This SMC overlaps a lot of different interests. I know some of the Board members will be very interested in this.

Initial Work Group Feedback on Information Needs and Data Gaps

Sam Magill mentioned main points heard from meeting attendees before the meeting:

- Concern about selection of 2015 as baseline year
- Need to connect groundwater levels to interconnected surface water impacts
- Their organizations have already put together approaches on this SMC; staff has received the documents and will look at them.

Overview of Interconnected Surface Water (ISW) and Groundwater Dependent Ecosystem (GCE) Mapping Efforts

Andy Rich, Sonoma Water presented the mapping of interconnected surface waters in Sonoma Valley and Santa Rosa Plain; there is limited data available for Petaluma Valley. Interconnected surface water is defined in the GSP regulations as surface water that is hydraulically connected at any point by a continuous saturated zone to the underlaying aquifer and overlying surface water is not completely depleted. A surface water body may be connected to groundwater during some periods and disconnected during other periods.

Questions/Comments

Rick Rogers – For the Sonoma Valley Basin, what specifically informed the determination of "interconnected surface water", i.e. the blue lined map?

Rich – Basically, a combination of different factors which allowed us to decide at various times and various times of the year. We didn't choose any one line of evidence, it required self-corroborating lines of evidence to allow us to choose.

Rogers – In Sonoma Valley it sounds like you are going to have a USGS groundwater surface model, are you planning on incorporating that into your determination of interconnected reaches, or have you already?

Rich – For Sonoma Valley, we already have a groundwater flow model, but we are opting to work with actual observations of groundwater exchange/seepage runs.

Rogers – So with the seepage runs, it looks like one run was done in May, are they done at different times of the year and is the data variability factored in?

Rich – The seepage runs generally are done on semi-annual basis and the major reaches perform the seepage runs monthly. 2010 and 2013 are the earliest time periods we had the seepage runs performed. Starting in 2016, we started to more aggressively do seepage runs as described.

Rogers – When looking at and factoring in seepage runs, was there any consideration of current groundwater impacts in a reach impacting seepage runs? Seems there is a gap of no seepage below Glen Ellen for a distance. Is it due to a geologic phenomenon, or is it a result of excessive unsustainable groundwater pumping in the area?

Rich – I think it is more of a presentation issue. Or maybe during this seepage run that area wasn't measured or included. Generally, seepage runs are being performed along most reaches of Sonoma Creek

Rogers – In other areas, was there consideration for current groundwater pumping impacts and how they are affecting seepage rate?
Rich – No.

Boland-Brien – Some streams are losing in March 2017 and some are gaining in March 2017. I wonder, shouldn't there be some consistency in such a wet year?
Rich – The real hydrologic process going on where maybe the stage increase exceeded the groundwater level increase causing the stream loss or just the basic issue with an error in stream gage measurements. We try to account for error in the calculations.
Boland-Brien – What is the total flows that this delta is based on?
Rich – It is labeled on there so net seepage is the delta CFS.
Boland-Brien – That is the delta, what are the absolute values?
Rich – It varies from 1 to 1000 CFS in a couple years.

Val Zimmer – Is the baseline analysis high resolution enough to analyze no flow actions such as restoration to ameliorate stream incision or groundwater recharge projects? Seems groundwater pumping may be impacted at certain times of the year (ag). If someone were to initiate a small- or large- scale recharge project would this baseline be sufficient to analyze the success of either of those kinds of projects?
Rich – Are you asking about how we address the SMC or a general question?
Zimmer – I am brainstorming a little bit.
Rich – The datasets would be useful to understand the various projects or actions, but I don't know about the resolution.

Boland-Brien (chat) – I t would be helpful to think about SMC in the context of what might be done to manage those SMC.

Rogers – As far as the protocol you are using and results being generated, will they be put in a draft chapter or memo so we can comment?
Rich – I have a write-up we can share.

Maurice Hall – The process you described so far is a process by which you have used to define where there is interconnected surface water? Would be helpful to access documentation to help digest the material.
Rich – Yes.

Marcus Trotta followed with an update on Groundwater Dependent Eco-systems in the three basins and presented staff's proposed approach for GDE mapping and next steps.

Questions/Comments

Rogers – What time of year was the "30 feet depth to groundwater" measured?
Trotta – Those maps were based on springtime water levels.
Melissa Rohde – Which year?
Trotta – It varies by basin, either 2015 or 2016, I can follow up and let you know.

Possible Approaches for Developing SMC

Marcus Trotta shared existing data and said the objective was to identify opportunities for using shallow groundwater wells as a proxy for setting minimum thresholds for depletion of surface water. We feel incorporating groundwater data into this SMC is very important. Trotta introduced Stephen Maples, a recent hire at Sonoma Water, experienced with groundwater-surface water interaction.

Stephen Maples walked through his presentation with a look at how we can leverage measurements and models to characterize groundwater/surface water interactions and surface water depletion.

Outstanding Questions and Next Steps:

1. Are (1) simulated/observed heads in good enough agreement and (2) the regression relation robust enough to perform this assessment?
2. Can a regression be developed to assess other metrics, like duration of interconnection?
3. Are different regression relations needed for different periods within a year (i.e. wet/dry periods)? Or for different water year types?
4. What is the best approach for assessing the contribution from groundwater pumping? Differencing multiple simulations?

Questions/Comments

Rohde – I like the approach in terms of characterizing hydrologic variability, how do you bring it back to defining what an Undesirable Result is? With SGMA we are supposed to ensure groundwater pumping isn't affecting beneficial uses of groundwater. How do we integrate that into the assessment to ensure we aren't causing significant and unreasonable impacts?

> Maples – A lot of the choice or Minimum Thresholds and Measurable Objectives comes down to the Advisory Committees and Boards. It is a question we have too.
>
> Trotta – It comes to identifying what are significant and unreasonable conditions. Varying opinions would be helpful to hear from you on the specific insights on significant and unreasonable conditions that may have occurred in the past or what things you want to avoid in terms of surface water depletion due to groundwater pumping impacts to beneficial users.
>
> Rohde – Cautionary advice, if we don't measure potential impacts on groundwater use to the Board, they aren't going to be able to make a decision. At this point, we should clarify what the cause and effect relationships could be and what measures we could use to assess if groundwater conditions are adversely impacting various beneficial users.
>
> Trotta – Thank you, that is helpful.

Boland-Brien – I would probably say it stronger than "caution". I got very lost in the last few slides of the presentation as to *why* it is being done. It is missing the *why*. Maybe we are jumping too fast from local to regional, what are the impacts you are trying to consider? I would like to hear from the others what is undesirable and what is reasonable and insignificant.

> Maples – I think the reason why we are looking at pairing local data is using groundwater levels as a proxy. Groundwater-surface water interactions are difficult to measure explicitly. They are being measured in Sonoma Valley by doing differential gaging to look

at the actual loss from one location to the next location or gain of water. Other than doing that, you can't really measure the process directly. By developing the relationship between the groundwater head – we have historical data and a quite robust monitoring network that includes it, you need to develop a relationship between and actual measurement and a response we are trying to get out of it. Thank you for the comment.
Boland-Brien – It makes sense. It may be easier to say there is a choke point in the system from migration and needs to be preserved, put the monitoring there, and that is how we are protecting the reach. It might be simpler.
Maples – Good way to think about it.

Rogers – I want to relay my agency's thoughts on using groundwater. It is a common first stab at trying to solve this problem. Concern we have with using groundwater, is that when you look at the Undesirable Results of the streamflow it's significant and unreasonable impacts of beneficial uses of surface water. When it comes to steelhead, migration, etc. variables are informed by what the habitat is in the creek that supports the habitat. If you use groundwater as a correlation there needs to be some linkage between the groundwater level threshold and what that means to the streamflow level in the creek and how that stream flow levels protect habitat. Without the linkage, there needs to be significant correlation. What could be potential habitat condition thresholds, e.g. fish rearing habitat, we have a lot of studies in Sonoma County on low summer flows. If you disconnect stream reaches and de-water ripples, that is a threshold condition for juvenile salmonae. That is the kind of threshold that needs to be worked into whatever proxy you are using as a threshold level.

Maples – Thank you for that comment. It is the question we have for all of you. Looking at how much of the contribution comes from groundwater and looking at the change in contributions, especially if paired with additional analyses performed on certain reaches, it would help further inform decision making around measurable objectives.
Rogers – I think everybody understands whatever the level within the creek needed to avoid Undesirable Results that is a level impacted by groundwater pumping and surface flow diversion. The purpose is to identify it. SGMA is looking at impacts of groundwater pumping. What we can do is identify the component that SGMA is responsible for and look at other avenues that surface water diverters are having.
Trotta – Identifying the component that is surface water depletion is due to groundwater pumping, we recognize that as an important component for us to characterize. To the extent you can point us to any data points that would be helpful for us to identify habitat conditions that should be considered, would be very helpful.
Jasperse – This isn't really about sorting out the impacts of surface water and groundwater pumping. Groundwater wells can have surface water rights too and leads to complexity of sorting out the obligations of the GSA. It may change and needs to be considered.

Georgina King – I want to ask Rick Rogers if he can point us to a place where studies have been done where groundwater contribution is calculated. In lieu of any measured data we have, if you can respond to if there are any known studies that can throw out the groundwater contribution.

Rogers – I was speaking mainly of studies of habitat and flow levels. As far as trying to figure out how much groundwater is depleting surface water, I have never done that. I

think the groundwater-surface water model is trying to do that. A lot of the GSAs haven't been collecting this data. I think we will have to use the groundwater-surface water model; we will be hamstrung for the first few years. By the end of the 20-year period, we will have gathered more data and have a much better idea of what is going on. We won't have the answers at the get-go.

Hall – The analysis does a great job describing the connection of groundwater levels and stream flow. One would envision if you can maintain the groundwater level at the purple line, if the same things happens in the future, the groundwater wouldn't affect the stream flow any more than it was negatively affecting it when you first establish a negative issue. It fills in some of what some of my work colleagues call the multiple lines of evidence. My compliments to the analysis. It is another signal to me that Sonoma County has done a lot of work in this realm, sets a good bar and is a good educational tool. I am supportive of the analysis you have done.

Natalie Stork – A lot of good work has been done. It is great to have these analyses and to see what you are proposing. How does it relate to actual conditions in the basin? The concept of the 2015 baseline - the statute doesn't require GSAs to address conditions prior to January 2015. It might be something to consider when trying to relate impacts in the basin back to beneficial users. There were some great water level maps showing 2016 conditions. Is there anything for 2014 or 2015, have you had a look at those to see if depletions can be managed?

Trotta – We have data that spans across the 2015 baseline conditions. Much of the data is integrated into the models so it could be looked at as you suggest. I appreciate your comment.

Lisa Porta – A lot of discussion was focused on how you related this technical analysis to the conditions in the basin. It is always going back to the unreasonable condition and maybe that is where we can try to circle back to the significant unreasonable conditions we want to avoid before diving too much on Minimum Thresholds and Undesirable Results.

Boland-Brien – I agree with what Lisa Porta said. Generally, for the SMC, you might explore how flexible you might be. I think there are areas of flexibility, take advantage of that.

Jessie Maxfield (chat) – This may have come up at the GDE workgroup meeting, but the Department feels using 2015 as a baseline is not appropriate. This was the fourth year of a historic drought so stream depletion was already an issue and using 2015 as a baseline may not be protective of fish and wildlife.

Trotta – Thank you for all the different insights and perspectives. Bringing it back to significant and unreasonable is a critical step for us. Any input you have on that will be helpful to us. During the 2015 timeframe, I pose the question back to you – are there conditions that occurred that year that would be considered significant and you can point to?

Hall – Thank you for all the materials and good introduction. I look forward to further dialogue. Happy to respond to further inquiries by email until the next meeting.

Rohde – In addition, 2015 is only one year. We need multiple years of data to characterize groundwater conditions here in California's Mediterranean climate.

Maxfield – The baseline should not be a point in time but based on habitat conditions.

Rogers – Re the 2015 baseline, the way we look at it, we are urging caution to use it as a baseline – it was during the height of the drought and it likely represented poor conditions for stream flow and instream habitat. When you are implementing your plan and need a federal permit, we are going to have to do a separate consultation and the plan. Our analysis of the plan is going to come in. If it is based on 2015 impacts on streams, it is likely to be a concern. Whether it leads to a jeopardy situation or adverse pond determination, it is a possibility. I am not making a pre-determination; I am just saying people should be aware of it.

David Manning, Sonoma Water – I am not hearing we have the ability for the model tell us the ripple effects related to groundwater pumping. Are we trending away what could be a likely impact on stream flows but not determining what that level is?

> Maples – The groundwater models developed and resolution they are at, they can't resolve specific ripples and disconnecting - they can tell us the regional response.
> Rogers – I think I get the gist of what you are explaining, I think we are on the same page. I realize that in the startup of the GSP for the first few years, we won't have all the answers. I would like to see a plan in the GSP to acquire the data so we can refine the model and have what we need at the end of the 20-year period.
> Manning – That makes sense. Linking the mod should be part of the plan.
> Stork – A lot of the data can be used to manage the SMCs. I think there is a lot in the model that can be used especially after a few more model runs. Folks are bringing up good points about using the models for specific ripples, but a lot can be done to get started.

Initial Discussion of Monitoring Methodologies and Approach

Marcus Trotta put this item on the agenda to get meeting participants thinking about it. We are initially thinking about using shallow wells as a proxy for specific SMCs. Initially we are hoping we can rely on some of the shallow monitoring wells as a proxy for the specific SMC. It is a good subject for the next work group meeting. If you have any ideas for monitoring methodologies and approaches, send them to staff.

Questions/Comments

Manning – The remote sensing concept is fantastic. Great to see how the conditions exist for species at a critical time of year.

Zimmer – If you are looking at additional monitoring or locations for groundwater monitoring or stream gaging, it might be good to think about areas that are critical for species and targets for restoration that reduce impacts for groundwater pumpers; either high value or target areas to improve streamflow conditions.

> Trotta – That is helpful. In terms of GSP projects, they will be developed in the next six months as we wrap up the sustainable management criteria development.

Review Meeting Action Items and Discuss Scheduling

Marcus Trotta thanked the folks for attending and for the helpful input. We are looking at wrapping up some of the other work groups and will bring back information to you. We will take the input we received today and will put together a more built-out approach for establishing Minimum Thresholds and Measurable Objectives and how to characterize significant and unreasonable conditions for our next meeting.

