MT approach is outlined on Slide 15.

The technical team looks forward to your thoughts and input at the April 9 Joint TAC meeting.

# CGA/GGA Joint Technical Advisory Committee Meeting

## **MEETING MINUTES**

January 8, 2021 | 1:00 p.m.

Due to safety concerns and directives from the Governor and Federal Government related to COVID-19,  
**This meeting was held remotely ONLY.**

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### **1. Call to Order, Roll Call, and Introductions**

The meeting was called to order at approximately 1:00 p.m.

Dave Ceppos with the Census and Collaboration Program started the meeting and went over some housekeeping and logistical items.

#### **In Attendance:**

##### **Committee Members:**

GGA: Emil Cavagnolo, Mark Lohse, David Kehn

CGA: Darrin Williams, Thad Bettner, Bill Vanderwaal, Jim Wallace, Brandon Davison (ex-officio)

**Others in Attendance:** Lisa Hunter (GGA Staff), Mary Fahey (CGA Staff), Dave Ceppos, Consensus and Collaboration Program [CCP]), Byron Clark (Davids Engineering, Inc.), Ken Loy (West Yost Associates), John Ayers (Woodard and Curran), Reza Namvar (Woodard and Curran), George Valenzuela (Woodard and Curran), Duncan MacEwan (ERA Economics), Hilary Reinhard (CGA), Leslie Nerli (GGA), Denise Carter (CGA), Shelly Murphy (CGA), Pat Vellines (DWR), Holly Dawley (GCID), Ben King, Jim Brobeck, Arne Gustafson, Karen Biane, Bridgette Gibbons, Paul Gosselin (Butte County), Matt Jones, Tom Charter, Chris Berg, Conway

### **2. Approval of Minutes (CGA TAC, GGA TAC)**

#### **a. \* December 11, 2020 CGA/GGA TAC meeting (GGA TAC only)**

For the GGA, Emil Cavagnolo made a motion to approve the minutes from the December 11, 2020 CGA/GGA TAC meeting with edits provided by David Kehn and Bill Vanderwaal. David Kehn seconded the motion, which passed per roll call vote:

#### **Roll Call Vote**

##### **Glenn Groundwater Authority**

David Kehn: AYE

Emil Cavagnolo: AYE

Mark Lohse: AYE

For the CGA, Bill Vanderwaal made a motion to approve the minutes from the December 11, 2020 CGA/GGA TAC meeting with edits provided by David Kehn and Bill Vanderwaal. Darrin Williams seconded the motion, which passed unanimously.

## **Roll Call Vote**

### **Colusa Groundwater Authority**

Thad Bettner: AYE

Bill Vanderwaal: AYE

Darrin Williams: AYE

Jim Wallace: AYE

### **3. Period of Public Comment**

Ben King commented about potential tectonic risks to groundwater quality. He said these issues are included in the Colusa County Groundwater Management Plan. He will forward USGS information related to this to Mr. Ceppos. He is concerned this could affect future groundwater quality.

### **4. Colusa Subbasin Groundwater Sustainability Plan Development:**

#### **a. Discussion: Subarea Water Budgets**

Byron Clark said that during development of the integrated model for the Colusa Subbasin, they have made local refinements to DWR's C2VSim Fine Grid Beta model and they have delineated 38 subareas based on water supplier service areas, county boundaries and groundwater-only areas. These subareas allow them to report out water budget estimates to support intrabasin discussion related to Sustainable Management Criteria, Management Areas (MAs) and Projects and Management Actions.

Mr. Clark described the components in a surface system water budget and a groundwater system water budget and provided some examples. The next steps are to assemble draft water budget summaries for each subarea and distribute that information for additional input.

Mr. Ceppos opened the floor to questions and comments first from the TAC and then the public.

Mr. Kehn asked, with so many subareas, what is an acceptable discrepancy at the boundaries? Mr. Clark said that as they look at smaller and smaller areas there is a discrepancy in the model because the water budgets are somewhat course.

Jim Wallace asked if Mr. Clark could forward a copy of the subarea map to the TAC members. Mr. Clark will send a pdf and kmz file of the map to the TAC by COB next Tuesday (January 12).

Mr. King commented about the human right to fresh drinking water and associated potential issues in Arbuckle, Williams, Colusa, Grimes and Princeton. He stated that, in his opinion, the Water Budgets should have a sub-budget for fresh drinking water.

Jim Brobeck asked a series of questions beginning with a clarification as to whether subsurface flows are the same as interbasin flows. Mr. Clark said no. He then asked how subsurface flows will be quantified. Mr. Clark explained that they will use the groundwater model.

Mr. Brobeck then asked if the water budgets will incorporate the currently updated Hydrogeological information being developed by Dr. Todd Green at Chico State, including Aeromagnetic survey data (AEM). Mr. Clark responded that the AEM data has not become available to the public and that they are using DWR's C2VSimFG Model refined to reflect local conditions.



Mr. Brobeck asked if the subareas will be used for MAs if they are formed. Mr. Clark responded that the water budgets can be used to help in the process but it is important to understand that these are subarea water budgets, not Management Areas.

#### **b. Discussion: Sustainable Management Criteria**

John Ayres began the discussion about Sustainable Management Criteria (SMC) and explained that he is going to add to the discussion considerations if surface water supplies are cut back. He provided a review of the percent of range chart and also reviewed the Thiessen polygons looking at well completion reports across the subbasin. Mr. Ayres described how the polygons can be used to help set Minimum Thresholds (MT). He presented some hydrographs and described the percent of range application to these specific wells.

Mr. Ayres provided a discussion on future surface water availability and explained that this is uncertain due to several factors. This needs to be considered as part of setting MT. The numerical model can be used to run different scenarios. Local considerations will be used to set MT and the model will be used as a tool to help with the planning. Mr. Ayres noted that monitoring, not modeling, tells whether the basin is sustainable.

Mr. Ceppos opened the floor to comments.

Mr. Ayres said that they are looking for consensus from the TAC today for approval of this approach to set MT.

Mr. Williams asked about looking at the number of wells that would be dewatered, and if using that factor to develop thresholds, how that relates to sustainability indicators.

Mr. Ayres responded that the Undesirable Result for chronic depletions of groundwater is significant and unreasonable negative effects to beneficial users. It's the TAC's job to help determine what is significant and unreasonable. The Colusa Subbasin is large with variable conditions. What is considered significant and unreasonable needs to be defined and the model is used as a planning tool.

Jim Wallace stated that it is difficult for him to understand how this is going to work practically and he is concerned about deadlines. He said it would be helpful to have a practical example in one area of the basin and develop an example of thresholds using the techniques described.

Mr. Clark said they are in the process of developing draft MT and Measurable Objectives (MO) that the TAC will see in the coming months. Mr. Ayres added that today they are presenting the approach to be sure they are on the right track.

Mr. Ceppos summarized that he thinks he hears from the TAC members that they feel they haven't seen practical examples to work with. Mr. Wallace said yes, he feels like he needs an example from the Colusa Subbasin in front of him to work with. Mr. Williams added that he understands the information that has been provided but he's having a hard time seeing how this applies to real-world scenarios and his ability to make management decisions.

Mr. Ceppos turned to the Consultant team to confirm that they are hearing the concerns expressed today and confirm there is a game plan in place to implement what is being presented today. Mr. Clark said that the plan is to release draft MT and MO this spring to allow for feedback and revisions before they go into the draft plan later in the year.

The parties agreed on the understanding of the timeframe and process moving forward.

Mr. King commented that the Arbuckle area or the west side of Interstate 5 area would be a good real-world example.

Duncan MacEwan continued the presentation and presented a potential economic analysis process to support the selection of MT and MO. An economic analysis is a way to analyze and quantify trade-offs when determining MT and MO in a consistent way. The analysis generally consists of a benefit-cost analysis. He then shared examples from other basins to illustrate the economic analysis process and potential considerations.

Mr. Kehn asked if this process can be scaled up or down for specific MAs, and if the MAs need to be defined to parse out the costs. Mr. MacEwan stated that MAs do not need to be defined for the general analysis, but they do if there are specific questions or considerations that should be addressed.

Mr. King stated concerns with the voting structure of the CGA regarding the public voice and external considerations such as subsidence. Mr. Ceppos noted that the CGA has two private pumper representatives, and the white areas are represented by Colusa County.

Mr. Brobeck stated surface water interconnection with groundwater should require analysis of how lower thresholds may impact water rights to downstream users. Inter-basin coordination should require analysis of how increased inter-basin flow may impede an adjacent basin's ability to implement its GSP and reach sustainability goals. Mr. MacEwan responded that similar considerations have come up in other basins. The economic analysis will provide information to support policy decisions, but not make the decision itself. Mr. Ceppos also confirmed that public comments, such as these, are being tracked and considered by the GSA Boards throughout GSP development.

### **c. Discussion: Management Areas**

John Ayres reviewed the MA regulations, potential boundaries, the inter-relationship between Projects and Management Actions and MAs, and some examples of MAs used in other GSPs. Mr. Ayres re-iterated the regulations, definitions, and required justifications to include in a GSP for MAs, including how the different thresholds interact between MAs. The intention of MAs is to help implementation of the GSP and the GSP goal is to reach and maintain sustainability. The GSA board can assign cost spatially across the basin in a manner that is appropriate, not limited to MA designation. MAs can be set to make implementation more efficient through existing organizational structures. MAs should be considered primarily based on either unique physical conditions that require a certain type of threshold (eg. salinity, fault) or to take advantage of the efficiency of existing organizational structures. He provided examples of physical features (canals, streams, isocontours) that could be used as boundaries as well as jurisdictional boundaries (districts, cities, counties) that could be considered. He continued by providing examples of MAs in the Cuyama, Kern Groundwater Authority, and Tulare Lake Subbasin GSPs. Mr. Ayres described pros to MAs include using existing management structures to streamline implementation in certain areas, and provide for local control. It can be problematic if challenging or different thresholds are set that are not compatible with the adjacent MA making conflict resolution very complex. Additionally, every annual report and five-year update must include analysis based on the MAs which would create added costs to the GSP implementation process.

It was clarified MA discussions have been requested at the CGA Board and discussions will take place in parallel at the TAC and GSA Boards. Ultimately, a recommendation may be provided from the TAC to the Boards. It was also recognized that each GSA will need to focus conversation for its own GSA area, although joint discussions may also take place.

Mr. Williams asked what can be done within a MA versus outside of a MA and how that relates to complexity and cost. Mr. Ayes replied that MAs could be based on physical conditions, but you could instead use a methodology that sets MT differently based on conditions through procedural statements, or if-then

statements to account for different conditions without drawing a boundary on a map. If political boundaries are used, it may be harder to explain the justification and how the thresholds interact with each other.

Mr. Kehn asked if we don't develop MAs, and one part of the basin is hitting the MTs, will the whole basin be required to pay for management actions, or can the cost be assigned to that area, or does a MA allow you to delegate the cost more locally? Mr. Ayres stated cost allocation would be developed and brought to the Boards to decide. It is a Board decision to decide how costs are allocated, which could be done a variety of ways. He confirmed MAs could be used to assign cost, but it may not always be appropriate. Mr. Clark added a consequence that could result from an Undesirable Result is State intervention which has an impact on costs to groundwater users. Mr. MacEwan also stated you do not need an MA to allocate project costs. Cost is typically allocated based on benefits received, which does not necessarily align with a MA.

Mr. Bettner pointed out that MAs already exist on county boundaries (GSAs) based on the authorities they have and differences in processes. He is interested in how MAs may be more efficient in terms of meeting the GSP objectives. Mr. Bettner indicated he does not want to use MAs to further split up the area, but rather to use the different authorities to make the efforts more efficient. Mr. Ayres shared how Kern uses MAs that is district-based, and further noted that MAs should be used to help coordinate implementation or because conditions are different. MAs are not a tool to protect you (as a district). Mr. Ayres shared another example where the thresholds were set the same, but MAs were established to streamline implementation by jurisdiction.

Mr. Vanderwaal noted that there is funding in the budget to set up MAs, so additional costs should not be a problem. He added that when doing projects, if there is a MA, there is a set area that is benefitting. If there is no MA, every time a new project is developed, the consultant will have to re-run the model to determine who is benefitting to assign costs which is an added expense to the GSAs.

