



CORRESPONDENCE

VINA STAKEHOLDER ADVISORY COMMITTEE

-----Original Message----- From: jimb@aqualliance.net <jimb@aqualliance.net> Sent: Wednesday, June 17, 2020 1:39 PM To: Buck, Christina <CBuck@buttecounty.net> Subject: interbasin flows

Hello Christina,

Most of the Scientific discussion defines “interbasin flows” as groundwater exchange between different watersheds. SGMA discussions however apparently use the term to describe groundwater flows between adjacent management sub-basins that are within a shared watershed; in our case the greater N Sac Valley watershed. I could find no clear reference to "boundary flows".

Correct, “boundary flows” was defined by Byron for the purposes of these preliminary water budget results for Vina due to the limitations of the BBGM. As presented, the boundary flow is the combination of subsurface flows and accretions/losses from the Sac River to or from the groundwater system. We are still working on how to address the western boundary and characterize it satisfactorily for the water budget, but also in keeping with the limitations of the BBGM since the boundary of the subbasin and location of the Sac River is the same as the boundary of the model domain. I would say we’re not there yet. One of the most important things is that the approach we take allows for reasonable comparison with what other regional models are suggesting.

In the GSP regulations, DWR recognizes that groundwater conditions in one basin may be affected by groundwater management practices in adjacent, hydrologically-connected basins. Each GSP must demonstrate that management activities within a basin will have no adverse impacts on sustainable management of adjacent basins. Therefore, it is important that agencies planning to develop and execute GSPs understand the hydrologic connections between adjacent groundwater basins and how different groundwater models deal with subsurface flows across those boundaries. [Right, this is all very relevant for the Sac Valley groundwater subbasins...](#)

Regional models are preferred to coordinate between close GSAs. As of 2016 DWR is developing a new model of the Sacramento Valley, named the Sacramento Valley Simulation Model (SVSim), but it was not complete at that time. SVSim is being developed to evaluate water transfer projects in the Sacramento Valley, and will be more refined than the fine grid version of C2VSim, both in terms of horizontal and vertical discretization and input datasets. Has this model been

completed and calibrated? Would a model created by DWR to facilitate water transfers be trusted and reliable to meet our goals? Is it possible to extend the BBGM into Glenn and Colusa counties? My understanding is that a beta version of SVSim is recently available. I have been urging DWR to make this model available to support GSP development in the Sac Valley for at least a year. Due to the objectives for which SVSim was originally developed (understanding water transfer impacts on stream depletions) I think it is definitely a tool to look at to evaluate boundary flows and stream/aquifer interactions. I understand Tehama County subbasins have recently selected it as the model to support their GSP development. I think this is great news. It was not available at the time Basin Setting work was underway in the other subbasins in the NSV region so we have moved ahead with BBGM, and Colusa and Corning subbasins have opted to use C2VSim-Fine Grid. There is some strength in having different modeling tools being used in the region since they each have different strengths and weaknesses. But it will require some technical coordination to understand how the model results are the same and how they differ and why. It's not possible to extend the BBGM into Glenn and Colusa counties at this time. The BBGM is currently dependent on C2VSim-Course Grid results to characterize groundwater heads along the western boundary. We can look to results from SVSim and C2VSim-FG to evaluate boundary flow and interaction of the Sac River with the groundwater system and then potentially refine BBGM to be more consistent with that if needed.

Article 8 of the GSP regulations describes interbasin agreements, which are OPTIONAL interagency agreements for hydrologically connected basins.

I will be encouraging the VGSA to negotiate such agreements with our honorable neighbors. These interbasin agreements are to include an estimate of groundwater flow across basin boundaries developed using consistent and coordinated data, methods and assumptions; estimates of stream-aquifer interactions at the boundary; and a common understanding of the hydrogeology and hydrology of the basins. Since the VGSA is adjacent to GSAs that plan on engaging in water transfers that may openly or covertly make use of groundwater to make surface water available the SHAC must have both understanding and confidence in the interbasin flow models/analysis to fulfill our charge to provide the VGSA board with well informed advice.

Interbasin coordination has begun amongst GSA managers from Tehama County subbasins (roughly Red Bluff) south to Sutter and Yolo subbasins. We looked at the requirements of the interbasin agreements and agreed that 1,2, and 3 under the Technical information is a good and doable approach for coordinating at this time.