Jay Jasperse said he appreciated the input and discussion. I agree putting our technical approach around the statement of significant and unreasonable conditions is essential. I am interested as we dive into more of the technical methodologies, one of the SMCs, seawater intrusion, don't have enough data, so we are going with an initial placeholder. I will be interested to see how this process works out as we examine data quality. I look forward to future discussions.

Sam Magill said an email would be sent out on next steps and to schedule a next meeting date. Today's slides are available at https://gcc02.safelinks.protection.outlook.com/ap/p-59584e83/?url=https%3A%2F%2Fmysacstate-my.sharepoint.com%2F%3Ap%3A%2Fg%2Fpersonal%2Fs_magill_csus_edu%2FEQ1pXkf1CXxLm6B3omBC_p8B1gM_LDl2V9ZVdeb9DApC_g%3Fe%3DRBT3p2&data=02%7C01%7CSimone.Peters%40scwa.ca.gov%7C93a0761f57ae45bc3fac08d86edec512%7Cc93b7179f57841648fe1c2704c730887%7C0%7C0%7C637381250356972267&sdata=ilRigCKbextB8Ziy092%2BBJqJ7%2F0yl53LmlX2bf26KQY%3D&reserved=0

Attendees

Jessie Maxfield, CA Department of Fish and Wildlife
Natalie Stork, State Water Resources Control Board
Val Zimmer, State Water Resources Control Board
Sam Boland-Brien, State Water Resources Control Board
Maurice Hall, Environmental Defense Fund
Melissa Rohde, The Nature Conservancy
Rick Rogers, National Marine Fisheries Service
Lisa Porta, Montgomery & Associates
Georgina King, Montgomery & Associates
Jay Jasperse, Sonoma Water
Marcus Trotta, Sonoma Water
Andy Rich, Sonoma Water
Stephen Maples, Sonoma Water
David Manning, Sonoma Water
Sam Magill, Work Group Facilitator
Simone Peters, Sonoma Water (recorder of meeting notes)

SANTA ROSA PLAIN • PETALUMA VALLEY • SONOMA VALLEY

GROUNDWATER SUSTAINABILITY AGENCIES

SUSTAINABLE MANAGEMENT CRITERIA FOR DEPLETION OF INTERCONNECTED SURFACE WATER

Time	Agenda Item	Materials
9:00	Welcome and Work Group Purpose Jay Jasperse, Sonoma Water	N/A
9:05	Agenda Review and Work Group Introductions Sam Magill , Work Group Facilitator All Work Group Participants	Agenda
9:15	Work Group Background • SGMA/SMC requirements and GSA role • GSP status and schedules Jay Jasperse, Sonoma Water Marcus Trotta, Sonoma Water	PPT presentation
9:25	Initial Work Group Feedback on Information Needs and Data Gaps Sam Magill , Work Group Facilitator	
9:35	Overview of Interconnected Surface Water (ISW) and Groundwater Dependent Ecosystem (GDE) Mapping Efforts • GDE Practitioner Work Group Overview and initial Outcomes • ISW mapping products and status • GDE mapping products and status Andy Rich, Sonoma Water Marcus Trotta, Sonoma Water	PPT presentation

Time	Agenda Item	Materials
10:05	Possible approaches for developing SMC • Prioritization of areas/stream reaches for establishing SMCs and monitoring o Beneficial users and uses of surface water o Impact of groundwater pumping on streamflows o *Purpose: Begin identifying relationship of pumping to shallow GW and then to streamflow* • Concepts for establishing Minimum Thresholds (MTs) and Measurable Objectives (Mos) o Role of model o Correlation with groundwater levels/groundwater pumping • Initial thoughts on Data gaps Groundwater Sustainability Plan (GSP) Staff All Work Group Participants	
11:35	Initial discussion of monitoring methodologies and approach GSP Staff All Work Group Participants	
11:55	Review Meeting Action Items and Discuss Scheduling	
11:00	Meeting Adjourns	

Workgroup Background – Jay Jasperse

Focus of Workgroup Meetings

Scope: This subgroup will be comprised of subject matter experts and representatives from agencies that have jurisdictional interests in stream flow, water use, and riparian ecosystems.

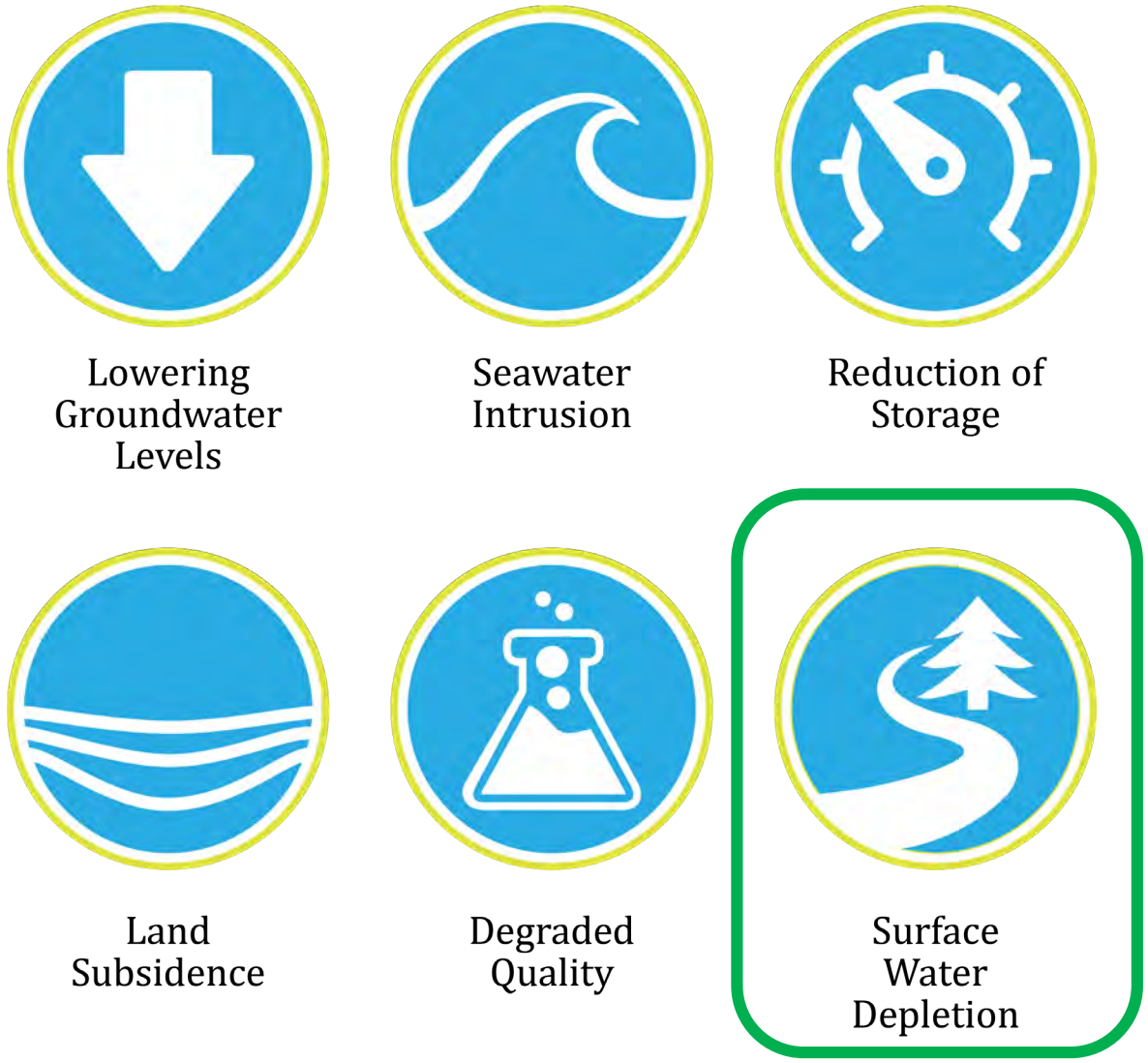
Utilize the results of the GDE subgroup, and other available information, in assessing options for developing SMCs for depletion of interconnected surface water due to groundwater pumping. The GSA technical staff will use the input from this subgroup to develop a recommended SMC methodology.

Sustainable Management Criteria

Sustainable Management Criteria (SMCs) are defined locally based on ***basin conditions*** to avoid *significant and unreasonable* ***Undesirable Results*** for SGMA ***Sustainability Indicators***.

Iterative Process which will involve significant stakeholder engagement, modeling of future climate, growth, and projects and actions

Sustainability Indicators



Sustainable Management Criteria Key Terms

- Undesirable Results
- Minimum Thresholds

Together these two terms **define what is <u>unacceptable</u>** within the basin and **determine whether the basin is being managed sustainably**

- Measurable Objectives

This term defines what is **<u>desirable</u>** within the basin and the conditions which the **GSA must strive to achieve**

Role of Workgroup, Advisory Committee and Board

Workgroup Role

- Recommended methodology for establishing and monitoring for Minimum Thresholds and Measurable Objectives
- Review preliminary MT and MO proposals
- Ideas for developing options for determining Undesirable Results
- Initial assessment of Data Gaps

Advisory Committee Role

- Review recommended methodology and preliminary MT and MO proposals
- Recommend options for determination of Undesirable Results
- Initial recommendations on prioritization of Data Gaps

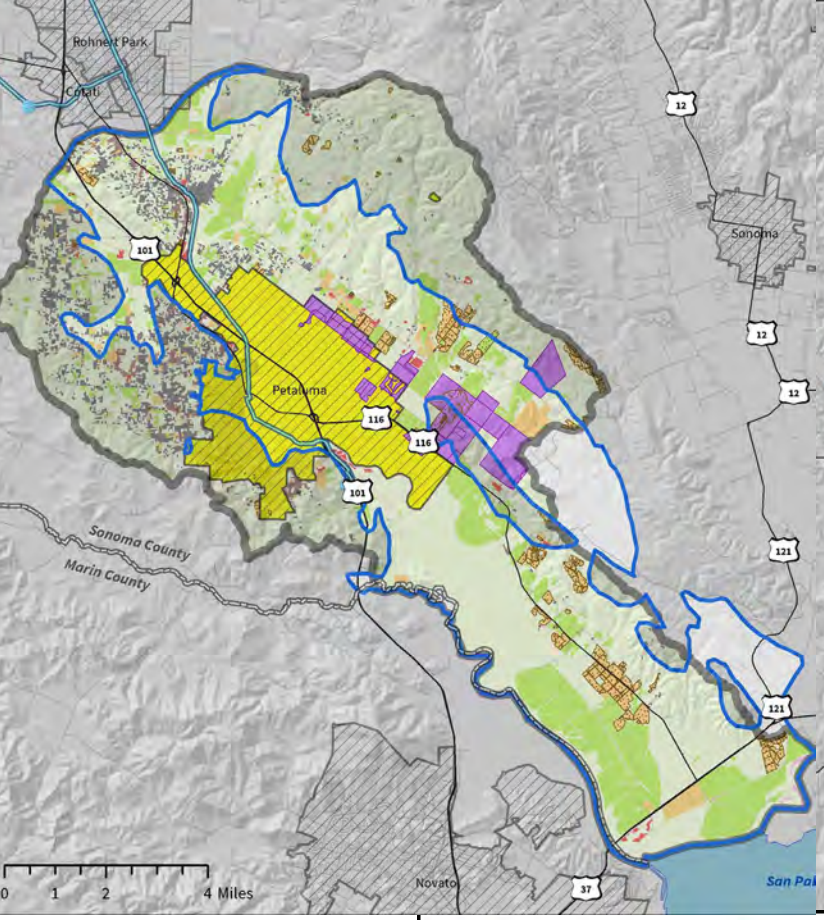
GSA Board Role

- Consider recommended methodology and preliminary MT and MO proposals
- Consider and select an option for determination of Undesirable Results
- Consider recommendations on prioritization of Data Gaps for GSP Implementation Program

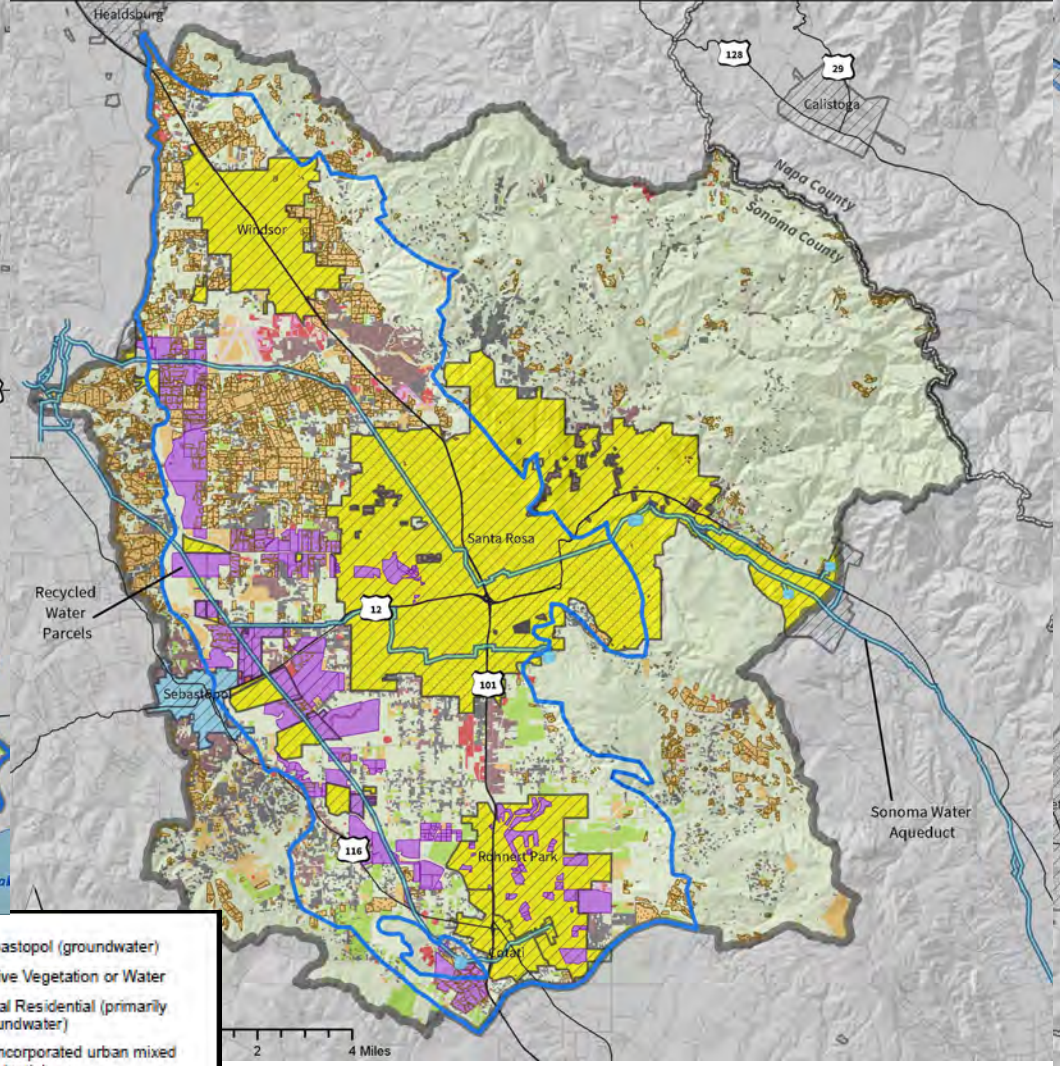
Key Challenges for Surface Water Depletion SMC