Mr. Wallace noted that for several meetings, a map delineating potential boundaries has been requested. It seems that perhaps that would be premature based on the need for a policy decision, but he would be interested in seeing that. Mr. Clark stated considerations for boundaries are included in the next segment.

Mr. Wallace asked Mr. Vanderwaal if he could envision a GSP without MAs. Mr. Vanderwaal replied that he can, but during the Colusa GSA meetings, his district specifically requested an assurance that when surface water is short, landowners will be able to pump groundwater as it is their overlying right. They are still waiting to see that assurance. Running the scenarios that have been provided to the consulting team will help this conversation.

Mr. Loy continued the presentation by showing a series of graphics depicting physical considerations in the basin. He emphasized these are not MAs, but rather delineation of the physical environment. Graphics included USGS Geomorphic Provinces, topography, geology, streams, groundwater levels, land use, institutional boundaries, monitoring networks, and historical groundwater use.

Pat Vellines asked if the maps would be included in the GSP. Mr. Loy responded that versions of these maps will be included in the basin setting portions of the GSP.

Mr. Brobeck stated the contours seem to include the shallow aquifer system and asked how much will the semi-confined and confined aquifers be included. Mr. Loy noted the confined and unconfined aquifers have very specific definitions and it is very important to understand. In this GSP, there is a single principal aquifer, some portions with a confined response and others with an unconfined response, but they are all part of one integrated aquifer. The best way to distinguish between the responses is by using multi-completion monitoring wells. Mr. Brobeck commented that many wells that have been recently developed are in the deep aquifer with higher piezometric pressure and it is important to recognize that wells are

tapping into pressurized portions of the aquifer. He again stated that the Butte County TAC had a presentation by Dr. Todd Greene regarding the recent AEM Study and he encouraged this type of data to be included in the GSP. Mr. Loy indicated that geologic conditions on each side of the Sacramento River are different.

Mr. King stated he is concerned with groundwater contamination issues caused by pumping depressions. He asked which USGS report was referenced and noted that the Geochemistry of Groundwater in the Sacramento Valley Report dated 1984 identifies Sutter Buttes as a unique geomorphic unit and requested it be included as a feature in the GSP.

## **5. Public Outreach Update**

Mr. Ceppos provided an overview of current outreach activities. He recalled the December 9 and December 10 Public Workshops that launched the SGMA-series and noted each had good attendance. The draft meeting summaries are being prepared. He encouraged all to “like” and “follow” Colusa Subbasin SGMA on Twitter and Facebook. The Colusa Subbasin logo has been finalized and is being utilized on joint GSA materials. Publicity is starting on the Projects and Management Actions form and the informational flyer and workshop information for the Well Monitoring Pilot Program will be distributed.

## **6. Interbasin Coordination Update**

Mary Fahey provided an update on the Interbasin Coordination effort in the Northern Sacramento Valley that is being led by Butte County. This report is a standing Joint TAC agenda item. The Interbasin Coordination group consists of staff and consultant teams that are working in the basins in Northern Sacramento Valley. They are working together on coordination of technical elements of the various GSPs to ensure that all are on the same page especially with the different models, cross boundary flows and groundwater/surface water interaction. The goal is to identify any significant issues early in the process of GSP development so those can be addressed prior to GSP submittal. The last meeting was December 1<sup>st</sup>, prior to last Joint TAC meeting, so there are no new updates to report. The basins are all in different stages of work on water budget development and model calibration. The next meeting is not until early March when we expect the work in each of the basins to be better aligned.

Lisa Hunter added that meeting summaries and other information from these meetings is posted on the Butte County website and the link is provided in today’s meeting packet.

Jim Brobeck, commented that coordination is necessary but interbasin conflicts are very possible. He does not feel the process is transparent enough and asked when documents would be published on the Butte County website. Mr. Ceppos stated that Mr. Brobeck would have to contact Butte County or the facilitation team that is coordinating the Interbasin coordination effort to get those answers. Mr. Brobeck stressed that he feels there is not enough outreach happening on this process.

## **7. Discussion on TAC Reports to CGA and GGA Boards**

Lisa Hunter kicked off this discussion to facilitate communications between the Joint TAC and the GSA Boards. She asked for open discussion to brainstorm ideas to efficiently support these communications. Discussion could include level of detail and key technical components, timing, decision points and feedback loop. She stated it is important to provide enough technical information that the Board members feel comfortable making critical decisions through GSP development.

Mr. Kehn shared that this topic has surfaced because a Board member felt there had not been enough information or communication. Mr. Kehn stated it is difficult to take a three-hour meeting and distill down to a five-minute summary and thought it would be helpful to discuss at the TAC level. He is looking for ideas to provide consistency in what the TAC report to the Board should contain.

Mr. Williams suggested sending all TAC materials to all Board members. It is too much detail to review in a short summary during a Board meeting. Board members need to spend some time reviewing and the TAC report should describe what the TAC is thinking. Mr. Kehn noted he is trying to confine his report to technical topics and ideally, it would be great if Board members could review all the materials.

Mr. Ceppos shared that this issue has come up in other basins. The Board needs to decide how much they want to rely on the TAC for the technical information. Mr. Williams stated Directors need to do their due diligence in order to be informed and ask necessary questions. They need to at least review the material to speed up the process, rather than rely solely on a TAC member report.

Mr. Kehn stated the extreme would be to just ask the Board if they have any questions and expect they have read the materials and will ask questions. Leslie Nerli agreed with Mr. Williams that the Board members need to do their due diligence and attend TAC meetings to listen to the discussion when possible. If they don't take the time to review, they need to trust the TAC's guidance. It is a lot of information to summarize. The agenda is forwarded to the GGA Board members, so they should know what is being discussed.

Mr. Ceppos asked if there was any value in a document to distill the TAC conversation or whether that may be perceived as busywork. Ms. Hunter stated the GGA meeting packets now include the Davids Engineering monthly update memo and the TAC meeting summary and meeting presentations. Mr. Williams suggested the TAC minutes included to the Board packet is sufficient and important for the Board members to review and be able to ask questions. Another document is not necessary. He added that each Director needs to have an understanding of what is being discussed and they cannot do that without reviewing the materials.

Mr. Ceppos asked if there may be a way to frame up the discussion in the meeting packet so the Board expects that it will be more interactive.

Ms. Fahey agreed with Mr. Williams that the minutes are quite detailed and that another document would not be necessary. The CGA packet now includes the TAC minutes and presentation in the Board packet. She sends the agenda to the Board members and will begin sending the entire meeting packet. Some members have expressed interest in listening in to these meetings. Mr. Clark also attends some of the Board meetings to be available to answer questions when needed.

Mr. Williams suggested agendaizing heavy topics from TAC meetings on the Board agenda to have a more robust discussion at the Board level.

Mr. Ceppos summarized that he is not hearing a desire for a new document, but rather encourage Board members to do their homework. Mr. Kehn indicated his report out will not change very much, but he liked the idea of hearing from the Board whether they are going to "rubber stamp" what the TAC says or if they would like to make the decision on their own and follow up with specific questions. Ms. Fahey indicated that discussion is timely. Ms. Hunter thought the conversation may come up naturally during the discussion. She also noted, she agreed with Mr. Williams' idea to agendaize important TAC items to facilitate Board discussion. Mr. Cavagnolo stated to Mr. Kehn that he can lean on other TAC members to provide information to the Board, which may be helpful.

## **8. Topics for Next Meeting**

The next Joint TAC meeting will be February 12, 2021. Mr. Clark suggested that the following items might be included on the agenda: further discussion on subarea water budgets, a draft Basin Setting chapter, further discussion on Sustainable Management Criteria, Projects and Management Actions and Management Areas.

## **9. Member Reports and Comments**

There were no reports provided.

## **10. Adjourn:**

The meeting was adjourned at 4:55 p.m.

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# CGA/GGA Joint Technical Advisory Committee Meeting

## **MEETING MINUTES**

February 24, 2021 | 1:00 p.m.

Due to safety concerns and directives from the Governor and Federal Government related to COVID-19,  
**This meeting was held remotely ONLY.**

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### **1. Call to Order, Roll Call, and Introductions**

The meeting was called to order at approximately 1:05 p.m. Time was spent prior to opening the meeting taking precautions to minimize potential disruptive behavior such as a “zoom bomb” event.

Dave Ceppos with the Census and Collaboration Program opened the meeting and went over some housekeeping and logistical items.

#### **In Attendance:**

##### **Committee Members:**

GGA: Emil Cavagnolo, Mark Lohse, Zac Dickens, David Kehn, Donald Bills

CGA: Darrin Williams, Bill Vanderwaal, Jim Wallace, Brandon Davison (ex-officio)

**Others in Attendance:** Lisa Hunter (GGA Staff), Mary Fahey (CGA Staff), Dave Ceppos, Consensus and Collaboration Program [CCP]), Danaka DeBow (CCP), Byron Clark (Davids Engineering, Inc.), Ken Loy (West Yost Associates), John Ayers (Woodard and Curran), Reza Namvar (Woodard and Curran), George Valenzuela (Woodard and Curran), Blake Vann (CGA), Leslie Nerli (GGA), Shelly Murphy (CGA), Holly Dawley (GCID), Ben King, Matt Jones, Tom Charter, Chris Berg, Lester Messina, Ashley Driver, Susan (last name unknown), Kim Travis, Jaime Lely, Jennifer Wallace Sanders, Craig Bradford, Lisa Porta (Montgomery and Associates), Christina Buck, Lisa Humphreys

### **2. Approval of Minutes (CGA TAC, GGA TAC)**

#### **a. January 8, 2021 CGA/GGA Joint TAC Meeting**

Meeting minutes were not available for review. This item was tabled until the next meeting.

### **3. Period of Public Comment**

There were no public comments.

### **4. Colusa Subbasin Groundwater Sustainability Plan Development:**

#### **a. Discussion: Subarea Water Budgets**

Byron Clark introduced the discussion topics and provided a presentation on the subarea water budgets. He explained that the subarea water budgets more precisely than the basin-scale water budget, specify information about surface water suppliers, groundwater-only areas and land use. This information supports model development and is also used for quality control of model outputs. Mr. Clark described the model and the approach to the water budgets.

Mr. Clark provided an overview of key components of a water budget and explained that they are a complete accounting of inflow and outflow of water in the system, including the surface water system and the groundwater system. Inflows minus outflows must equal the change in storage. Mr. Clark described how the groundwater system and surface water systems are connected.

Next, Mr. Clark presented four subarea water budget examples from the Colusa Subbasin, including an area that is primarily rangeland, an area served primarily by groundwater, an area with mixed water supplies and an area served primarily with surface water. Mr. Clark also described the draft Technical Memorandum (TM) which contains information about each of the subarea water budgets comprising the Colusa Subbasin.

Mr. Clark opened the floor to questions.

David Kehn asked about the Rangeland subarea water budget example in the northwest portion of the basin and how sensitive the boundaries are in that area. Mr. Clark said that they can carve up the basin in any way. It would not be difficult to develop a water budget that excludes the orchards in that area. If that was done, Mr. Clark felt that the area would show up as a net recharge area.

Darrin Williams asked if Mr. Clark had updated the model based on input from some TAC members, and what kinds of updates are being made. Mr. Clark explained that in the original version of the DWR C2VSimFG model, all water suppliers were assumed to have the same, uniform surface water availability. This is not accurate, for example, the districts along the Tehama Colusa Canal receive different allocations year to year as compared to other districts in the basin. Therefore, one of the model updates involved distinguishing the different water supply entities and associated surface water diversions to more accurately represent where surface water supplies are actually being used. Seepage information was updated based on Agricultural Water Management Plans (AWMPs) and other documents to get a better estimate of that component of the water budget. Similarly with land use, the original model showed rice along the Tehama Colusa Canal and orchards in the rice growing areas so this data was updated. At the subbasin scale the original model results might have been reasonably representative but at the scale of subareas, model results were not sufficiently representative. Regarding Evapotranspiration (ET), they considered ET rates in the model compared to U.C. Davis, CSU Cal Poly and satellite analysis and made adjustments for some crops. Irrigation efficiency adjustments were made based on previously completed water budget analysis and from speaking with TAC members to review different crop ET and water use estimates. Estimates of irrigation efficiency were refined based on available information and consultation with several TAC members. Estimated return flows and reuse were refined to better reflect practices in the subbasin, similar to how irrigation efficiency was determined. A comparison of simulated outflows from the Colusa Basin Drain with measured stream gage results indicated a good comparison. Irrigation timing and pond depths were estimated based on discussions with TAC members about growing practices as well as prior studies. Localized estimates of population and per capita water use were used and data was gathered from Cal Water, the Department of Finance and others to gather data at a finer scale.