I am writing to ask for clarification of interbasin flow information that has been presented.

1. Are "boundary flows" the movement of surface water (including very shallow streamside GW) into adjacent GSA territory?

Let me see if I can clarify a bit. Groundwater can "get out" of the basin two different ways along the boundary between Vina and Corning subbasins. 1. Water can move from the groundwater to the river

and become flow in the Sac River (stream accretions) or 2. groundwater can flow from Vina to Corning in the subsurface (interbasin outflow). Likewise, it can “get into” the Vina subbasin along that boundary in two ways: 1. Water from the Sac River moves into the groundwater system (stream losses), 2. groundwater can flow from Corning to Vina in the subsurface (interbasin inflow). Byron defined “boundary flows” as the combination of these two processes. That’s because subsurface flow and stream gains/losses are both dependent on the groundwater head at the river/boundary. Since the model boundary coincides with the subbasin boundary/river, all these things are tied closely to one another and interact. They are interdependent on one another and therefore hard to accurately tease apart. We are still thinking about the best way to deal with this and report out water budget numbers that best reflect what’s physically happening, but that also respect the limitations of the model.

2. How are the Colusa interbasin flows of 261K A/F into Butte Basin [slide 17 of the Butte Basin setting presentation] compatible with the 200K A/F outflow from the Butte Basin to Colusa and the 56K A/F outflow from the Vina to Corning [slide 16 of the Vina setting]? I don’t know the answer to this specifically. I’ve passed this question on to Byron so he can help explain it.

I understand the movement of GW in a S-Westerly direction but the Easterly flow from Colusa seems possible only if Butte GW pumping is creating a gradient that allows gravity to pull water in our direction.

I actually recently came across documentation in a report that describes how geologic features in the southern part of the Butte subbasin (Willows fault, Colusa dome and Sutter Buttes) affect the direction of groundwater flow in that area:

These structures cause a deviation in the typical regional direction of groundwater flow which is toward the Sacramento River from the northeast to the southwest and from the northwest to the southeast. However, in the area of the Gray Lodge Wildlife Refuge north of the Sutter Buttes, groundwater flow takes an anomalous path and converges toward the Butte Sink. Groundwater from the central portion of the Butte subbasin flows southwestward, while groundwater from the Sacramento River flows southeastward and eastward. The converging groundwater flow in this area is structurally controlled due to the intrusion of the Sutter Buttes to the east and the buried Colusa Dome to the west (DWR 2005).