- Technical complexities in identifying fraction of surface water depletion caused by groundwater pumping (spatial and temporal variations)
  - Once estimated, how much of that depletion caused by groundwater pumping should be considered "significant and unreasonable"?
- Data and Information Limitations
  - Monitoring infrastructure for assessing degree of surface water and groundwater interaction (eg, streamflow gauges and shallow monitoring wells)
  - Locations, depths and timing of groundwater pumping from water wells
- Surface Water Rights
  - Limited information on type, location, timing and amounts of permitted surface water diversions
  - Regulatory complications

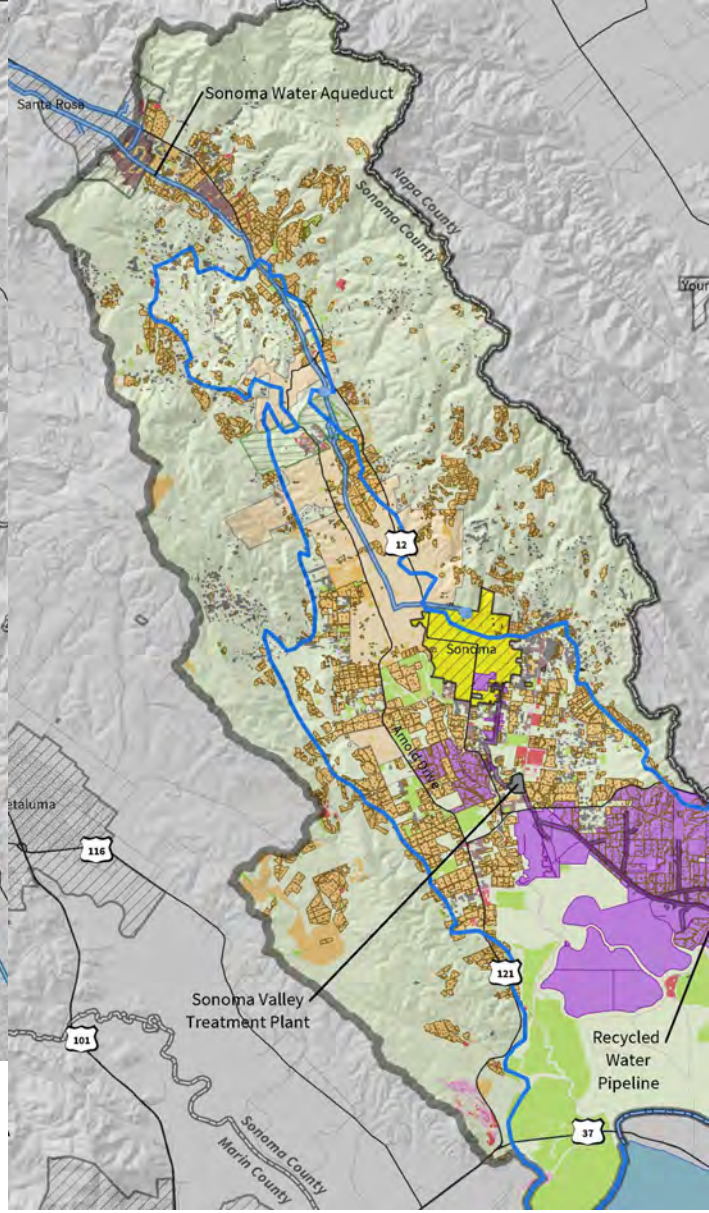
Basin Setting/Conditions Overview – Marcus Trotta



Petaluma Valley



Santa Rosa Plain



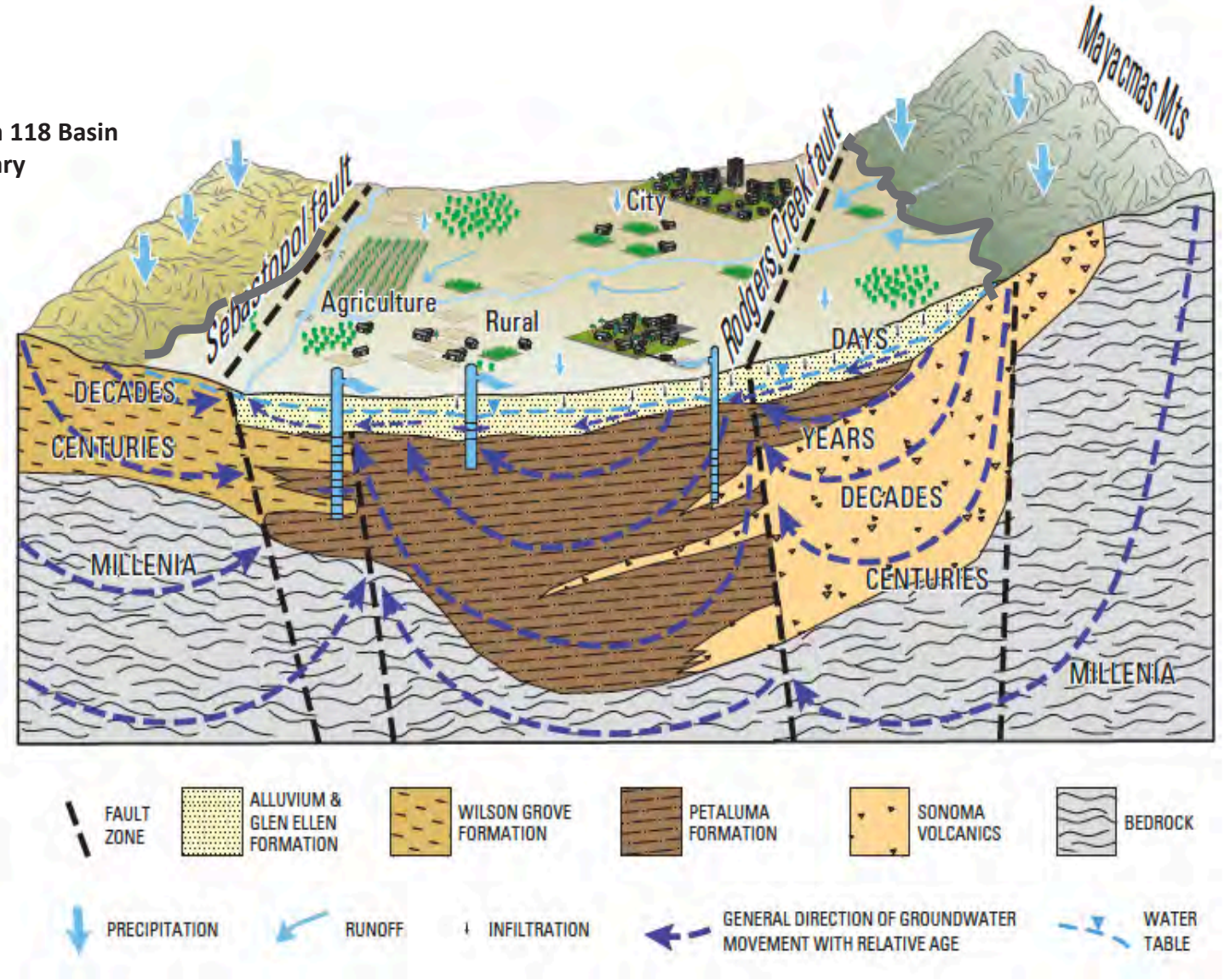
Sonoma Valley

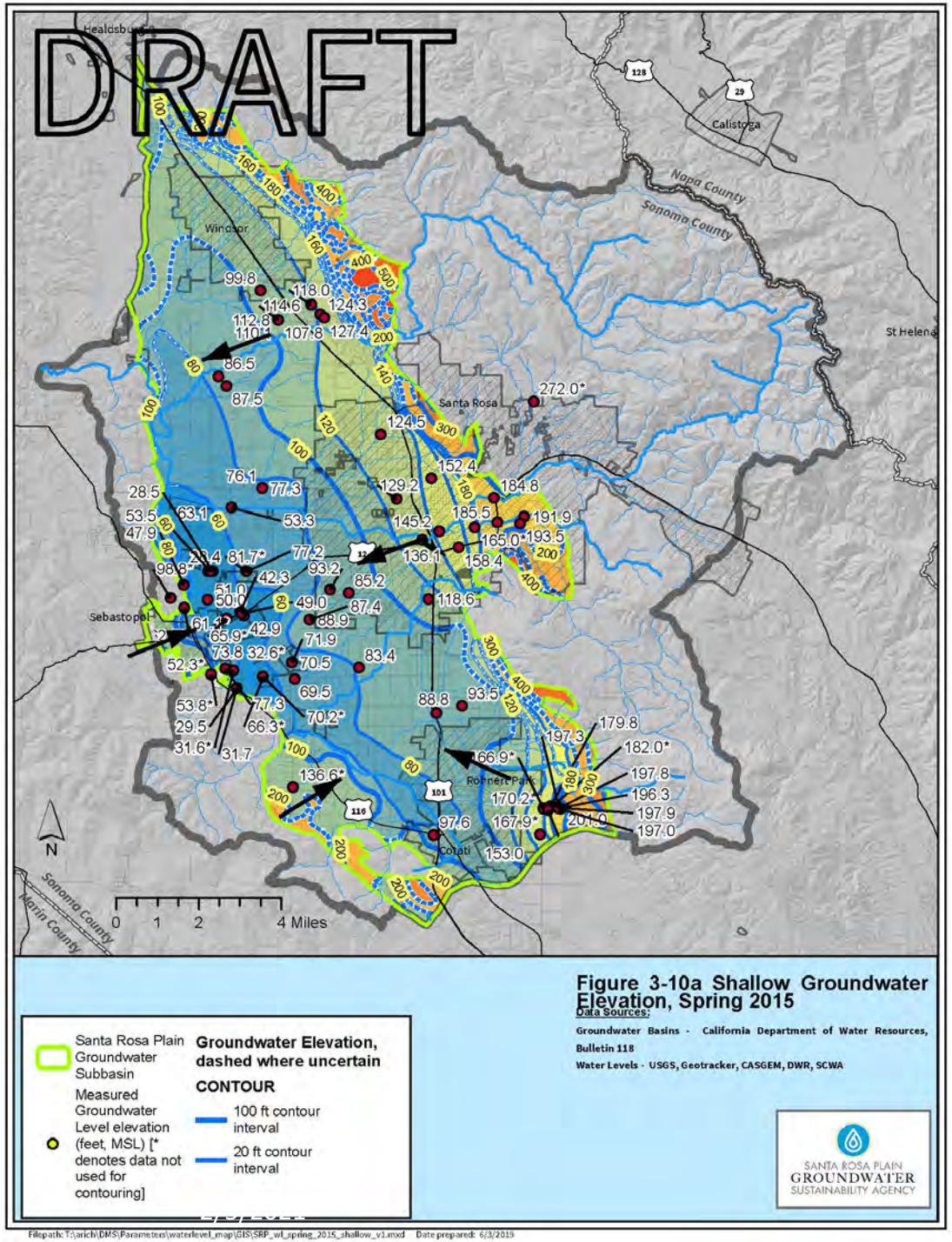
- Santa Rosa Plain Groundwater Subbasin
- Contributing Watershed Area
- Vineyards
- Recycled Water Parcels (primarily recycled water with some backup groundwater and/or surface water)
- Santa Rosa, Rohnert Park, Windsor and Cotati (primarily imported surface water with supplemental groundwater)
- *Irrigated Agricultural (primarily groundwater with some surface water)
- *Non-irrigated Agricultural
- Sebastopol (groundwater)
- Native Vegetation or Water
- Rural Residential (primarily groundwater)
- Unincorporated urban mixed residential commerical/industrial (primarily groundwater)
- Unincorporated commerical/Industrial (primarily groundwater)
- Vacant
- Sonoma Water Aqueduct
- City Footprints
- County Line