Mr. Williams asked if the information in the TM is hard data or based on model numbers. Or is there a combination and if so, which is which? For instance, are the surface water diversions reported from agencies or from model data? Mr. Clark said this is primarily diversion data from the Bureau of Reclamation, Glenn-Colusa Irrigation District, Reclamation District 108, and AWMPs. The only area where numbers had to be estimated by the model is along the Sacramento River between approximately Princeton and Colusa where there are several small surface water diverters. Mr. Clark said that information can be added to the TM to describe the source of information.

Mr. Williams commented that there seems to be a negative groundwater storage trend line in the groundwater-only areas. He feels the data does not go back far enough to tell the entire story. Since the



early/mid 1990s when there was a change in the way water supplies were allocated from the Bureau of Reclamation to the Tehama Colusa Canal, the numbers have averaged lower. Certain areas along the west side especially might show a reduction in storage but that could be a result of up-stream or down-stream pumping in another area. Mr. Williams felt that there are conclusions being made from subareas, but there could be contributing factors occurring in adjoining subareas.

Shelly Murphy commented that water transfers from other districts to the Tehama Colusa Canal don't show up on Bureau of Reclamation records, they show up on the transferor's records. Mr. Clark said that they cross-referenced information in AWMPs but he will follow up with Ms. Murphy to ensure their information is accurate.

#### **b. Discussion: Sustainable Management Criteria**

Mr. Clark introduced John Ayres from Woodard and Curran to present the information about Sustainable Management Criteria (SMC).

Mr. Ayres explained that the team is working on setting Minimum Thresholds (MT) and Measureable Objectives (MO) for groundwater levels, groundwater quality, land subsidence, and stream depletions. Today the discussion will focus on groundwater levels.

Mr. Ayres reviewed the percent of range concept for setting MT and MO, and presented maps with Thiessen polygons around each monitoring well, color coded for depth to water and percent of range. He described the proposed approach to set MTs is based on a combination of historical groundwater levels and the depth of nearby domestic wells for each representative monitoring site. Historical groundwater levels are evaluated using the lowest observed historical groundwater level plus a percent of the historical range in observed groundwater levels. For the example, 20% of each well's groundwater level measurement range (highest measured groundwater level - lowest measured groundwater level) below the historical low was used to identify a potential MT based on historical groundwater levels. Also for the example, the 20<sup>th</sup> percentile depth of nearby domestic wells (calculated based on DWR well completion report records within each of the Thiessen polygons) was used to identify a potential MT based on nearby domestic well depths. By using the 20<sup>th</sup> percentile, 80 percent of nearby wells would be protected using this threshold. Of the potential MTs based on historical groundwater levels and nearby domestic well depths, the lower of the two was selected as the draft MT.

Mr. Ayres mentioned that this process is very similar to the process used for the Yuba GSP and others. The consultant team is confident in this approach because well infrastructure and local conditions are considered. Thresholds can be set using this methodology and at different levels within the Subbasin independent of management areas, potentially addressing some of the Management Area concerns.

Mr. Ayres described the next steps in the process. The consultant team will run a sensitivity and risk assessment of MT exceedances, conduct an economic impact analysis and consider the process to define MOs.

Mr. Ayres turned to the Joint TAC and asked if the members were comfortable with using 20% of range below historical low to set MTs, or another number.

Ultimately, Undesirable Results (URs) are defined as exceedance of MTs in a locally identified number (or percentage) of monitoring wells over a specified period. He recommended that the Joint TAC consider a scenario where 25% of wells in the subbasin would have to be under the MT for two consecutive years to constitute a UR. If at any point the groundwater levels are measured above the MT, the time resets and another two consecutive years of measurements would need to be recorded. Two years provides time to

investigate the cause(s) of MT exceedances and to take action to fix any potential problem, provided that the applicable Projects and Management Actions are sufficiently ready for implementation. In this scenario, in the Colusa Subbasin, 13 of 50 wells would have to exceed their MT for two consecutive years to constitute a UR.

Mr. Ayres opened the floor to the Joint TAC for discussion about what percentages and how many exceedances were acceptable.

Mr. Ceppos asked Mr. Ayres when this information needs to be advanced to the GSA Boards. Mr. Ayres explained that today they need to know from the TAC members if proposed approaches are not acceptable. If the Joint TAC is generally okay with this process, the consultant team can move forward. If the Joint TAC generally does not like the approaches presented, they need to provide something in writing within the next week so the consultant team can create the draft thresholds at all fifty wells to share at the next meeting.

Mr. Ayres explained that if a greater percentage of range is used, this lowers the MT depth and gives the GSAs more time to address issues. If the MT is too low, regulators are not likely to accept the approach. 20% of range seems to address both of these scenarios.

Mr. Williams asked what defines an exceedance. Some polygons may only have one or two wells. Mr. Ayres explained that polygons are only used to evaluate the depth of nearby domestic wells and there is only one GSP representative monitoring well per polygon. Mr. Williams asked if an exceedance is just one well or numerous wells. What if groundwater levels in one well drop for two days then levels come back up? Does this need to be defined? Mr. Ayres said that is why they are proposing exceedances to be set up as 25% over 2 years. Each well has to be in exceedance for two continuous years to count toward the UR. Every time a well recovers above the exceedance level, it resets the timer for that well. This is a concept that has been in development for several GSPs. Just one set of measurements is not significant and unreasonable. Two years gives time for investigating the problem and providing solutions through projects or management actions.

Mr. Kehn asked if the wells are classified as domestic. Mr. Ayres said they looked at all wells in the basin and then at domestic wells. They are using domestic wells to check against groundwater levels because domestic wells are typically the shallowest and more likely to be affected. It is a more conservative value. Mr. Kehn said he likes the idea of a mixed approach but has concerns about infrastructure and cost for individuals. He questioned if this approach would help a well owner or hurt them. He said he is good with 25% over 2 years.

Leslie Nerli commented that this concept is a good idea, but she is a bit confused. Looking at the map, there is an individual monitoring well for each polygon and we know how many domestic wells there are. We don't usually know about an issue until there are problems. 13 out of 50 wells under 20% for 2 years is a lot. How do we determine which domestic wells we are using?

Mr. Ayres explained that domestic wells are not monitored under SGMA. GSAs are not required to ask for registration or pumping records, but they can. In the process shown today, the team has used an analytical technique to compare wells in each polygon with a monitoring well and compared thresholds in the monitoring well with depths of surrounding wells with the assumption they are all at the same ground surface elevation (therefore depths would be comparable and would not take into account local topographic changes). At this point they cannot do a more detailed examination because they do not know the exact location of each well. They are not monitoring domestic or production wells, only the monitoring wells. There is a robust groundwater level monitoring network in the Colusa Subbasin without many data gaps. The plan is to monitor this network and compare results to the thresholds to tell the story to the regulators. The GSAs can raise thresholds to current conditions in protection of domestic wells, but that will limit the

ability to utilize conjunctive use in many areas and limit ability to manage groundwater because there will not be room to utilize the storage in some of the areas.

Donald Bills commented that it looks to him like at certain percentiles a different number of wells will dry up depending on location. What affect will this have in a given area where they exceed a 20% for two years if wells have gone dry? How does this relate to change in storage overall? Mr. Ayres replied that he heard Mr. Bills expressing concern that the 20<sup>th</sup> percentile will dewater too many wells and that will change depending on which polygon is being addressed. Mr. Bills further inquired how the percentile relates to monitoring wells compared with domestic wells. Mr. Ayres said they used nearby well infrastructure to set a number on the monitoring wells to help figure out at what depth there is likely to be undesirable results, which would be dewatering of domestic wells. The domestic wells are not monitored. If undesirable results are set so 0 wells can be dewatered, this would be an issue since there are likely a number of wells that are very old, very shallow or out of production that are already above the groundwater level and are already de-watered.

Mr. Ayres clarified that they are trying to determine what defines the UR. Setting MTs can be tailored more to domestic wells. Mr. Bills asked if setting MTs is related to percent of change in storage. Mr. Ayres explained that the team is currently planning to use groundwater level thresholds as a proxy for groundwater storage.

Mr. Ayres commented that the GSAs are not prevented from taking action to address a potential UR prior to reaching a UR. Setting thresholds lower does not mean the GSAs do nothing to address potential issues. GSAs have to take actions before reaching a UR. Setting a lower but defensible UR allows the Subbasin to retain local control and flexibility toward correcting the problem(s) before State intervention.

Bill Vanderwaal asked if Mr. Clark had run previously requested scenarios for his district to evaluate the sensitivity of MT exceedances to potential changes in surface water supplies. Mr. Clark said one approach would be to develop a scenario for the entire subbasin by talking with all districts in the basin to understand potential future changes in water supplies. This could result in some inconsistencies between individual areas. Currently, "parametric" model scenarios representing basin-wide reductions in surface water supplies of 10, 25, and 50 percent have been developed to help understand the sensitivity of groundwater conditions. Examples of this approach are included in the next portion of the presentation. Mr. Vanderwaal said that he, and likely GCID, will want to see that information before making a determination about the approach to setting MT.

Mr. Vanderwaal commented that the GSAs will have opportunities to implement projects and management actions and there will be grant funds available. A potential project could be to identify areas where domestic wells could be impacted and apply for grant funding to improve those wells.

Ken Loy, West Yost Associates, commented that as he understands the Thiessen polygons, a polygon is created for each monitoring well delineating the area closest to each monitoring well. Using the DWR well completion database, we know generally the distribution of well depths in that area. He suggested that the team could examine how changes in groundwater depth could affect all wells in that area. It is easy to compare well depth to depth to groundwater measured in each monitoring well. This is all tied to management objectives and the GSAs need to decide what those objectives are. If the GSAs are mostly interested in domestic wells the percentages can be adjusted.

Mr. Ayres clarified that the smaller the percent of range to be set below historic low, the shallower the MT depth, which is more protective of domestic wells, but provides less flexibility. 10%-25% of the range has been used in 2020 GSPs.

Mr. Loy commented that areas with rapid change in groundwater elevations should be reviewed.

Ashley Driver, a member of the public, commented that she is more comfortable with setting MTs based on 10% of wells (5/50). 20% (10/50) seems high considering there could be a large number of people who would suffer from losing water for domestic purposes. Two consecutive years seems like a significant amount of time to fix a problem.

Mr. Ceppos turned the presentation back to Mr. Clark who presented a discussion about examining the sensitivity of MTs and risk of exceedance, including considering potential reductions in future water supplies and the implications of setting MTs at different levels. He presented some hypothetical scenarios to illustrate how the system would respond. These scenarios were all developed using the model. Mr. Clark noted that none of these scenarios consider projects and management actions.

Mr. Clark provided graphs with the various scenarios and opened the floor for questions. He explained that this is just a concept to try to understand how the system may respond to potential future surface water supply reductions.

Mr. Vanderwaal asked if Mr. Clark has this information specifically for the monitoring wells in RD 108 and how the proposal for setting MTs compares to these. Mr. Clark said they have building blocks to provide this information, but haven't put it together for each well yet. Today they are looking for input on the MT proposal that has been presented. They think that 20%-25% is reasonable but they will still have the ability to make modifications based on what they learn from the risk assessment and from the economic analysis.

Ms. Driver asked if water sales are going to be considered and minimized or prohibited to maintain available water supplies. Mr. Clark did not know at this time. Ms. Driver asked if MTs were decreased, would this be applied to all monitoring wells in the basin, or area by area. Mr. Clark said they should have a uniform percent of range and percentile of domestic wells basin-wide.