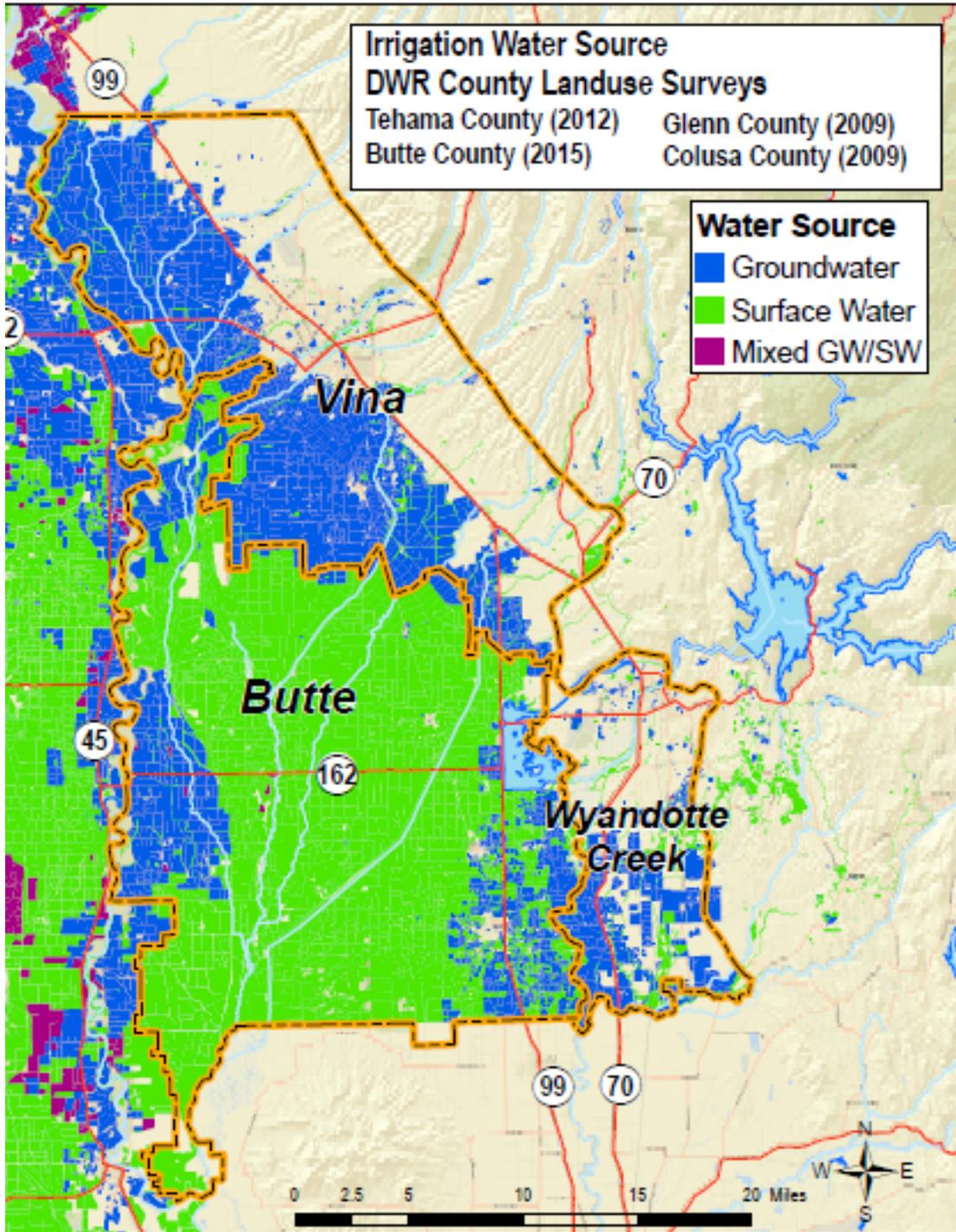
All this to say, I think we would mostly expect relatively little flow across the Butte-Colusa subbasin boundary since generally the flow of groundwater in that area would be in a southerly direction and largely perpendicular to the subbasin boundary line. However, locally groundwater flow directions can change and depending on where the boundary line is in relation to those local conditions, interbasin

flows result. The map below does show a groundwater dependent area of Glenn county within the Butte subbasin (area in blue near the boundary)...perhaps there is some boundary flow from west to east in that area?? Just a guess at this time. We would need to dig into the details a bit more from the BBGM results to see if that's the case. And even better would be to look at results from C2VSim-FG and SVSim.

The technical team and I are still going to take some time to understand these issues you raise better. They are important to understand and clarify. Sorry I don't have the answers yet, but continue to stay tuned.

Thanks for helping me participate in a meaningful way to SGMA.

Jim Brobeck, V-SHAC member



Christina R. Buck, Ph.D.
 Assistant Director

Dept. of Water and Resource Conservation
 Butte County

308 Nelson Avenue
Oroville, CA 95965-3302
Off: [530.552.3593](tel:530.552.3593)
Cell: 530.864.6057
cbuck@buttecounty.net

-----Original Message-----

From: jimb@aqualliance.net <jimb@aqualliance.net>
Sent: Wednesday, June 24, 2020 12:04 PM
To: Buck, Christina <CBuck@buttecounty.net>; Byron Clark <byron@davidsengineering.com>
Subject: projected climate change scenarios

Dear Colleagues,

I have expressed concern that the assumptions presented in the 2030/2070 climate change scenarios do not include the potential for multi-decade drought (mega drought).

A new PPIC article, California's 21st Century Megadrought (Jeffrey Mount, Michael Dettinger) gives me reason to continue to pursue this line of thought.