*Based on DWR land use mapping

Conceptual Model Diagram

Bulletin 118 Basin Boundary




DRAFT
Healdsburg
Windsor
Santa Rosa
Calistoga
St Helena
Napa County
Sonoma County
Sebastopol
Rohnert Park
Cotati
Sonoma County
Marin County
0 1 2 4 Miles
N
Santa Rosa Plain Groundwater Subbasin
Measured Groundwater Level elevation (feet, MSL) [* denotes data not used for contouring]
Groundwater Elevation, dashed where uncertain
CONTOUR
100 ft contour interval
20 ft contour interval
Figure 3-10a Shallow Groundwater Elevation, Spring 2015
Data Sources:
Groundwater Basins - California Department of Water Resources, Bulletin 118
Water Levels - USGS, Geotracker, CASGEM, DWR, SCWA
SANTA ROSA PLAIN GROUNDWATER SUSTAINABILITY AGENCY
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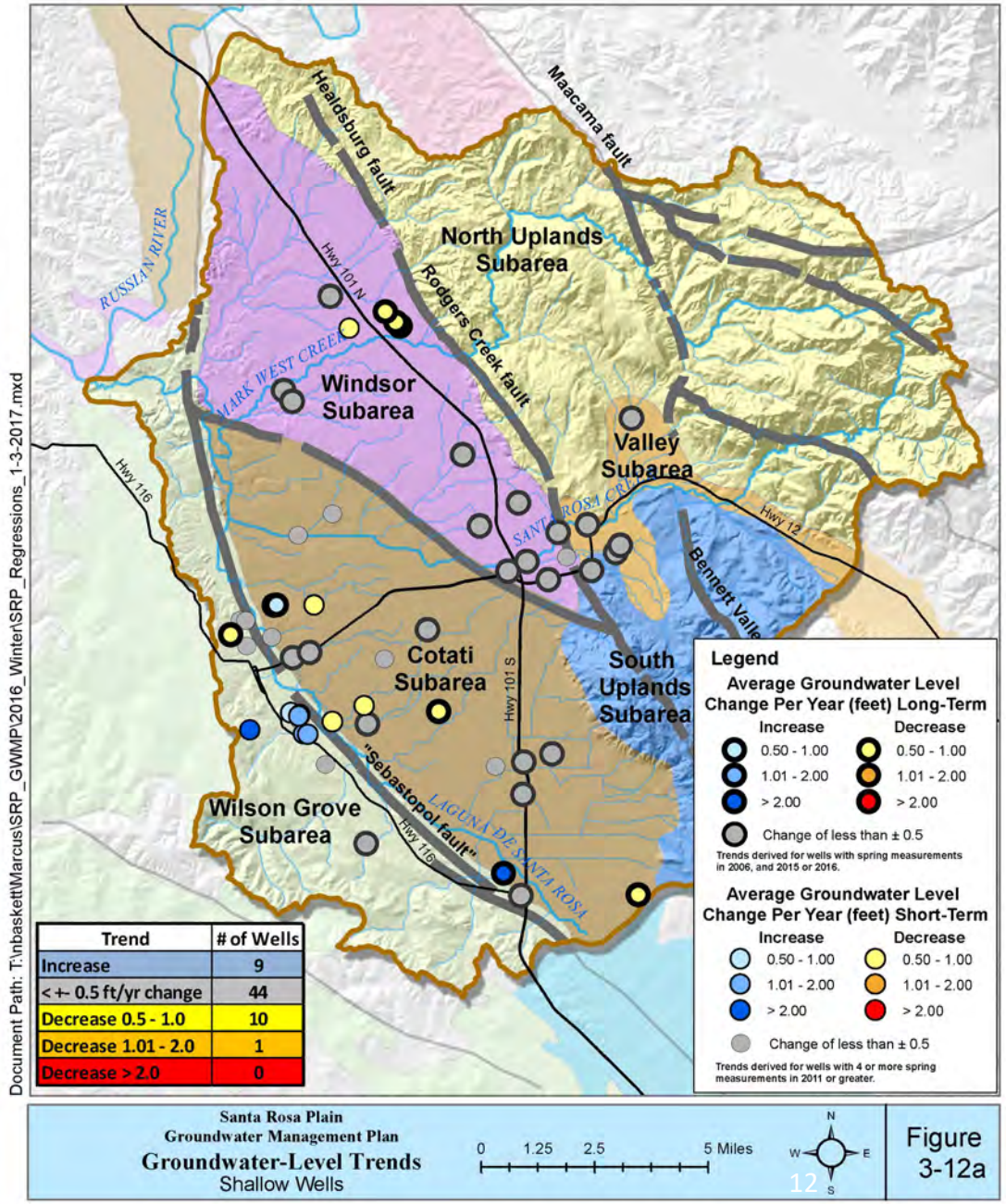
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Healdsburg fault
Maacama fault
Rodgers Creek fault
Hwy 101 N
Hwy 116
Hwy 101 S
Hwy 12
RUSSIAN RIVER
MARK WEST CREEK
SANTA ROSA CREEK
LAGUNA DE SANTA ROSA
Bennett Valley
"Sebastopol fault"
North Uplands Subarea
Windsor Subarea
Valley Subarea
Cotati Subarea
South Uplands Subarea
Wilson Grove Subarea
Trend | # of Wells
Increase | 9
< +- 0.5 ft/yr change | 44
Decrease 0.5 - 1.0 | 10
Decrease 1.01 - 2.0 | 1
Decrease > 2.0 | 0
Legend
Average Groundwater Level Change Per Year (feet) Long-Term
Increase
Decrease
0.50 - 1.00
1.01 - 2.00
> 2.00
Change of less than ± 0.5
Trends derived for wells with spring measurements in 2006, and 2015 or 2016.
Average Groundwater Level Change Per Year (feet) Short-Term
Increase
Decrease
0.50 - 1.00
1.01 - 2.00
> 2.00
Change of less than ± 0.5
Trends derived for wells with 4 or more spring measurements in 2011 or greater.
Santa Rosa Plain
Groundwater Management Plan
Groundwater-Level Trends
Shallow Wells
0 1.25 2.5 5 Miles
N
W
E
S
Figure 3-12a

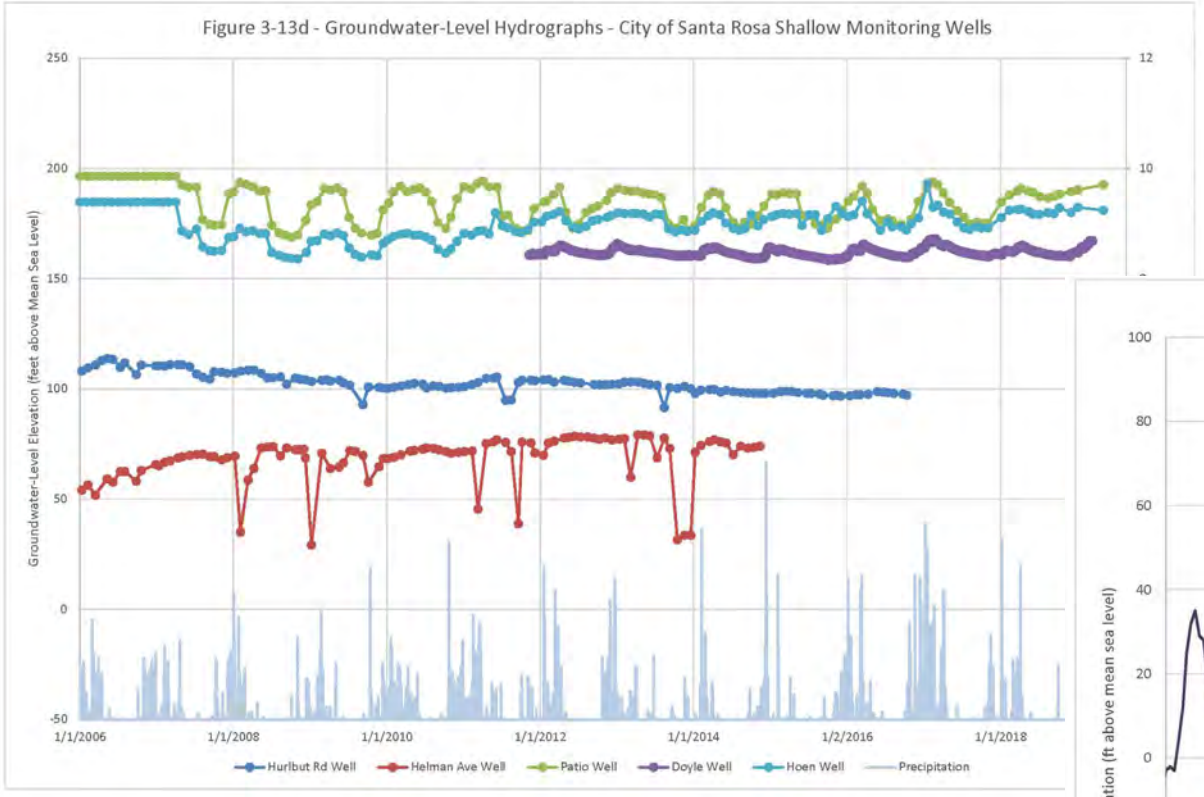


Figure 3-13d - Groundwater-Level Hydrographs - City of Santa Rosa Shallow Monitoring Wells
Groundwater-Level Elevation (feet above Mean Sea Level)
250
200
150
100
50
0
-50
12
10
1/1/2006
1/1/2008
1/1/2010
1/1/2012
1/1/2014
1/2/2016
1/1/2018
Hurlbut Rd Well
Helman Ave Well
Patio Well
Doyle Well
Hoen Well
Precipitation

.

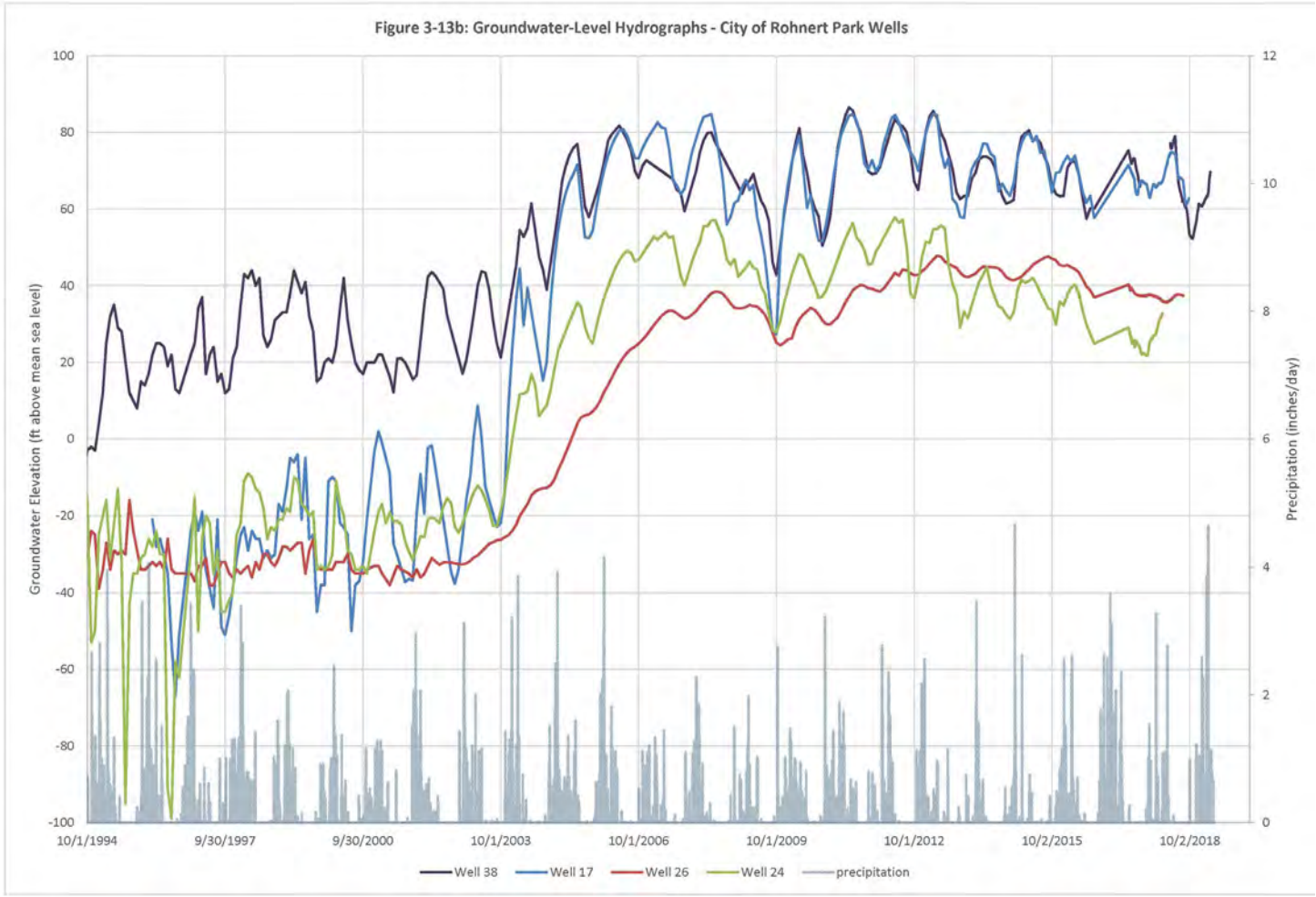
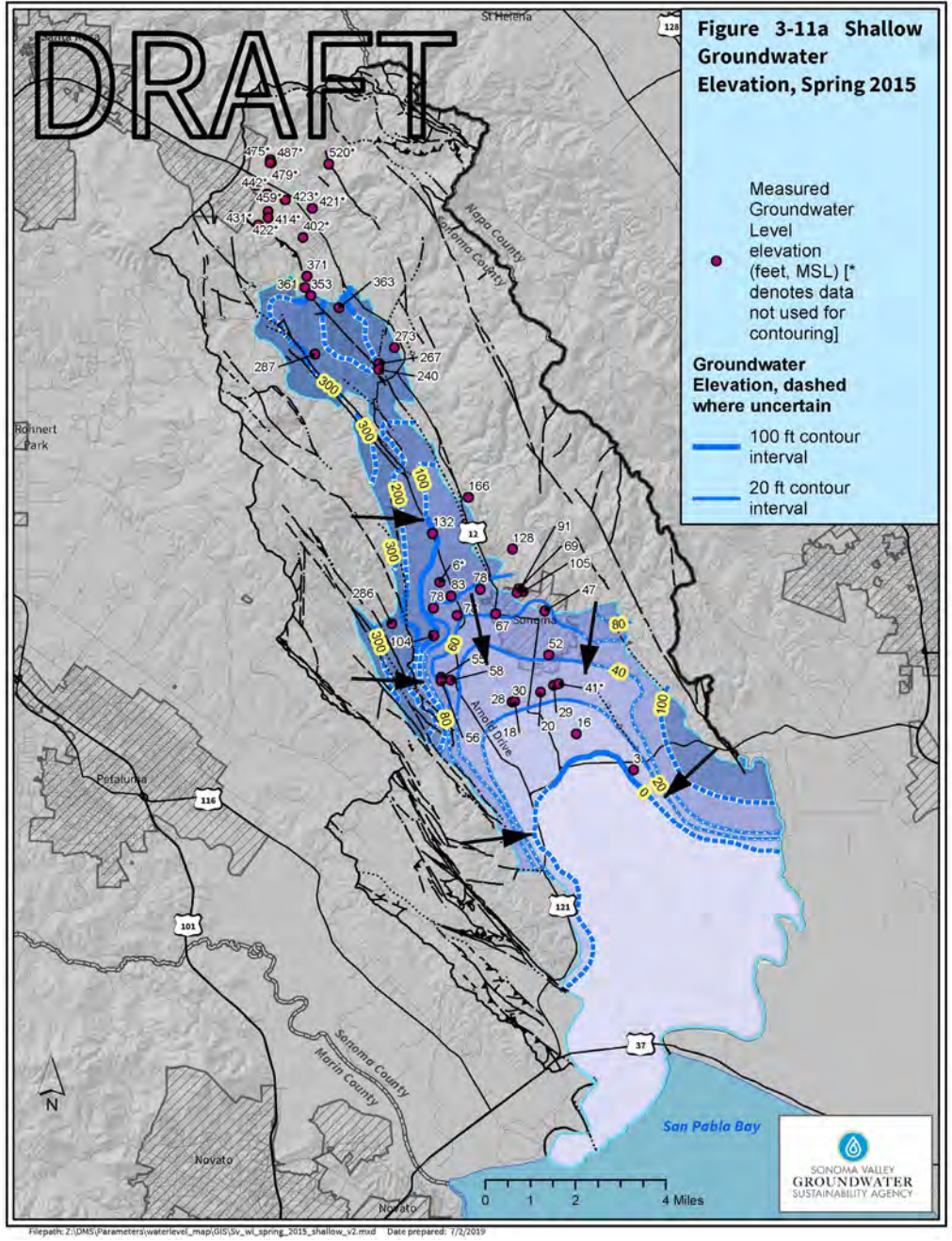
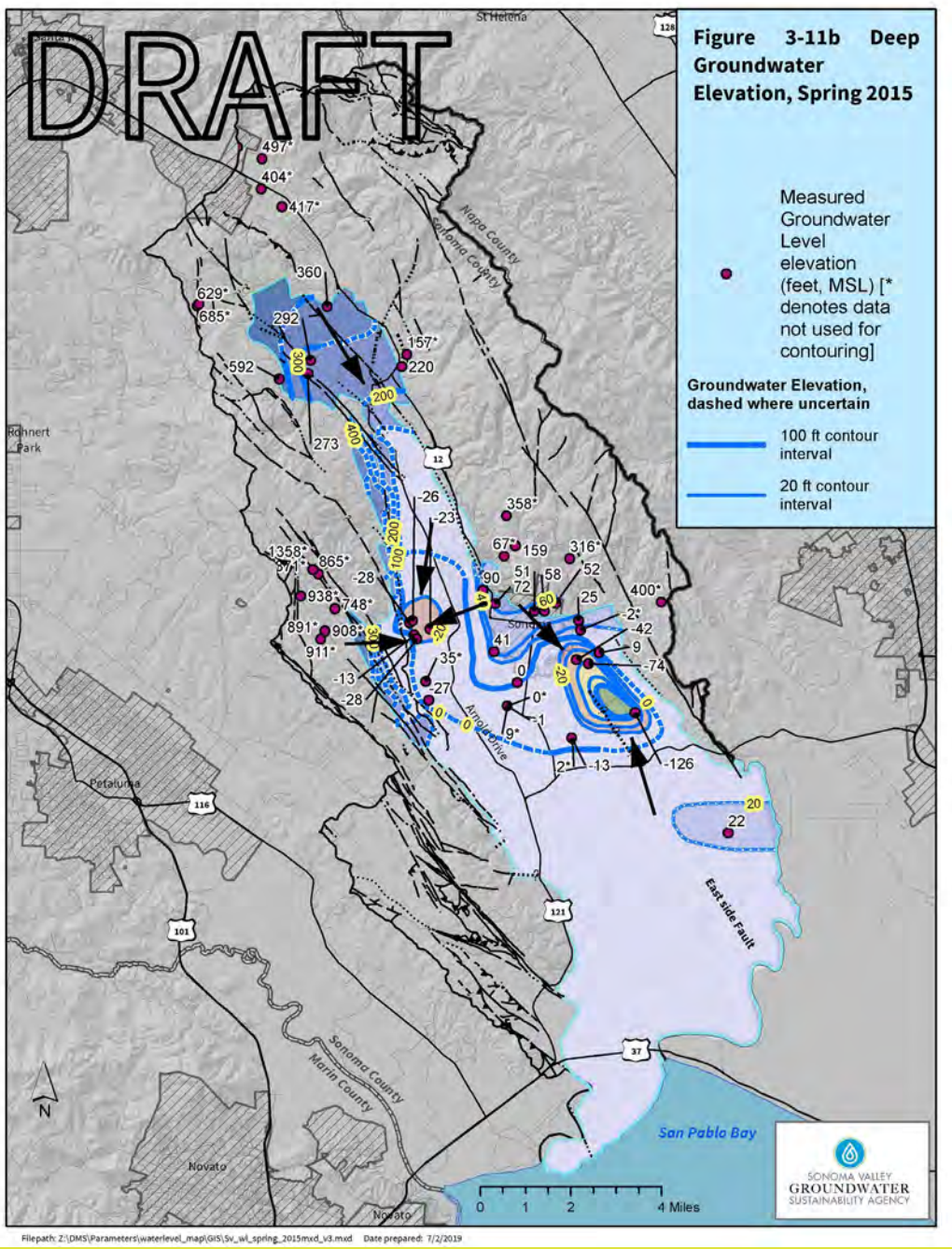