Mr. Clark said that in addition to the analysis that was discussed today, and looking at the risk of surface water reductions in the future, the team is also working on an economic impact analysis. This will allow the GSAs to look at relative costs and benefits of different MTs and MOs, and will provide information about economic costs and benefits to the overall economy in the basin. This information will also provide a basis to identify projects and management actions. The GSAs will be able to layer in costs and benefits of PMAs in context of the overall economy in the basin.

Mr. Williams commented that he has learned a lot today but still can't say he feels 100% confident about providing direction. He feels that 20% of range is reasonable. GSAs can't be responsible to guarantee domestic wells. There are a lot of old wells in the basin and a lot of them are going to fail especially during drought. He feels domestic well owners stand to benefit from the GSAs and the SGMA process through projects and management actions. Domestic well owners will most likely be able to get assistance for well replacements that they never had before. This is an important point to get out to the public. 20% is a good start and adjustments can always be made.

## **5. Public Outreach Update**

Mr. Ceppos mentioned that there have been applications coming in for the Well Monitoring Pilot Program. Ms. Fahey mentioned the Well program application deadline is Friday (February 26). She also reminded the group about the Colusa Subbasin SGMA social media pages. Lisa Hunter reminded the group that the Projects and Management Actions (PMA) forms are available. Mr. Ceppos said that the proposed outreach approach has been discussed through the August timeframe. Another set of public outreach meetings will be coming in April. He reminded the group to like and join the Colusa Subbasin SGMA Facebook page.

## **6. Topics for Next Meeting**

There was no discussion on this item.

## **7. Member Reports and Comments**

There were no Member comments.

Ben King, a member of the public, commented that he feels the GSAs should be proactive around domestic wells and identify wells that might go dry and find funding to help those well owners.

Mr. Ceppos commented that the law has defined Beneficial Users as all individuals that directly or indirectly use groundwater. The broader the ability for people to be involved benefits everyone.

Ashley Driver commented that domestic well owners that will be affected probably don't utilize Facebook. It is important to get the information out to them. Water deprivation is a big issue.

## **8. Adjourn at 3:24**

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### **Action items:**

1. Follow-up on notations in Technical Memorandum regarding sources of information (comment from Mr. Williams)
2. Follow-up with Shelly Murphy regarding water transfer data and Bureau of Reclamation records





COLUSA AND GLENN GROUNDWATER AUTHORITIES

# Colusa Subbasin

## Joint Technical Advisory Committee

### GSP Development

4/9/2021

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## Discussion Topics

- 4.a.—TAC Recommendation Timeline
- 4.b.—Sustainable Management Criteria
- 4.c.—Projects and Management Actions
- 5.—Topics for May 14 Joint TAC Meeting

4/9/2021

Joint TAC

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## 4.a. TAC Recommendation Timeline

- Preparation of GSP Chapters 6 and 7 depend on TAC decisions
  - Chapter 6—Sustainable Management Criteria
  - Chapter 7—Projects and Management Actions
- Both chapters scheduled for draft review by July 16
- Joint TAC Meetings
  - April 9 (today)—TAC recommendations for Water Quality and Subsidence
  - May 14—TAC recommendations for Groundwater Levels, Groundwater storage, GDEs, and Streamflow Depletion
  - June 11—TAC recommendation for Projects and Management Actions to be included in the GSP
- Possible Need for Extra Meetings

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## 4.b. Sustainable Management Criteria

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# 4.b.i. Groundwater Quality

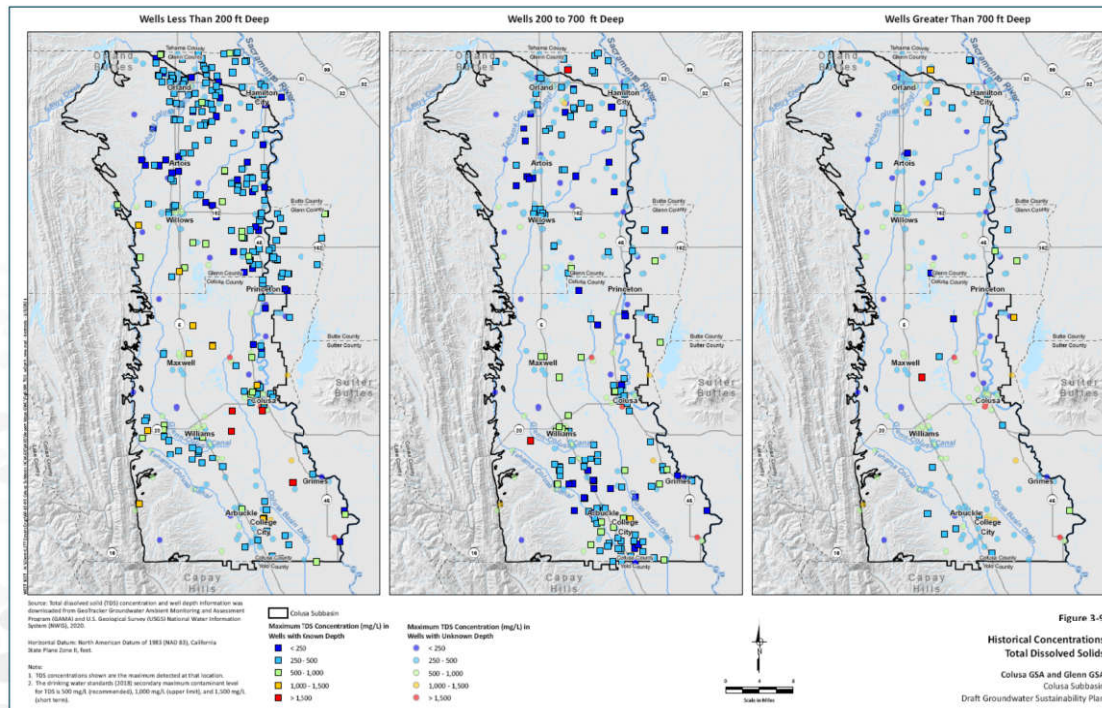
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## Saline Groundwater Quality Monitoring

- Total Dissolved Solids
- Inadequate historical data
- Establish a monitoring network for groundwater to monitor upwelling saline water



4/9/2021



# Groundwater Quality Monitoring Network

- Technical team recommendation:
  - Establish groundwater quality monitoring network
    - Monitor for TDS
    - Monitor deep zone for upwelling saline waters
  - Establish salinity thresholds for groundwater quality as part of 2027 GSP update

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Joint TAC

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## Proposed Action

*The Joint TAC recommends that the GSA Boards adopt a GSP policy to conduct monitoring of saline groundwater to support establishing salinity thresholds for groundwater quality as part of the 2027 GSP update.*

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## 4.b.ii. Land Subsidence

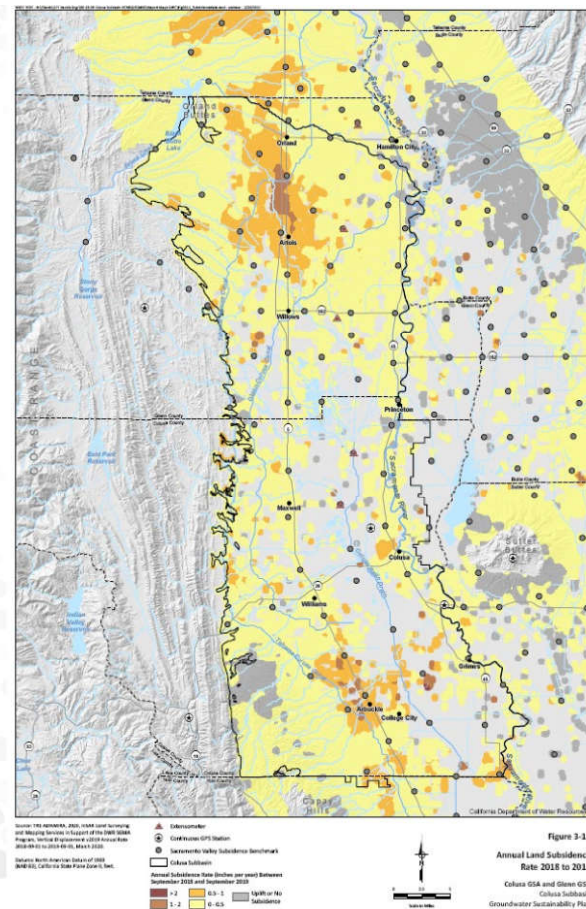
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### Land Subsidence Approach

- Use Sacramento Valley Height Modernization Project Benchmarks for representative monitoring network
- Continue extensometer monitoring to continue to improve basin understanding
- Thresholds established with consideration of historic subsidence using a maximum rate of subsidence over a five-year period for each station



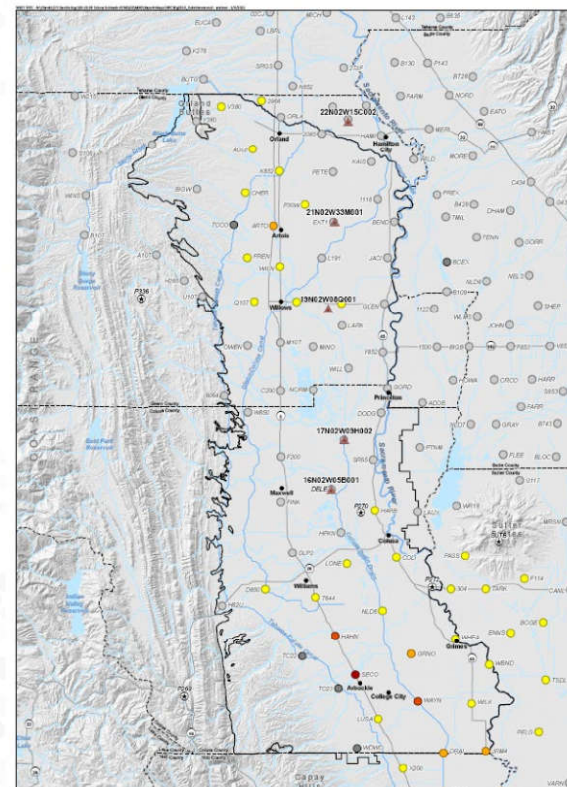
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# Land Subsidence MT and MO Recommendations

- Thresholds established with consideration of historic subsidence using a maximum rate of subsidence over a five-year period for three groups based on measurements from 2006 to 2017:
  - Areas with greater than 1 foot of historical subsidence:
    - Set MT at 0.60 foot/year, set MO at 0.25 feet/year
  - Areas with less than 1 foot historical subsidence:
    - Set MT at 0.50 feet/year, set MO at 0.25 feet/year
- Consider adding subsidence monitoring benchmarks



Sacramento Valley Benchmark Subsidence Measured Between 2008 and 2017

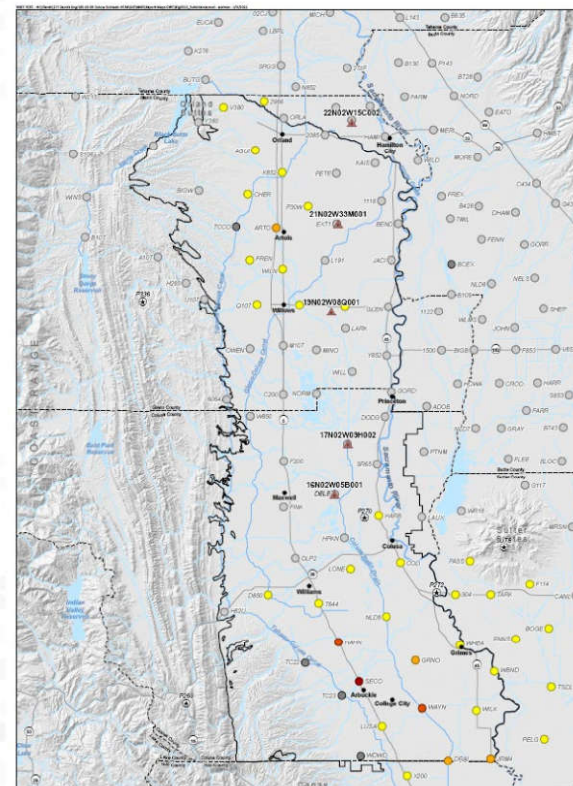
● > 2 ft	● 0.5 - 1 ft	● < 2 inches
● 1 - 2 ft	● 2 inches - 0.5 ft	● New Benchmark or Not Surveyed