[https://urldefense.com/v3/__https://www.ppic.org/blog/californias-21st-century-megadrought/__;!!KNMwiTCp4spf!VgmAPBV9Iwo43XU_Tff3PgWWizOmzgw8CU_JJo2Cd62So0AGa53M6bhJsG0-Hj0EM8\\$](https://urldefense.com/v3/__https://www.ppic.org/blog/californias-21st-century-megadrought/__;!!KNMwiTCp4spf!VgmAPBV9Iwo43XU_Tff3PgWWizOmzgw8CU_JJo2Cd62So0AGa53M6bhJsG0-Hj0EM8$)

"A recent paper on climate change in California and the West has been in the news and raising concerns. Based on extensive analysis of tree ring data—a good measure of summer soil moisture—the authors postulate that most of the region is in an unfolding “megadrought” that began in 2000 and is the second worst in the past 1,200 years.

What does this mean for California water management? If the state is in a megadrought, it means a great deal. We should plan accordingly."

Are California water analysts/modelers/managers going to include Megadrought as we present different scenarios?

Thanks for your consideration.

Jim Brobeck

From: "Gosselin, Paul" <PGosselin@buttecounty.net>

Subject: FW: calendar, public comments

Date: July 23, 2020 at 9:48:29 AM PDT

To: Jim Brobeck <jimb@aqualliance.net>

Cc: "Buck, Christina" <CBuck@buttecounty.net>, "Peterson, Kelly" <KPeterson@buttecounty.net>, Tania Carlone <tcarlone@cbi.org>

Hi Jim

We have prepared responses to the questions you raised.

Dear Colleagues,

I was looking forward to meeting with the SHAC next Tuesday July 21 as listed on the VGSA website but I am now informed that the next meeting is in August. I urge the staff/consultants to keep the web pages current.

[Response: The Vina GSA website has been updated.](#)

The Water Solutions for July explains: "Public review documents will include the draft Basin Setting chapter which includes the hydrogeologic conceptual model, groundwater conditions, and water budget information for the subbasin. Significant portions of the Monitoring Network chapter will also be made available for review. Once available, the draft chapters will be posted to the subbasin's website and a notice to all interested parties will be sent to inform stakeholders of the 30-day comment period."

The time spent in the SHAC discussing these items was too short and I have sent several comment letters to Christina concerning the BGSA/VGSA discrepancies in inter-basin flow, the importance of identifying vertical flow patterns between aquifer levels, the inadequate network of shallow aquifer monitoring for GDEs, the need to include analysis of potential long-term drought predicted by paleo-climatologist and highlighted in a recent PPIC article.

Will the draft be expanded to include these suggestions?

[Response: The comments you submitted regarding the inter-basin flow issue are being considered as part of the upcoming revisions. Although many of the comments will be addressed in the revisions, some will require more time and analysis. For example, it is likely the Western Boundary and how it is handled may be identified as a data gap in the GSP. The interbasin collaboration which is underway will also feed into better understanding of boundary issues and water budget estimates \(which should show up in the final GSP or interbasin agreements\). Vertical gradients is a section of the groundwater conditions drafts. It's likely this remains an identified data gap as well \(in part due to limited shallow monitoring as you have also pointed out\).](#)

[Regarding the paleo drought, although not explicitly addressed in the Basin Setting work as a paleo-drought scenario, the historical and scenario water budgets give us lots of numbers from model output to potentially explore further for additional context when developing SMCs. I should note that the papers you provided indicated that the current period \(2000-2018\) is one of the most severe "mega-droughts" in a millennia. We can build upon the water budget from the current severe hydrology and the climate change scenario which accounts for increased severity of wet and dry periods to guide the](#)

sustainable management criteria. This is a specific topic that I would like to see the SHAC weigh in on more specifically.

The Draft GSP chapters to be released shortly will not include the GDE analysis. This portion of the GSP is on a different timeline and be handled separately. The draft timeline for future GDE analysis milestones and review by the public will be presented to the GDE Working Group during the next meeting.

When will to documents be released for 30-day public comment?

Response: We are currently shooting for the first week of August. As always, this schedule is tentative but we realize we need to get these out the door and are pushing hard to do that.

What happened to the promised investigation into the consequences of artificial recharge?

Response: As discussed at the June 18th SHAC meeting, the project was put on hold due to budget issues. The department is hoping to restart the project if funds become available. In the meantime, the issues and questions that were developed as part of the project will be used as a guide to evaluate specific projects as they are presented.