Figure 3-13b: Groundwater-Level Hydrographs - City of Rohnert Park Wells
Groundwater Elevation (ft above mean sea level)
100
80
60
40
20
0
-20
-40
-60
-80
-100
12
10
8
6
4
2
0
Precipitation (inches/day)
10/1/1994
9/30/1997
9/30/2000
10/1/2003
10/1/2006
10/1/2009
10/1/2012
10/2/2015
10/2/2018
Well 38
Well 17
Well 26
Well 24
precipitation


DRAFT
Figure 3-11a Shallow Groundwater Elevation, Spring 2015
Measured Groundwater Level elevation (feet, MSL) [* denotes data not used for contouring]
Groundwater Elevation, dashed where uncertain
100 ft contour interval
20 ft contour interval
St Helena
Napa County
Sonoma County
Rohnert Park
Petaluma
Sonoma
Arnold Drive
Sonoma County
Marin County
Novato
San Pablo Bay
0 1 2 4 Miles
N
SONOMA VALLEY GROUNDWATER SUSTAINABILITY AGENCY
Filepath: Z:\DMS\Parameters\waterlevel_map\GIS\Sv_wl_spring_2015_shallow_v2.mxd Date prepared: 7/2/2019


DRAFT
Figure 3-11b Deep Groundwater Elevation, Spring 2015
Measured Groundwater Level elevation (feet, MSL) [* denotes data not used for contouring]
Groundwater Elevation, dashed where uncertain
100 ft contour interval
20 ft contour interval
St Helena
Napa County
Sonoma County
Rohnert Park
Petaluma
Sonoma
Arnold Drive
East side Fault
Sonoma County
Marin County
Novato
San Pablo Bay
0 1 2 4 Miles
N
SONOMA VALLEY GROUNDWATER SUSTAINABILITY AGENCY
Filepath: Z:\DMS\Parameters\waterlevel_map\GIS\Sv_wl_spring_2015mxd_v3.mxd Date prepared: 7/2/2019

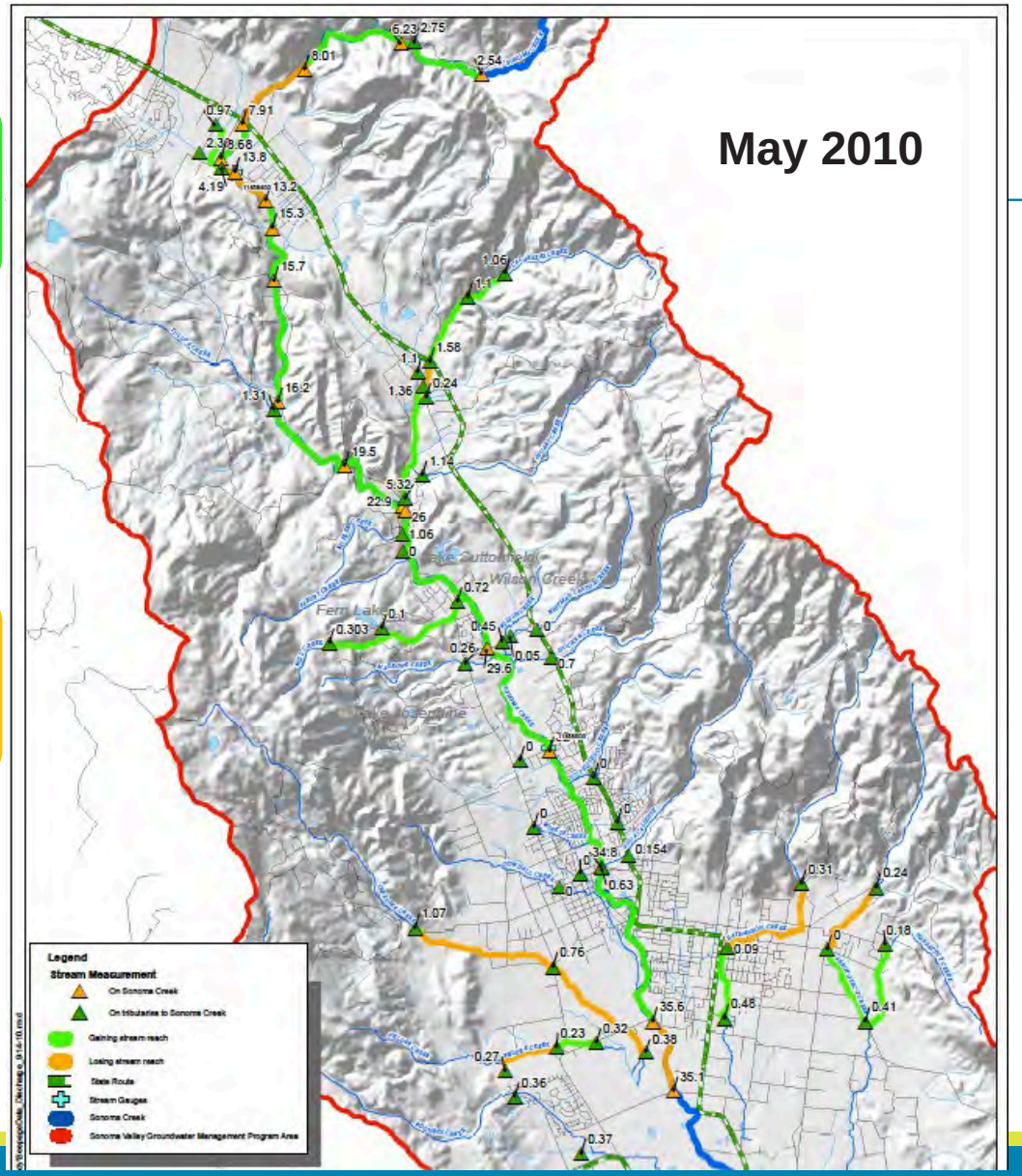
Sonoma Valley: Seepage Runs

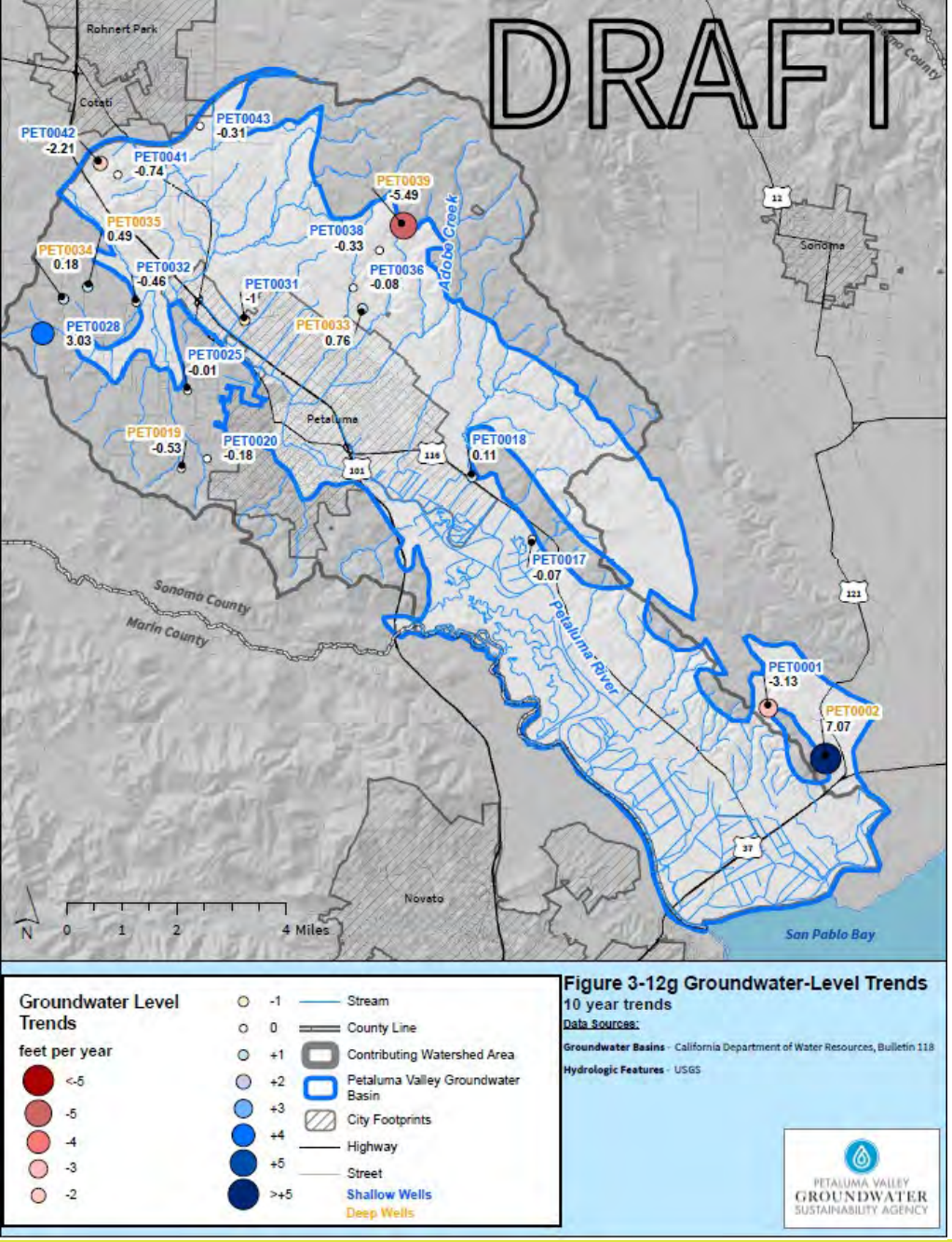
Discharge Segments
(Groundwater flows into Stream)