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# Land Subsidence Undesirable Result Recommendation

- Undesirable Result is detected when:
  - 10% or more (6 or more of 60 representative monitoring sites) experience subsidence rates above the minimum threshold



Sacramento Valley Benchmark Subsidence Measured Between 2008 and 2017

● > 2 ft	● 0.5 - 1 ft	● < 2 inches
● 1 - 2 ft	● 2 inches - 0.5 ft	● New Benchmark or Not Surveyed

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Joint TAC

## Proposed Action

*The Joint TAC recommends that the GSA Boards adopt the Land Subsidence MTs and MOs presented on Slide 11 and the Land Subsidence Undesirable Results criteria presented on Slide 12*

## GSA Board Recommendations for TAC Adoption at Next Meeting (5/14/21):

- Groundwater Levels
- Groundwater Storage
- Groundwater Dependent Ecosystems
- Surface Water Depletions



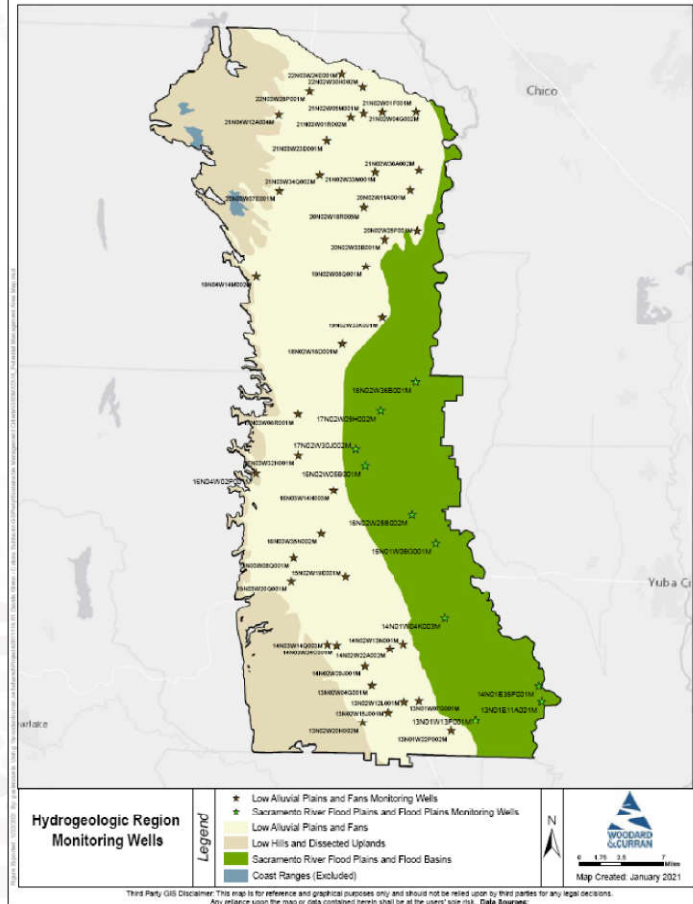
# Minimum Thresholds and Multiple Sustainability Indicators

- GSP must manage to avoid undesirable results for all applicable sustainability indicators and beneficial uses
- Need to simultaneously consider minimum thresholds across multiple sustainability indicators because they can be different for:
  - Groundwater Levels
  - Groundwater Dependent Ecosystems
  - Depletions of Interconnected Surface Water
- GSP by necessity will need to manage to keep conditions above the shallowest of the minimum thresholds at each monitoring well

## 4.b.iii. Groundwater Levels

# Chronic Lowering of Groundwater Levels

- MT = Lower of:
  - 20% of range below historical low, and
  - The 20th percentile of shallowest domestic wells in the monitoring well's Thiessen polygon
- MO = Mean of last 5 years available measurements
- IMs = TBD based on PMAs

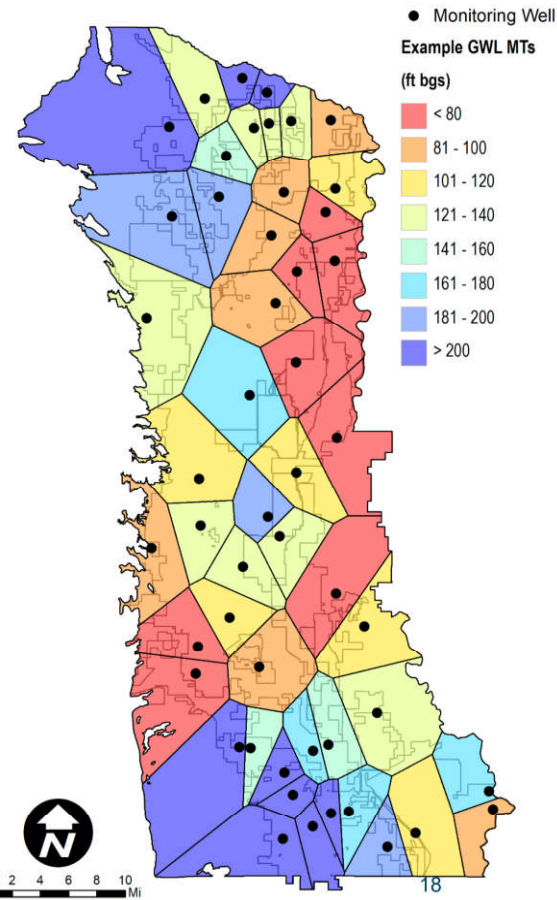
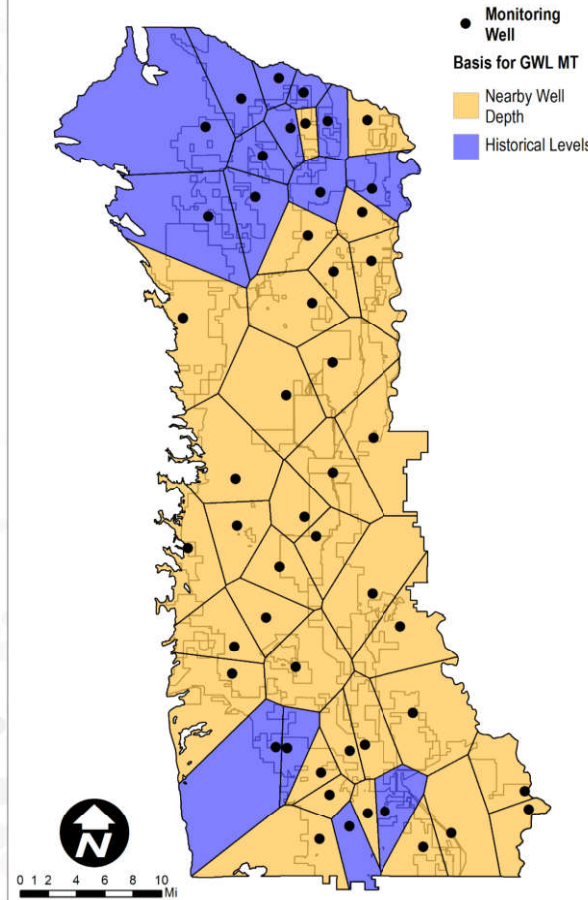


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## Proposed Approach

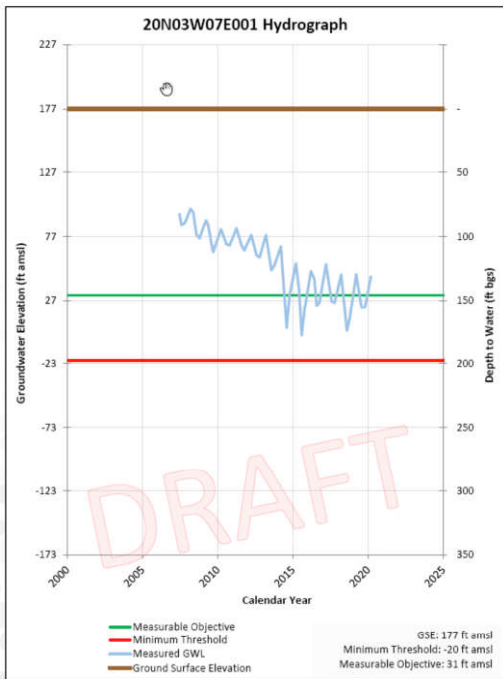
- Set MTs based on lower of historical low plus percent range and percentile depth of nearby wells
- Well depths used to set MTs in most areas
- Historical water levels used to set MTs in areas of greatest drawdown



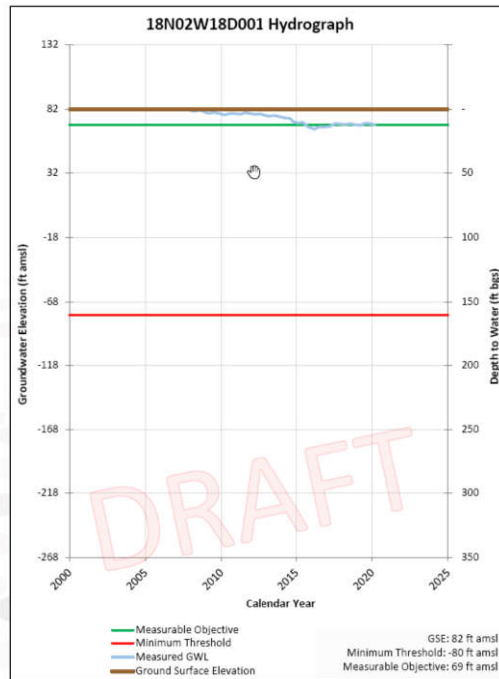
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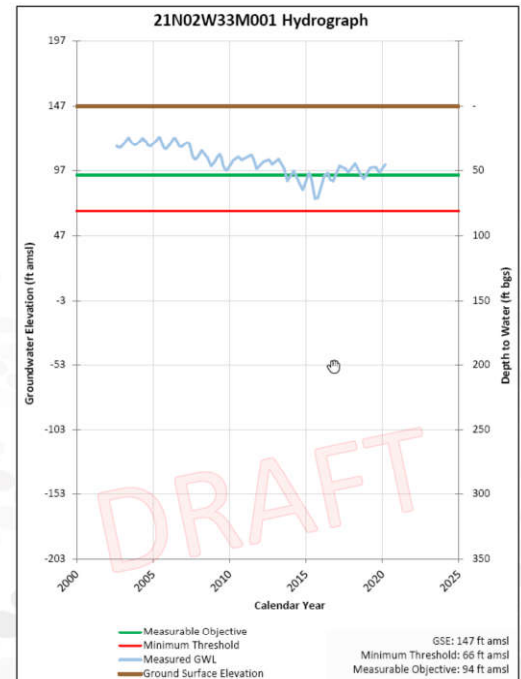
# Groundwater Levels: Minimum Threshold, Measurable Objective



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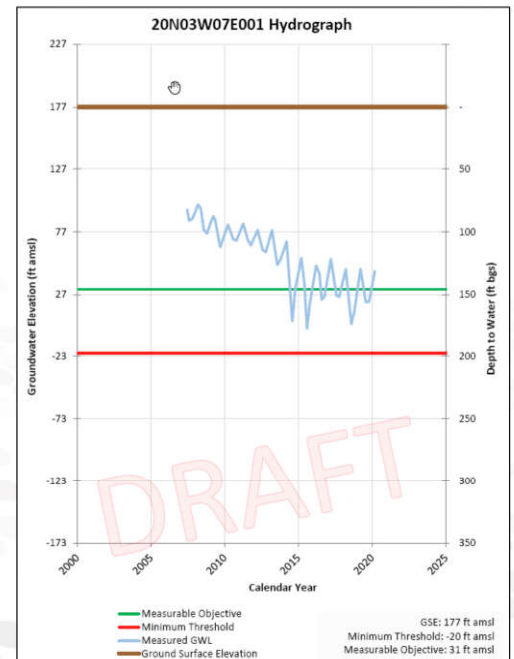
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## Summary: Groundwater Levels – Minimum Threshold, Measurable Objective

- MT = Lower of:
  - 20% of range below historical low, and
  - The 20th percentile of shallowest domestic wells in the monitoring well's Theissen polygon
- MO = Mean of last 5 years available measurements
- Undesirable Result is detected when:
  - 25% (13 of 50 representative monitoring wells) fall below the minimum threshold for 24 consecutive months



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# Economic Analysis to Support Setting Groundwater Level MTs/MOs

- The proposed criteria for setting MT is the lesser of 20% below the historical low or 20<sup>th</sup> percentile of nearby domestic well depths
  1. What are the economic implications of setting higher/lower MT?
  2. Is there an economic rationale for setting MT higher than the proposed criteria?