How are the GDE committee meeting proceedings being recorded/incorporated and will VGSA SHAC and Board members be notified of the meetings (the committee/meetings are not mentioned in the newsletter or calendar)?

Response: Any of the input provided by the GDE Working Group will be taken by staff for possible modification to the GDE effort. The working group is not a standing committee nor is it subject to the Brown Act. The value of the working group is to provide staff with input prior to having the GDE draft be presented to the public, advisory committees and GSA Boards.

Thank you.

Paul

From: jimb@aqualliance.net

Subject: Vina, Butte Basin setting process

Date: August 10, 2020 at 3:10:29 PM PDT

To: Christina Buck <cbuck@buttecounty.net>

Cc: Paul Gosselin <pgosselin@buttecounty.net>, "Peterson, Kelly" <KPeterson@buttecounty.net>, Tania Carlone <tcarlone@cbi.org>, Byron Clark <byron@davidsengineering.com>

Christina,

Last week I received an email from a SHAC member announcing a SHAC web meeting on the same day/time as the VGSA meeting followed by a notice of cancellation. Kelly explained that the SHAC member thought he was pressing a "calendar" tab but accidentally pressed something else. I am concerned that people will be so confused that they will miss the board meeting. I hope there will be a follow-up announcement with links for the board meeting on Wednesday. How is the general public being informed? I know people on the Water Solutions mailing list that have not been reminded by email about the meeting and I have seen no media announcements. Since our basins are not "critically" overdrawn we should press DWR for deadline extensions that allow for full public participation in the process.

I am reviewing the Vina and the Butte Basin hydrologic setting documents. The draft basin setting

tracking tables should have been separately labeled with the Butte Basin, Vina, Wyandotte GSA designations for those of us that are planning on submitting comments.

The Butte Basin setting draft should have numbered lines like the Vina draft for clarity of comment tracking and consistency.

My questions about the interbasin flow volume discrepancy remain unanswered. The draft author (Davids Engineering?) replaced the contradictory interbasin flow data in the initial Butte and the Vina drafts with the following data-less paragraph:

"Interbasin flows are dependent on conditions in adjacent basins. It is recommended that GSAs refine estimates of subsurface groundwater flows from and to neighboring basins through coordination with GSAs in neighboring basins during or following GSP development and through review of modeling tools that cover the Sacramento Valley region, including the C2VSim and SVSim integrated hydrologic model applications developed by DWR."

County staff has advocated for artificial recharge since the days of Ed Craddock, despite extensive past and present opposition and significant legal water rights issues. Staff and consultants continue to do so by shepherding the Tuscan Water District intention to facilitate expanded conjunctive use to experiment with in-lieu recharge. The efficacy of artificial recharge and the ability to achieve sustainable goals would be predicated to some extent on how groundwater flows between GSA "basins". The initial basin setting graphs and maps are not in the draft documents, but may still indicate the assumptions of water purveyors in these GSAs and beyond.

Jim Brobeck

From: "Buck, Christina" <CBuck@buttecounty.net>
Subject: RE: Vina, Butte Basin setting process
Date: August 11, 2020 at 3:24:45 PM PDT
To: "jimb@aqualliance.net" <jimb@aqualliance.net>
Cc: "Gosselin, Paul" <PGosselin@buttecounty.net>, "Peterson, Kelly" <KPeterson@buttecounty.net>, Tania Carlone <tcarlone@cbi.org>, Byron Clark <byron@davidsengineering.com>

Hi Jim,

The confusing emails only went to SHAC members and Kelly sent a clarifying email. All the meeting materials are posted on the Vina GSA website. All SGMA related meeting notices go out to our SGMA Interested Parties email list. If someone isn't sure what email lists they're on, they can contact Autum in our office.

Good catch on the line numbers not being in the Butte Basin Setting document. We are in the process of fixing that.

The tracking table is generic. I hope you and others will save subbasin specific comments in separate tracking sheets. Per the email notice and website information, the comments are submitted to three different email addresses that are subbasin specific. If you have comments that apply to all three, feel free to indicate that and they will be compiled under each of the three sets of compiled documents.

I will include your final paragraph with comments received on the Basin Setting drafts. The interbasin

flow discrepancy is still on my list of items needing clarification.

Best,
Christina