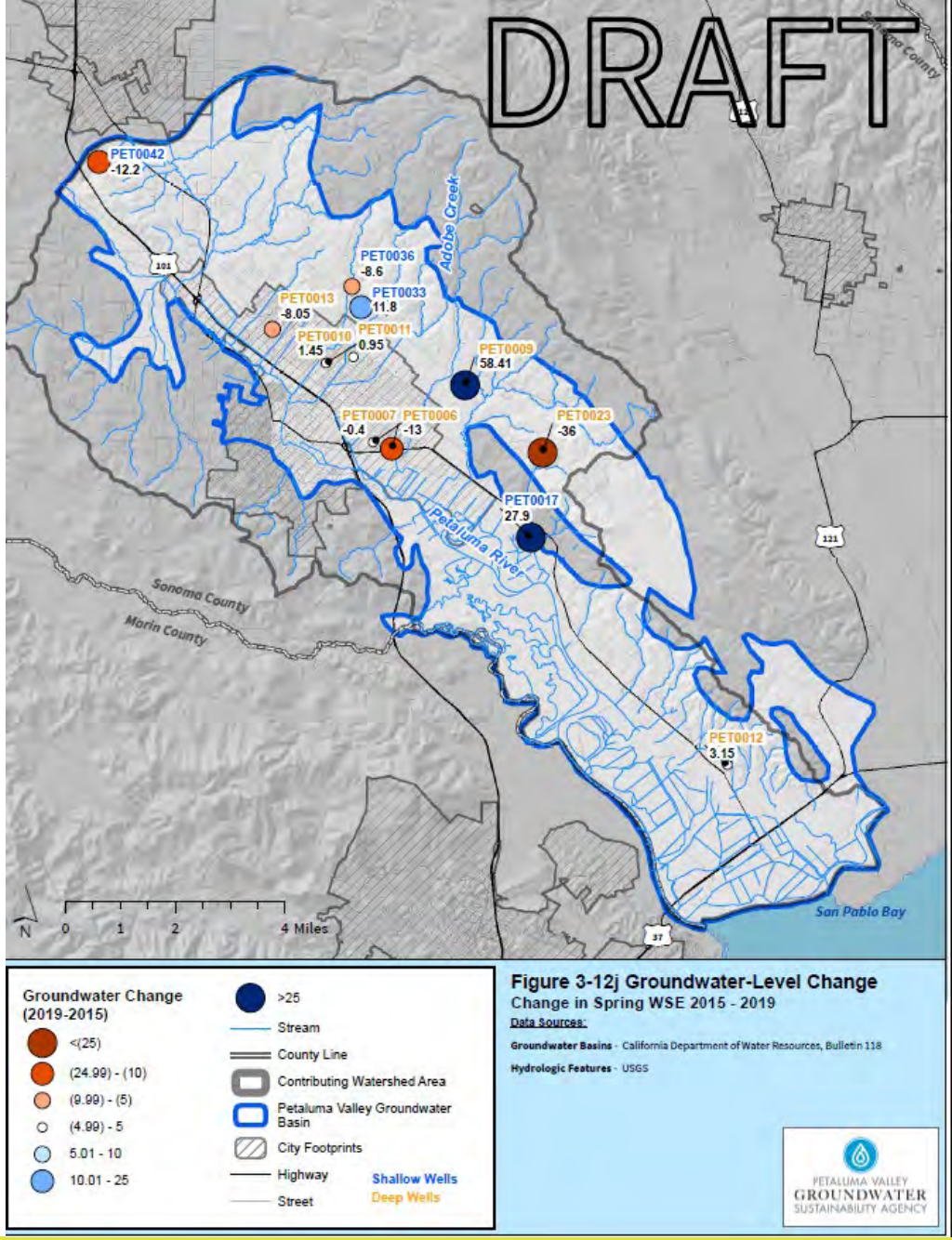
- **Most of Sonoma Creek**
- **Most of Calabazas**
- **Lower reaches of Fryer and Nathanson**

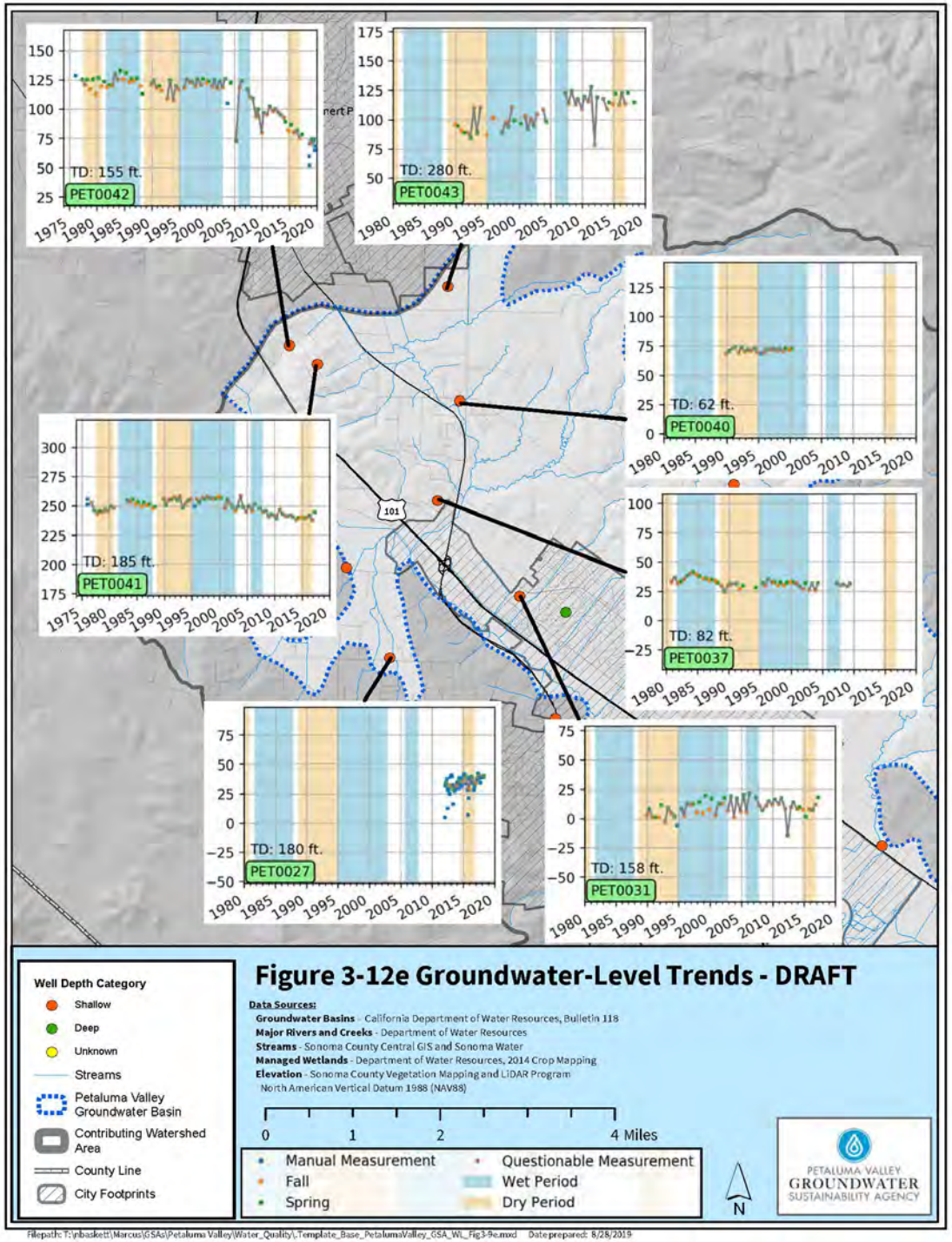
Recharge Segments
(Stream recharges Groundwater)

- **Sonoma Creek near Kenwood**
- **Carriger**
- **Upper reaches of Fryer and Nathanson**
- **Portion of Felder Creek**




DRAFT
Rohnert Park
Cotati
Sonoma
Petaluma
Novato
Sonoma County
Marin County
Adobe Creek
Petaluma River
San Pablo Bay
PET0042 -2.21
PET0043 -0.31
PET0041 -0.74
PET0039 -5.49
PET0035 0.49
PET0038 -0.33
PET0034 0.18
PET0032 -0.46
PET0031 -1
PET0036 -0.08
PET0028 3.03
PET0033 0.76
PET0025 -0.01
PET0019 -0.53
PET0020 -0.18
PET0018 0.11
PET0017 -0.07
PET0001 -3.13
PET0002 7.07
N 0 1 2 4 Miles
Groundwater Level Trends
feet per year
<-5
-5
-4
-3
-2
-1
0
+1
+2
+3
+4
+5
>+5
Stream
County Line
Contributing Watershed Area
Petaluma Valley Groundwater Basin
City Footprints
Highway
Street
Shallow Wells
Deep Wells
Figure 3-12g Groundwater-Level Trends
10 year trends
Data Sources:
Groundwater Basins - California Department of Water Resources, Bulletin 118
Hydrologic Features - USGS
PETALUMA VALLEY GROUNDWATER SUSTAINABILITY AGENCY


DRAFT
Sonoma County
Marin County
Adobe Creek
Petaluma River
San Pablo Bay
PET0042 -12.2
PET0036 -8.6
PET0033 11.8
PET0013 -8.05
PET0010 1.45
PET0011 0.95
PET0009 58.41
PET0007 -0.4
PET0006 -13
PET0023 -36
PET0017 27.9
PET0012 3.15
N 0 1 2 4 Miles
Groundwater Change (2019-2015)
<(25)
(24.99) - (10)
(9.99) - (5)
(4.99) - 5
5.01 - 10
10.01 - 25
>25
Stream
County Line
Contributing Watershed Area
Petaluma Valley Groundwater Basin
City Footprints
Highway
Street
Shallow Wells
Deep Wells
Figure 3-12j Groundwater-Level Change
Change in Spring WSE 2015 - 2019
Data Sources:
Groundwater Basins - California Department of Water Resources, Bulletin 118
Hydrologic Features - USGS
PETALUMA VALLEY GROUNDWATER SUSTAINABILITY AGENCY



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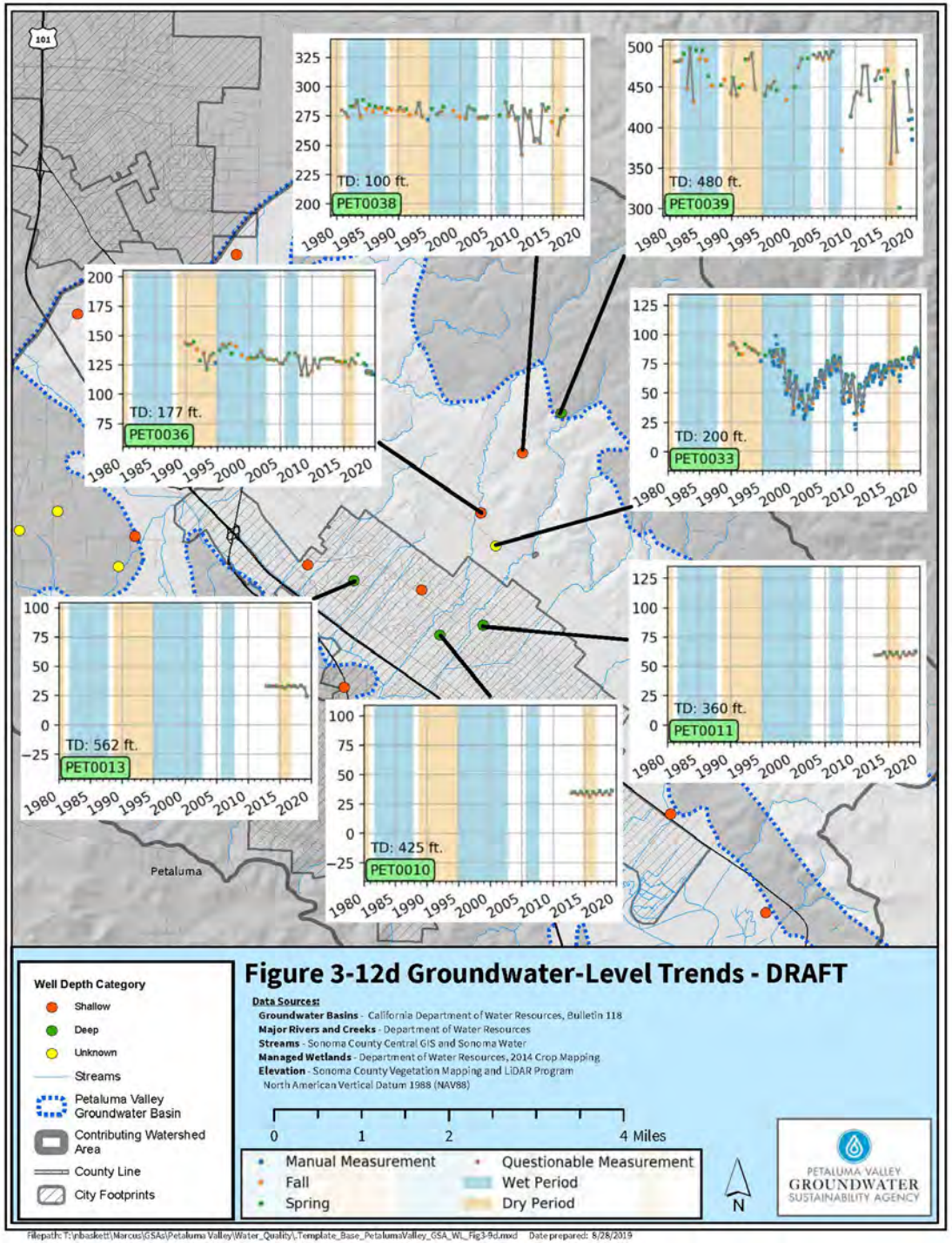
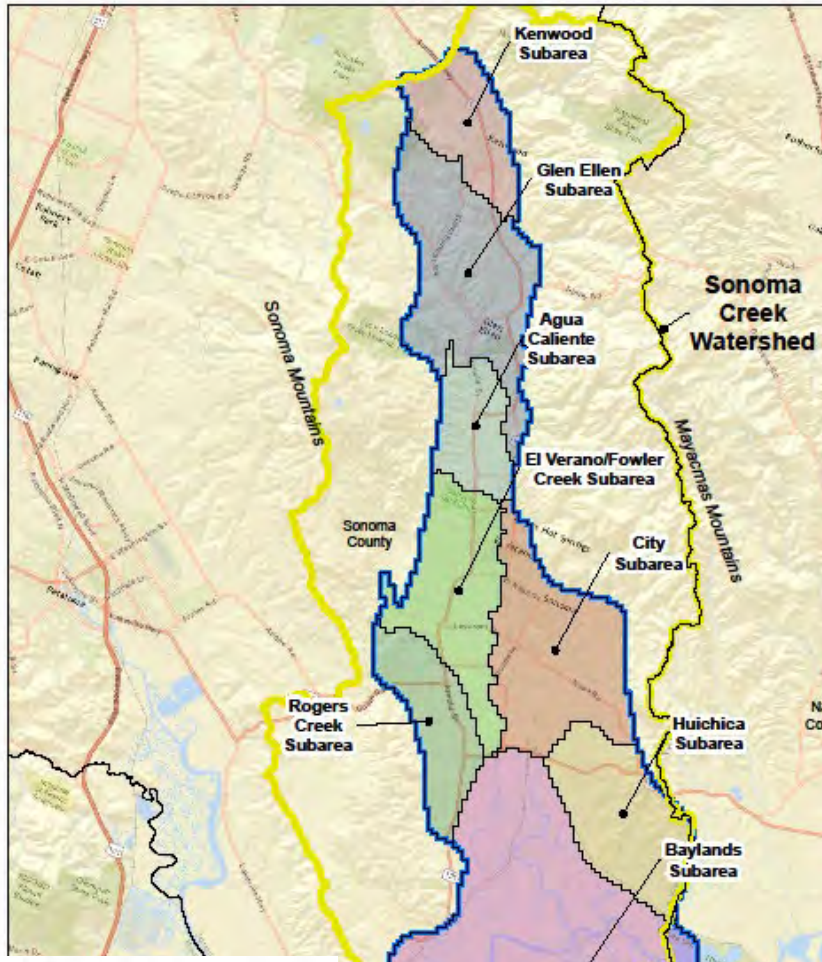
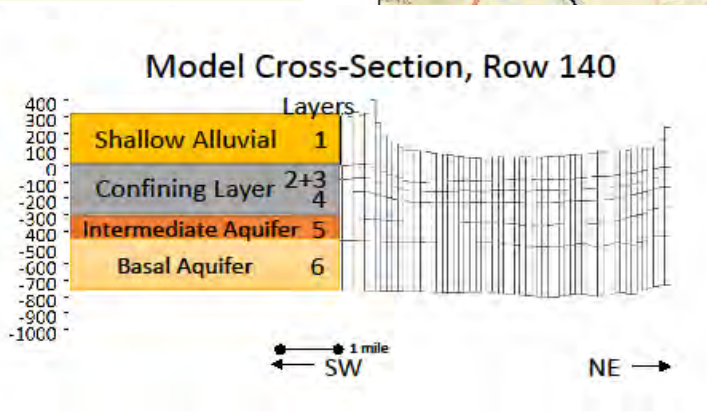