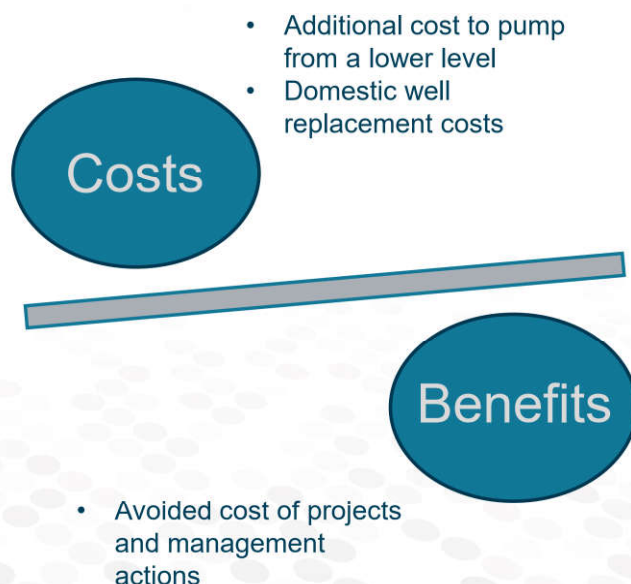
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## Economic Analysis Overview

- Quantify, costs, benefits, and tradeoffs of setting MT at different levels
- Reconnaissance-level assessment:
  - Applicable only to regions with MT set based on levels
  - Example analysis only considers monetizable benefits and costs



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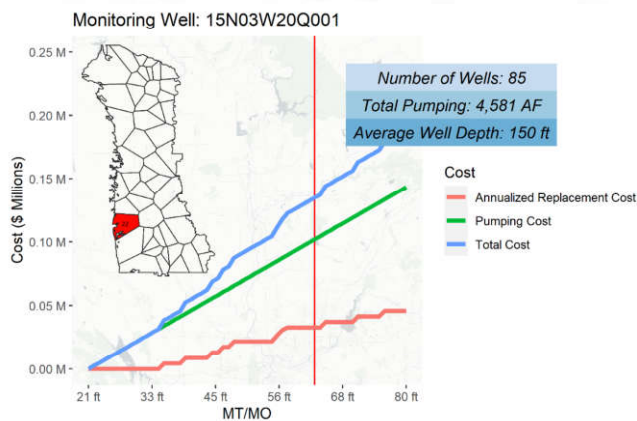
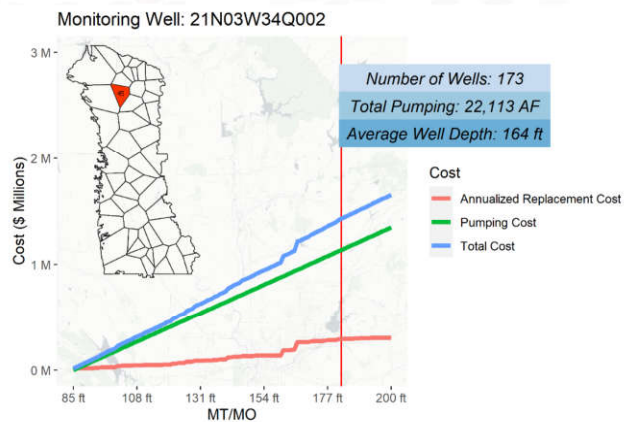
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# Example Costs

- All costs are annual over a range of possible MT
  - Well replacement
  - Pumping cost
- Annual cost at the proposed MT are generally under \$1M per year
- Vary due to:
  - Number of domestic wells
  - Current pumping depth
  - Average annual pumping

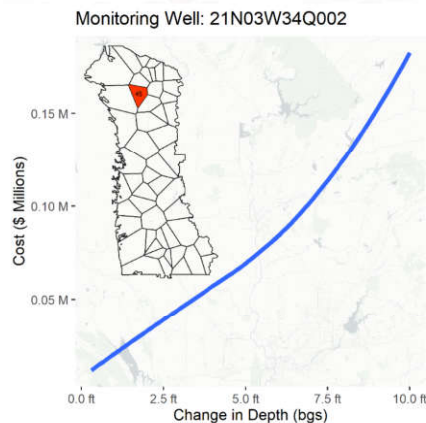


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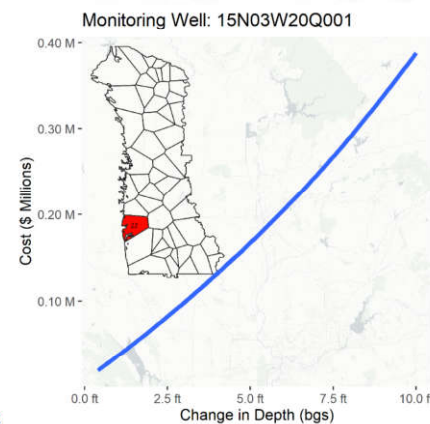
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# Example Benefits

- Evaluate the avoided-cost of projects/management actions required to keep levels higher
  - This example uses demand management as a proxy cost
  - In practice, projects would be considered
- Annual cost at the proposed MT are generally under \$0.75M per year
- Vary due to:
  - Pumping
  - Current crop mix



	Crop	Acres
1	Almonds	247
2	Walnut	842
3	Wheat	270
4	Alfalfa	147
5	Tomatoes	75
6	Sunflower	3,127
7	Olives	396
8	Melons	1,175
9	Other Truck	782



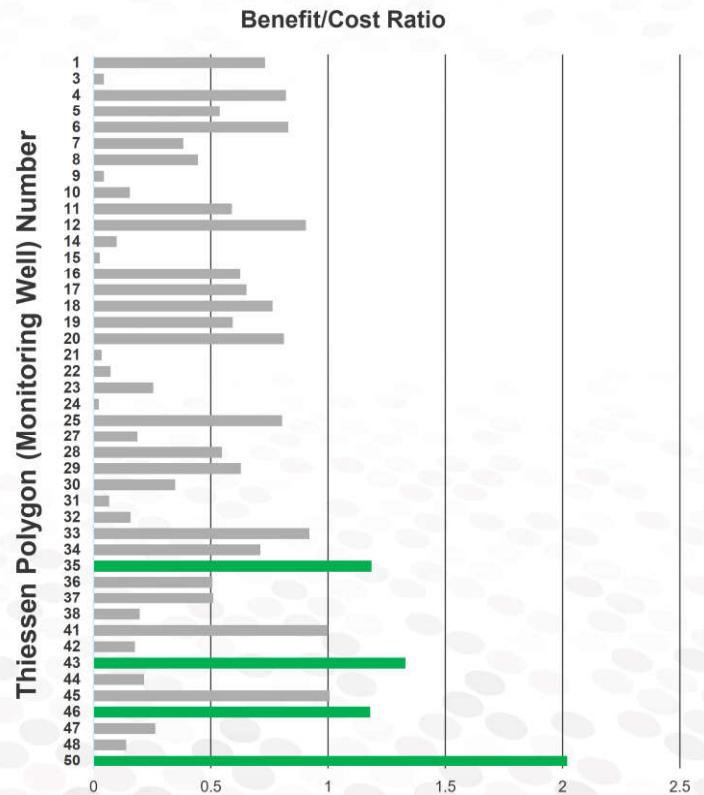
	Crop	Acres
1	Almonds	801
2	Walnut	90
3	Wheat	105
4	Young Perennials	591
5	Alfalfa	57
6	Tomatoes	517
7	Misc. Grain	296
8	Corn	96
9	Sunflower	7,535
10	Olives	61
11	Melons	457
12	Other Truck	12

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# Benefit Cost Analysis

- Is there an economic rationale for setting MT incrementally higher than the proposed criteria?
- **Summary conclusion:**
  - Example economic analysis shows that the cost of setting higher MT is generally greater than the expected benefits
  - Exceptions are in areas near the river that will set MT based on alternative criteria



## 4.b.iv. Groundwater Storage

## Reduction of Groundwater Storage

- Levels are an appropriate proxy because the limiting factor in accessing storage in the Colusa Subbasin is well infrastructure, not water available in storage.
- Recommendation: Monitor and manage using groundwater level MTs and MOs as a proxy.

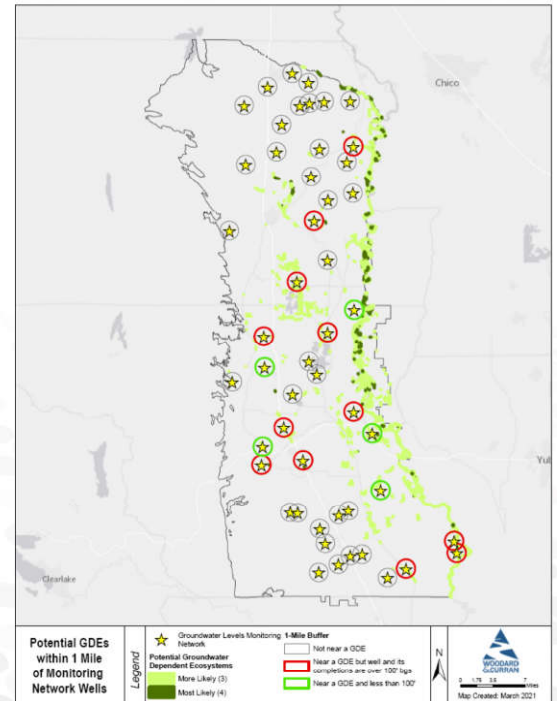
## 4.b.v. Groundwater Dependent Ecosystems (GDEs)



# Groundwater Dependent Ecosystems (GDEs)

- Select Representative Network:
  - Shallow monitoring wells (shallower than 100 feet bgs) within one mile of “More Likely (3)” and “Most Likely (4)” GDE locations
- Only 5 of the 50 representative sites are both shallower than 100 feet bgs, and within one mile of a GDE
- Minimum threshold consideration - 30 feet bgs (TNC 2018 pp 46, 72, and 75)<sup>1</sup>
- Recommendation: improve GDE classification reliability, expand shallow monitoring network near GDE locations, and establish minimum thresholds in 2027 GSP update.

1. Nature Conservancy. 2018. *Groundwater Dependent Ecosystems under the Sustainable Groundwater Management Act*. January.



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## 4.b.vi. Depletions of Interconnected Surface Water

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## Depletions of Interconnected Surface Water

- Depletion of Interconnected Surface Water Undesirable Result Statement (from 11/13/20 Joint TAC Meeting)
  - The undesirable result for depletions of interconnected surface water is a result that causes significant and unreasonable adverse effects on Beneficial Uses and Users of interconnected surface water **within the Colusa Subbasin** over the planning and implementation horizon of this GSP. (Emphasis added)

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## Depletions of Interconnected Surface Water

- GSP regulations in places support limiting Undesirable Results analysis to within the Colusa Subbasin
- GSP regulations in places infer that Undesirable Results outside the Colusa Subbasin are included
- Environmental community strongly endorsing that GSPs explicitly protect streamflow depletion
- Other Sacramento Valley subbasins generally taking a position:
  - Acknowledging that the Sacramento River and groundwater are interconnected but the relationship is inadequately understood and influenced by external factors (factors outside the subbasin)
  - Supporting increased monitoring to better understand dynamics

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# What Does Modeling Reveal About Streamflow Depletion?