Filepath: T:\pbaskett\Marcus\GSAs\Petaluma Valley\Water_Quality\Template_Base_PetalumaValley_GSA_WL_Fig3-9d.mxd Date prepared: 8/28/2019

Sonoma Valley Integrated Model Overview

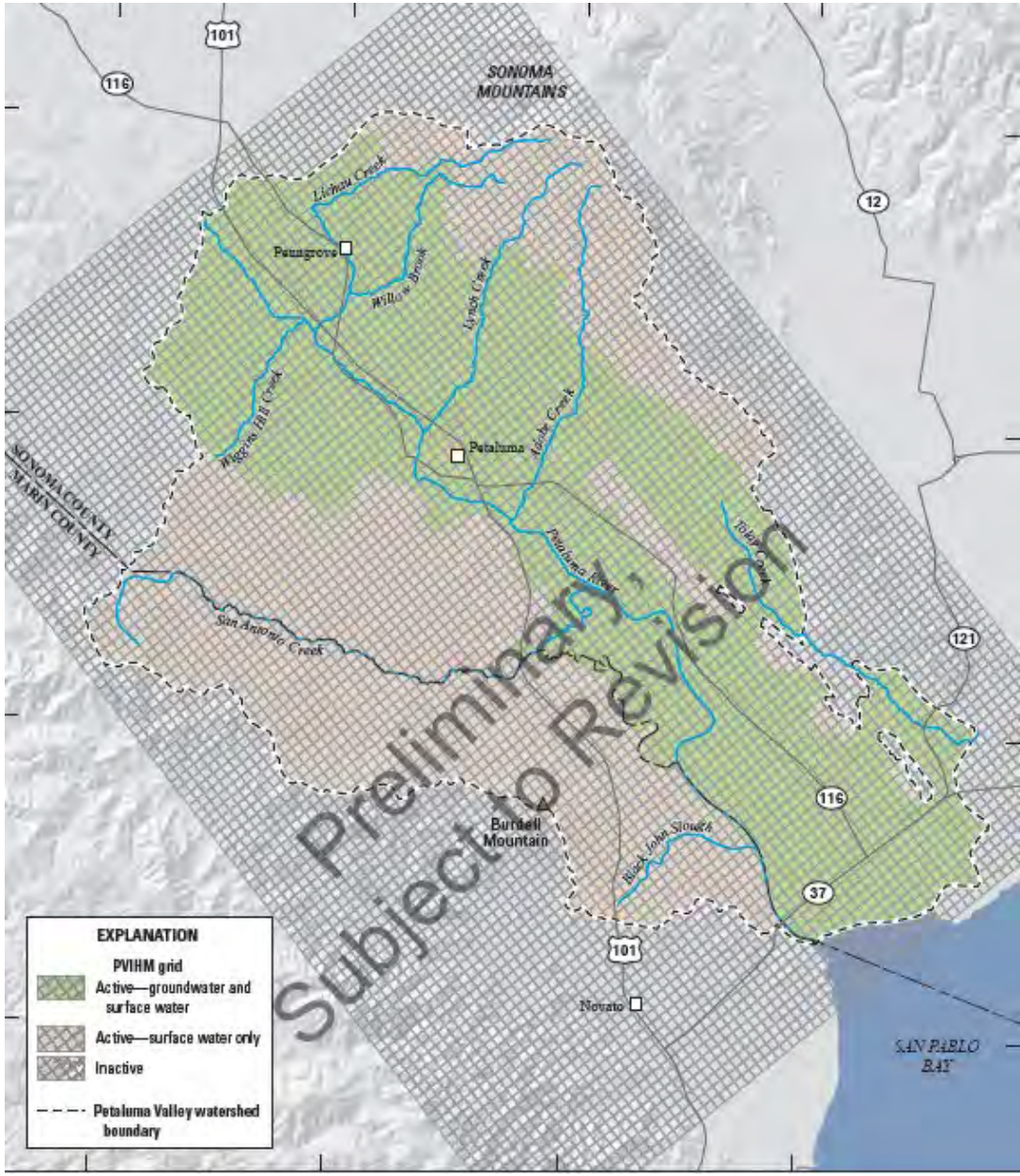
Sonoma Valley Subbasin	
Model Code/Developer	**USGS MODFLOW-OWHM/Sonoma Water**
Simulated Timeframe	**December 1969 to September 2018 (~49 yrs)**
Model Framework	**6 Layers with 500 by 500 foot grid cells**
Major Surface Water Features	**Sonoma Creek and tidal marshlands near San Pablo Bay**
Potentially Applicable Undesirable Results	**Groundwater level declines, storage declines, surface water/groundwater interaction (related to GDEs), saline water intrusion from San Pablo Bay**





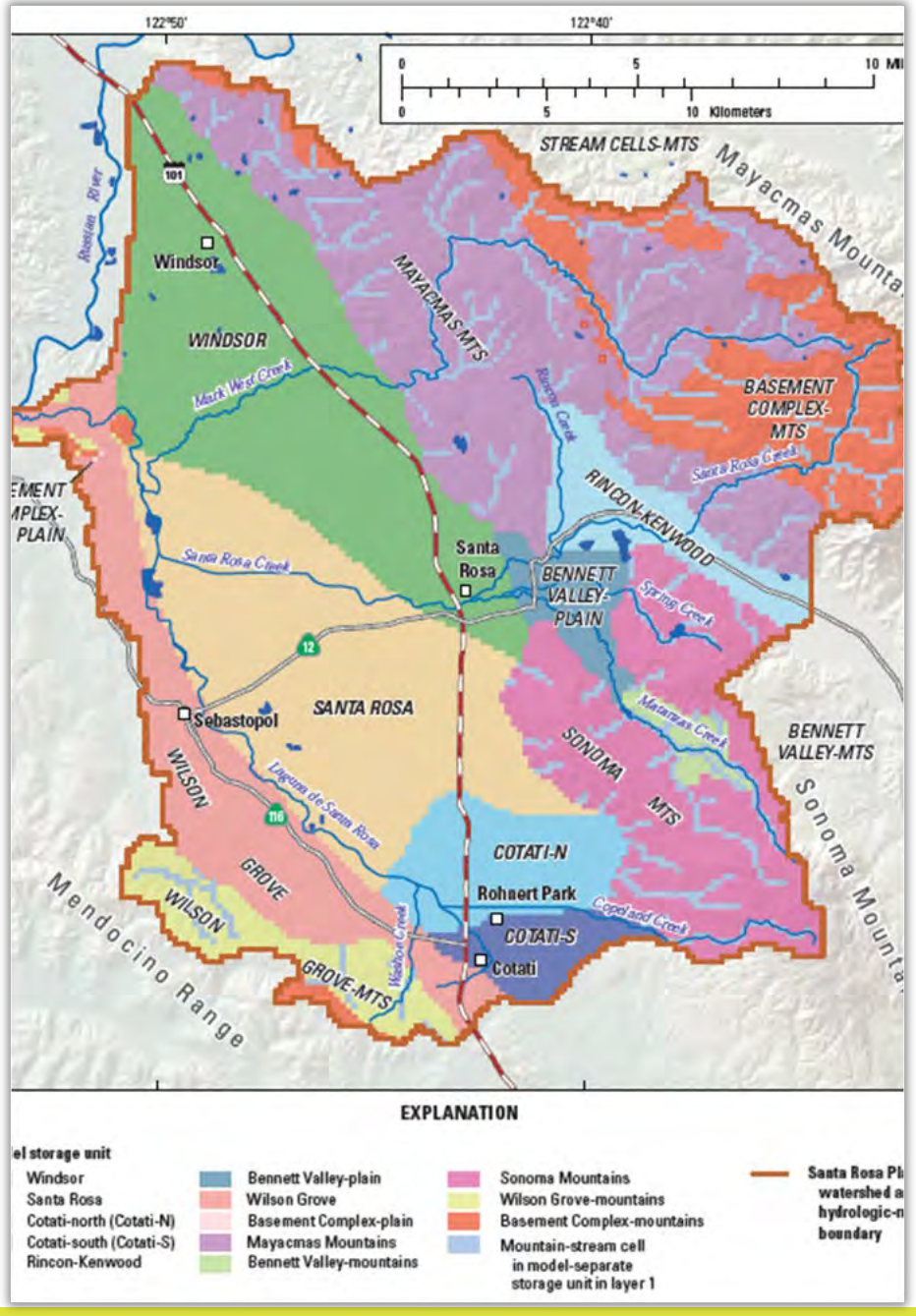
Petaluma Valley Integrated Model Overview

Petaluma Valley Basin	
Model Code/Developer	USGS MODFLOW-OWHM/USGS (In progress – anticipated late 2019)
Simulated Timeframe	October 1959 to September 2015 with monthly stress periods (planning to update to 2018 for GSP)
Model Framework	5 Layers with 984 by 984 foot grid cells
Major Surface Water Features	Petaluma River and tidal marshlands near San Pablo Bay
Potential Undesirable Results	Groundwater level declines, storage declines, surface water/groundwater interaction (related to GDEs), saltwater intrusion from San Pablo Bay