- Viewed together, averaged over a 50-year projection, average annual gains and losses from the Sacramento River and Stony Creek are:

Stream Gains and Losses	Future Conditions without Climate Change (TAF)	Future Condition with 2070 Climate Change (TAF)	Change (TAF)	Change (%)
Gains from GW	+349	+323	-26	-7.5
Losses to GW	+231	+253	+22	+9.5
Net Stream Gain	+118	+70	-48	-41

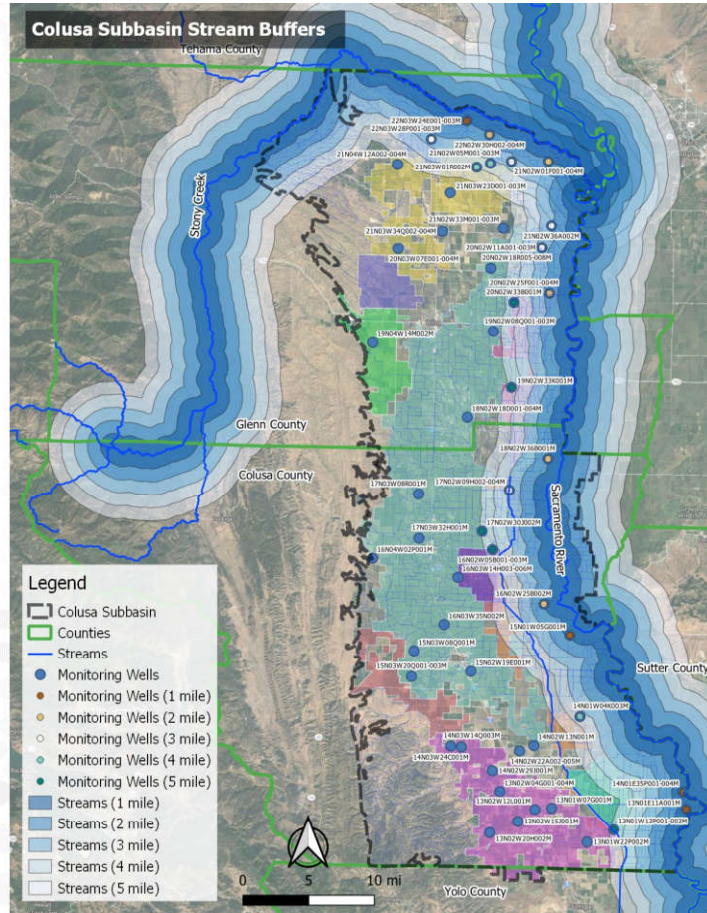
- Why? Primarily increased GW pumping to meet higher crop demands due to climate change
- Modeled values subject to high uncertainty

# Depletions of Interconnected Surface Water: Possible Approach for Near-Stream Wells

- Approach Depletions of Interconnected Surface Water using groundwater levels as a proxy
  - Stream gages are not prevalent enough to use for monitoring at this time
  - Investigate adding stream gages and appropriate GW level monitoring
- Set MTs at historical low GW levels to avoid changes to SW gain/loss relative to recent historical (2015) conditions
- Focus on key water bodies:
  - Sacramento River
  - Stony Creek
  - Colusa Basin Drain

# Near-Stream Wells

Stream buffer (miles)	Number of monitoring wells within buffer
1	4
2	9
3	14
4	17
5	22



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# Minimum Thresholds and Multiple Sustainability Indicators

- GSP must manage to avoid undesirable results for all applicable sustainability indicators and beneficial uses
- Need to simultaneously consider minimum thresholds across multiple sustainability indicators because they can be different for:
  - Groundwater Levels
  - Groundwater Dependent Ecosystems
  - Depletions of Interconnected Surface Water
- GSP by necessity will need to manage to keep conditions above the shallowest of the minimum thresholds at each monitoring well

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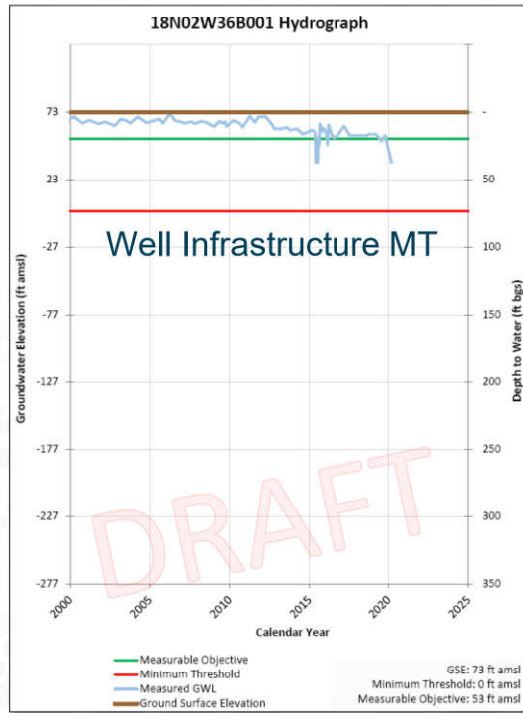
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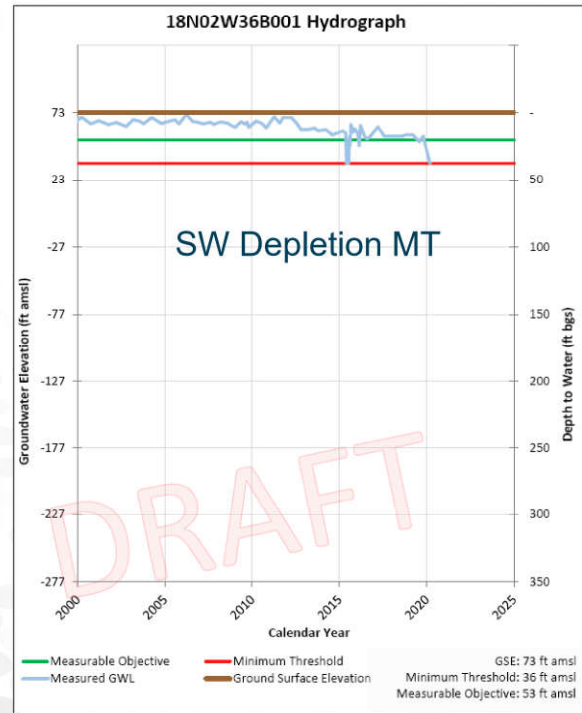
# Multiple Sustainability Indicator Minimum Thresholds

- Surface water depletion MTs are shallower than well infrastructure thresholds



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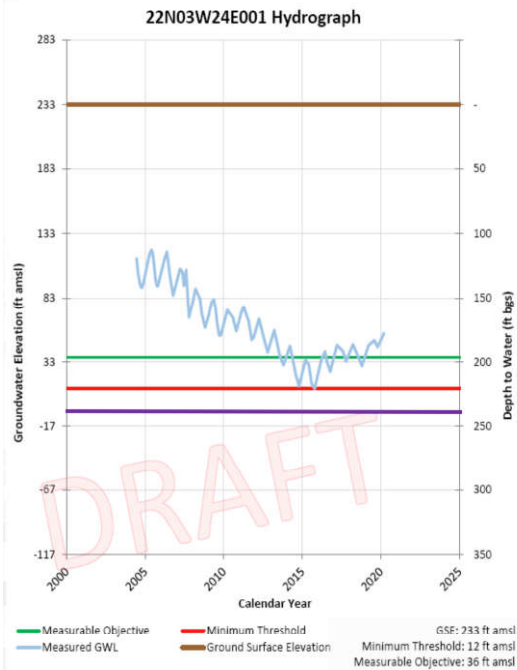
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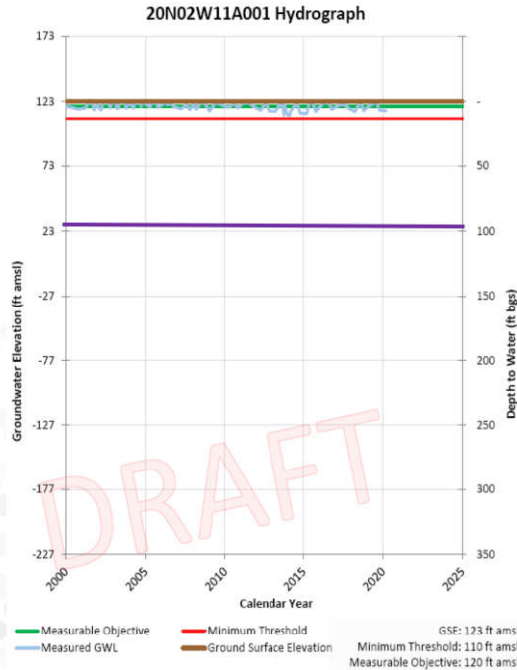
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# Depletion of Interconnected Surface Water

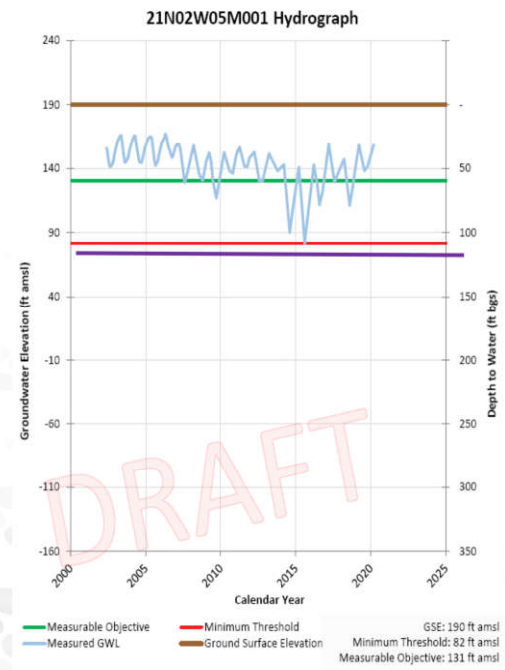
- Example Hydrographs



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# Summary and Discussion

- Additional monitoring needed to improve understanding
  - Potential regional approach across Sac Valley subbasins
- MTs based on streamflow depletion are higher and more constraining than those for GW levels
- MTs based on recent historical GW levels would:
  - Allow future GW operations to be about the same as historical
  - Prevent changes in streamflow accretion/depletion relative to historical (avoids significant and unreasonable effects)

## 4.c. Projects and Management Actions (PMAs)

# Projects and Management Actions (PMAs)

- Last addressed at 11/13/20 Joint TAC meeting
  - Reviewed approach to identify, describe, and select PMAs for inclusion in the GSP
- Draft Chapter 6 due for review by July 16
- Targeting completion of technical work by mid-June
- Joint TAC Meetings
  - April 9 (today): Review initial project list/solicit input
  - May 14: Project details and ranking
  - June 11: Adopt recommendation on selected PMAs

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## PMAs - GSP Regulatory Requirements

- GSP must include projects and management actions (PMAs) “.. to meet the *sustainability goal* for the basin in a manner that can be maintained over the planning and implementation horizon.” (§ 354.42)
- Sustainability goal must “... ensure that the basin will be operated within its sustainable yield...” (§ 354.24)
- Information Required (§ 354.44) :
  - List of proposed PMAs
  - Measurable objective(s) that will benefit from the proposed PMAs
  - Description of conditions triggering implementation and decision process
  - Other details

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# General Project Types

- Recharge
  - In-lieu groundwater recharge
    - Existing conveyance and distribution infrastructure
    - New conveyance and distribution infrastructure, if needed
  - Direct groundwater recharge
    - Winter flooding of ag lands
    - Recharge basins
    - Recharge wells
- Reductions in non-beneficial consumption
- Recharge water supply sources
  - Sacramento River: full use under existing CVP contracts, water transfers, Section 215 water (unmanaged flood flows)
  - Stony Creek
  - Small, local watersheds

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# Initial PMA Inventory (Project List)

- Solicitation for PMA ideas via this [Google Form](#)
  - PDF and Word versions of form on CGA and GGA websites
  - Only one response received to date, possibly another coming
- Sources of project information
  - Existing projects that could be scaled up
  - Previously identified projects
  - Team-identified projects
  - TAC-suggested projects
  - Other
- Focus on projects that could help address areas with sustainability concerns

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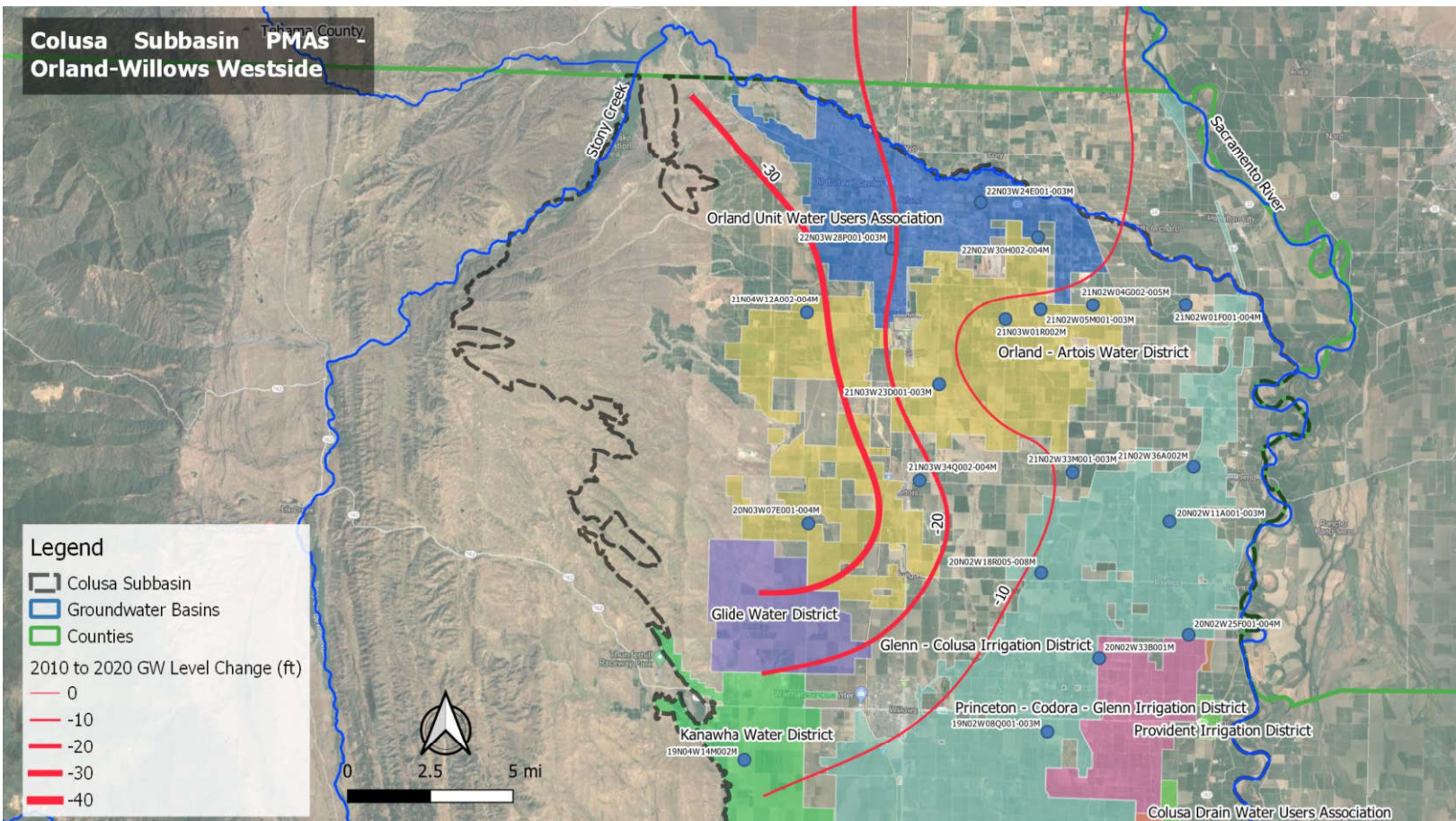
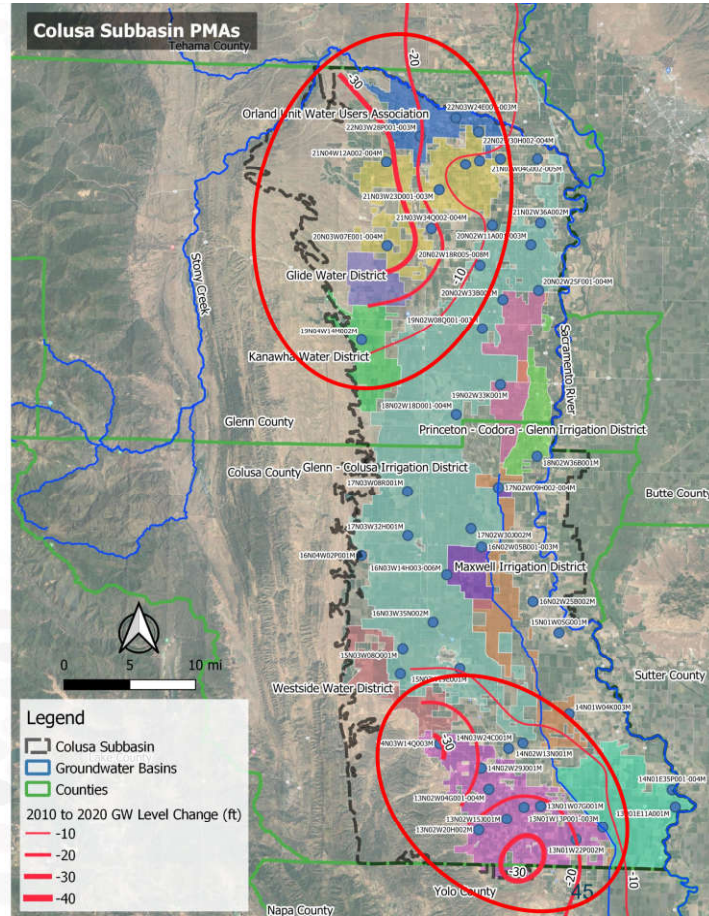
# Areas with Sustainability Concerns

- Orland-Willows Westside
- Williams-Arbuckle Westside

Average 2010 to 2020 change in GW elevation. Source: <https://sgma.water.ca.gov/webgis/?appid=SGMADataViewer#gwlevels>

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# Orland-Willows Westside

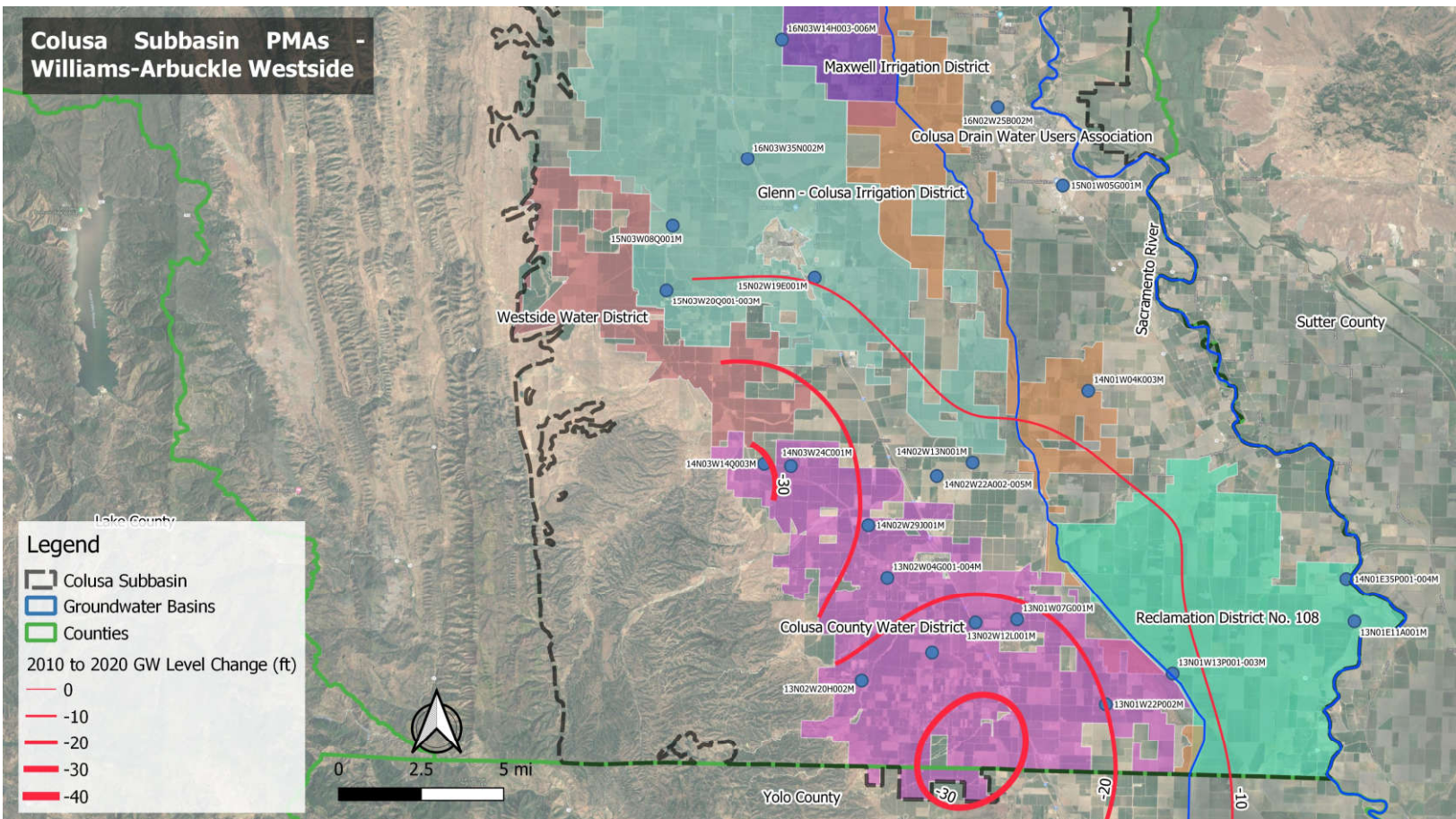
- Existing infrastructure
  - Orland-Artois, Glide, and Kanawha Water Districts, Orland Unit Water Users Assn
- In-lieu recharge
  - Within existing service areas
  - Service area expansion
    - OAWD service area “in-fill”
    - Annexations (subject to system capacities)
- Direct recharge
  - Winter spreading on ag lands
  - Voluntary, incentive-driven participation

Many potential configurations

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# Williams-Arbuckle Westside

- Build on existing arrangements/agreements
- Existing infrastructure
  - Westside and Colusa County WDs
- In-lieu recharge
  - Within existing service areas
  - Service area expansion
    - Annexations (subject to system capacities)
- Direct recharge
  - Winter spreading on ag lands
  - Voluntary, incentive-driven participation

Many potential configurations

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## Other Identified Projects

- 1) Multi-benefit On-farm Managed Aquifer Recharge/FloodMAR
  - CGA & GGA partnerships with TNC
  - Increase direct recharge
  - Environmental benefits
- 2) GCID Main Canal Regulating Reservoir
  - 30,000 to 40,000 AF regulating reservoir on CBD
- 3) Invasive plant species (Arundo) eradication
  - Reduce shallow GW consumption
- 4) Sacramento River Water Treatment Facility
  - Treat and deliver high quality drinking water to small communities currently using poor quality groundwater
- 5) Orland Unit Water Users Assn Recharge
  - Direct recharge of Stony Creek high flows in creeks, ag lands, and dry wells
  - Could be integrated into Orland-Willows Westside project configurations
  - Other projects to be identified

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## **PMAAs - Next Steps**

- Continue to identify viable, effective project concepts
- Use model to establish scale of recharge needed
- Estimate recharge water sources, quantities and timing
- Develop and evaluate alternative projects needed to achieve and maintain sustainability
- Develop project descriptions for GSP

## **5. Topics and TAC Decisions for Next Meeting**

# May 14, 2021 Joint TAC Meeting Topics

- Sustainable Management Criteria
  - Make TAC recommendations to GSA Boards for GW levels, GW storage GDEs and streamflow depletion
- Projects and Management Actions
  - Conceptual project configurations
  - Model results (sustainability benefits)
  - Initial cut at most promising projects

## Discussion