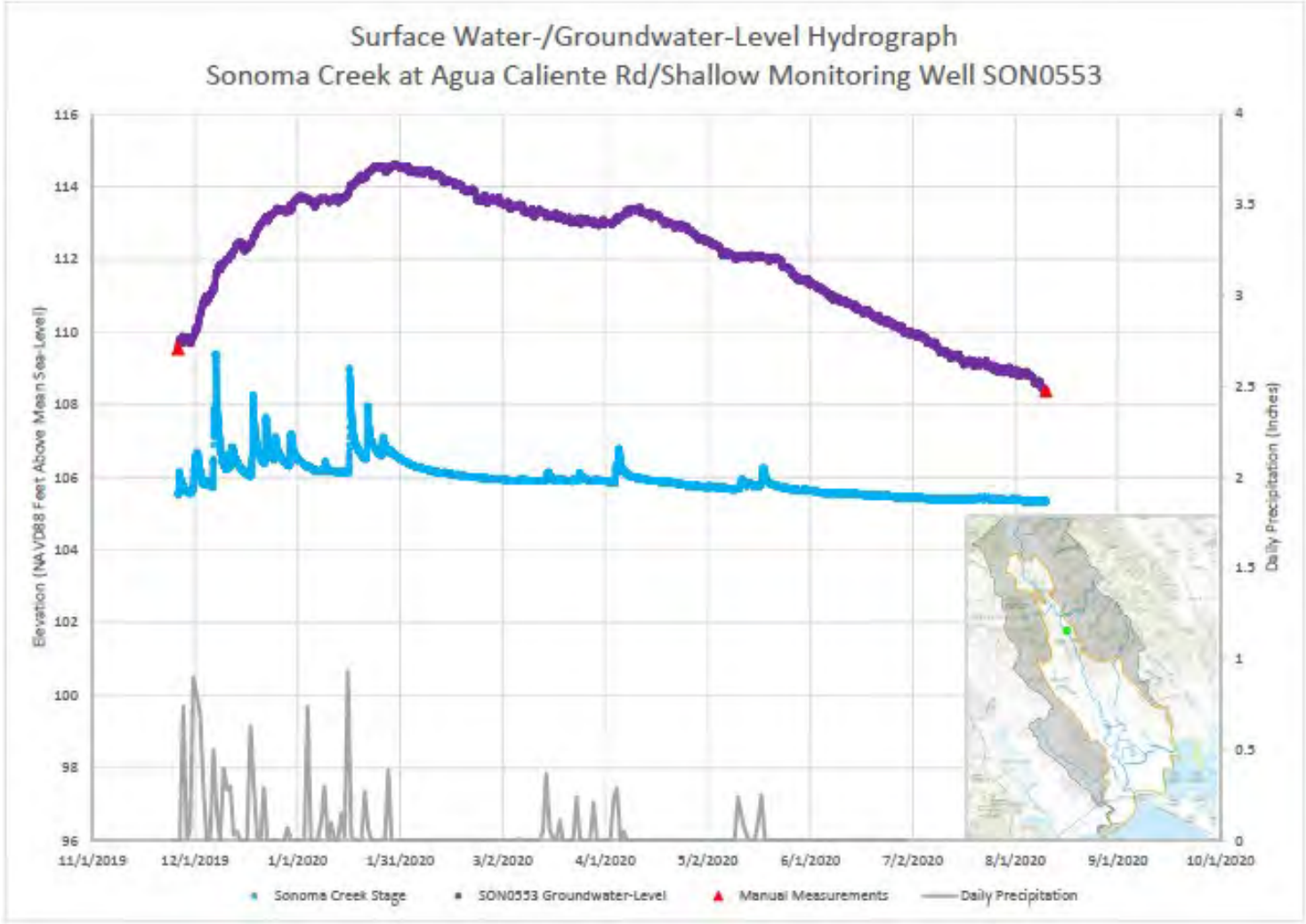


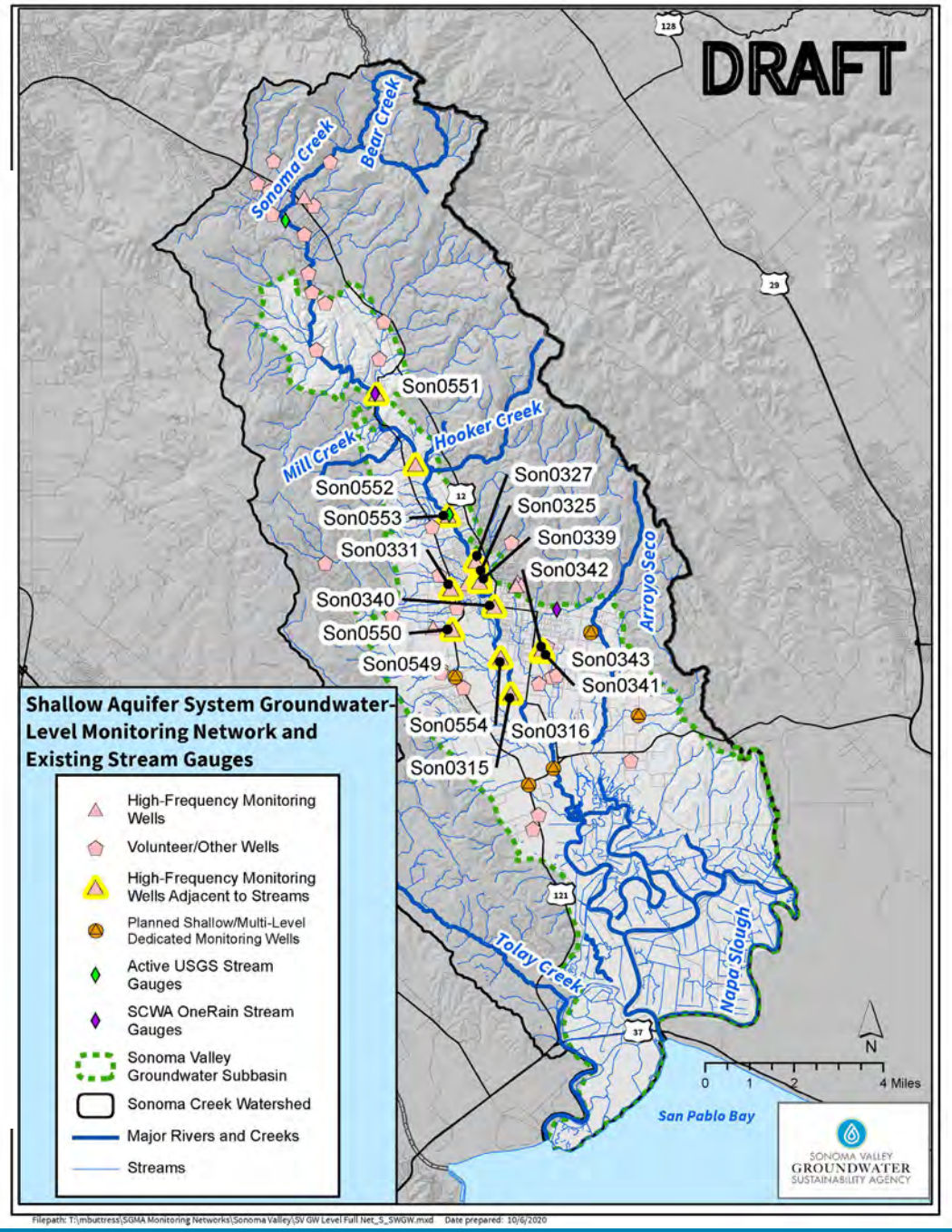
Santa Rosa Plain Integrated Model Overview

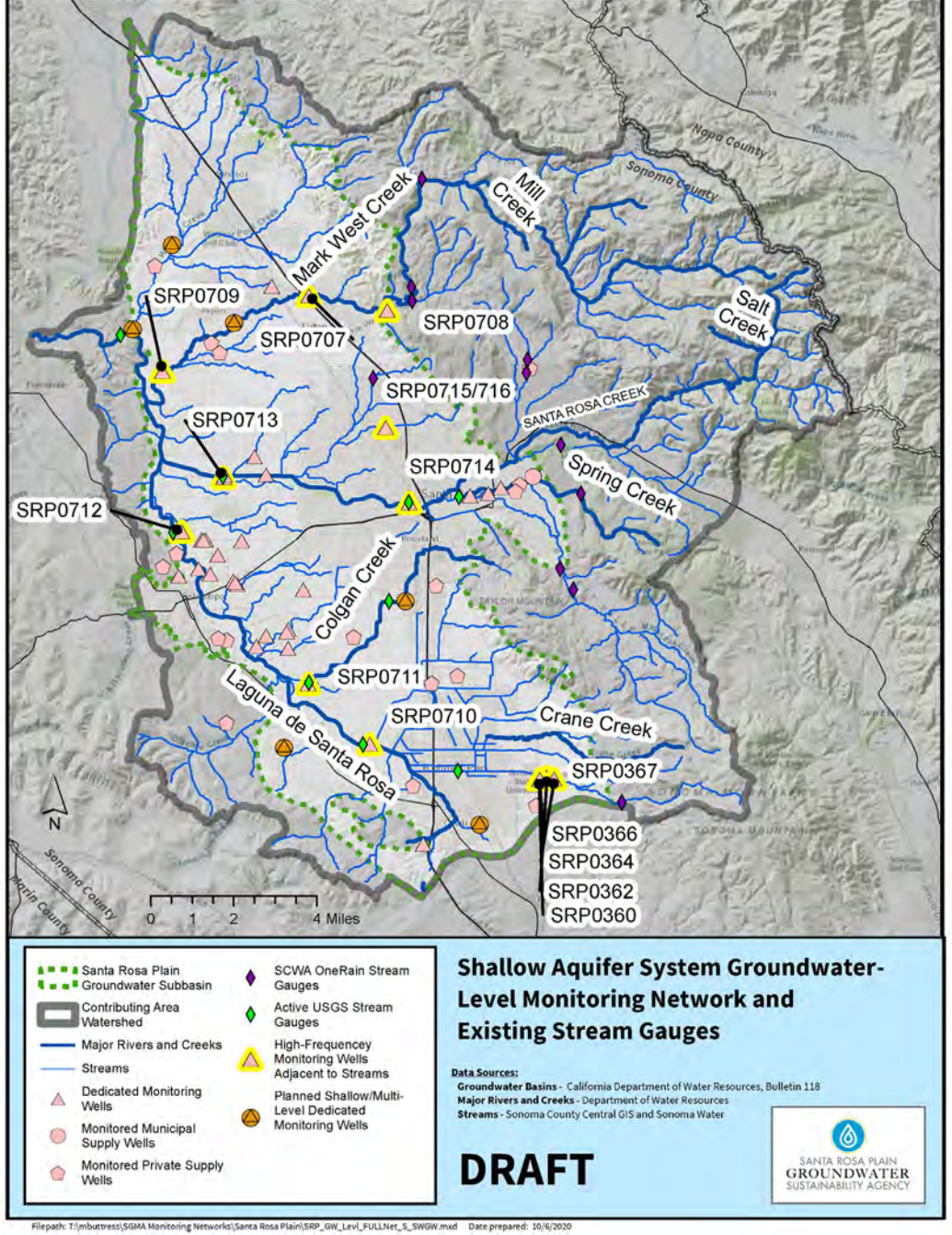
Santa Rosa Plain Subbasin	
Model Code/Developer	USGS GSFLOW/USGS
Simulated Timeframe	Calibration timeframe: water years 1975–2018 (43 years)
Model Framework	8 Layers with 660 by 660 foot grid cells
Major Surface Water Features	Santa Rosa Creek, Laguna de Santa Rosa, Mark West Creek (a tributary to the Russian River)
Potential Undesirable Results Model Could Assess	Groundwater level declines, storage declines, surface water/groundwater interaction (related to GDEs)

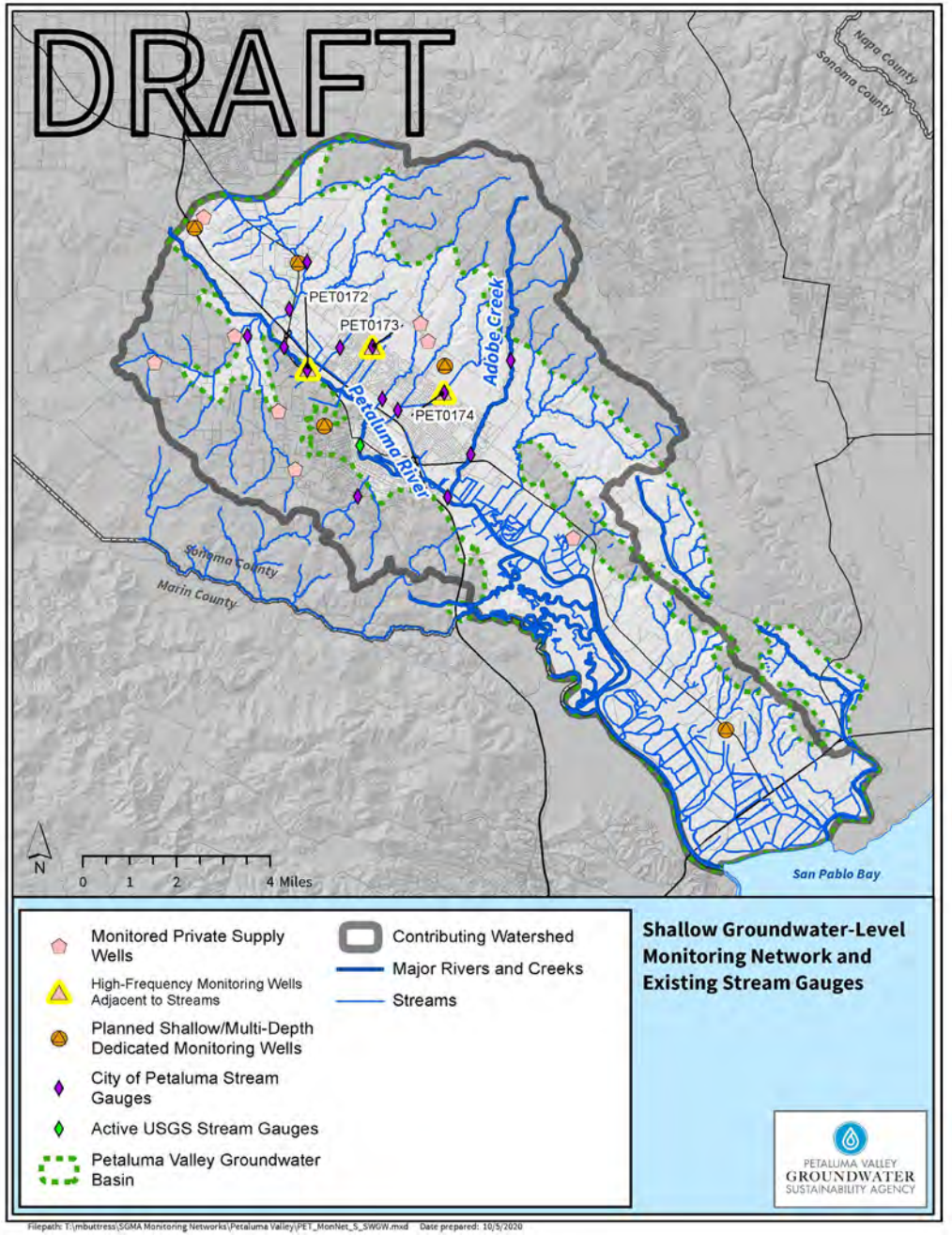


Additional Data Sources: Paired Shallow Monitoring Wells with Stream Gauges






Mark West Creek
Mill Creek
Salt Creek
SRP0709
SRP0707
SRP0708
SRP0715/716
SANTA ROSA CREEK
SRP0713
SRP0714
Spring Creek
SRP0712
Colgan Creek
SRP0711
Laguna de Santa Rosa
SRP0710
Crane Creek
SRP0367
SRP0366
SRP0364
SRP0362
SRP0360
Napa County
Sonoma County
Marin County
N
0 1 2 4 Miles
Santa Rosa Plain Groundwater Subbasin
Contributing Area Watershed
Major Rivers and Creeks
Streams
Dedicated Monitoring Wells
Monitored Municipal Supply Wells
Monitored Private Supply Wells
SCWA OneRain Stream Gauges
Active USGS Stream Gauges
High-Frequency Monitoring Wells Adjacent to Streams
Planned Shallow/Multi-Level Dedicated Monitoring Wells
Shallow Aquifer System Groundwater-Level Monitoring Network and Existing Stream Gauges
Data Sources:
Groundwater Basins - California Department of Water Resources, Bulletin 118
Major Rivers and Creeks - Department of Water Resources
Streams - Sonoma County Central GIS and Sonoma Water
DRAFT
SANTA ROSA PLAIN GROUNDWATER SUSTAINABILITY AGENCY
Filepath: T:\mbuttress\SGMA Monitoring Networks\Santa Rosa Plain\SRP_GW_Levl_FULLNet_S_SWGW.mxd Date prepared: 10/6/2020


DRAFT
Napa County
Sonoma County
PET0172
PET0173
PET0174
Adobe Creek
Petaluma River
Sonoma County
Marin County
San Pablo Bay
N
0 1 2 4 Miles
Monitored Private Supply Wells
High-Frequency Monitoring Wells Adjacent to Streams
Planned Shallow/Multi-Depth Dedicated Monitoring Wells
City of Petaluma Stream Gauges
Active USGS Stream Gauges
Petaluma Valley Groundwater Basin
Contributing Watershed
Major Rivers and Creeks
Streams
Shallow Groundwater-Level Monitoring Network and Existing Stream Gauges
PETALUMA VALLEY GROUNDWATER SUSTAINABILITY AGENCY
Filepath: T:\mbuttress\SGMA Monitoring Networks\Petaluma Valley\PET_MonNet_S_SWGW.mxd Date prepared: 10/5/2020

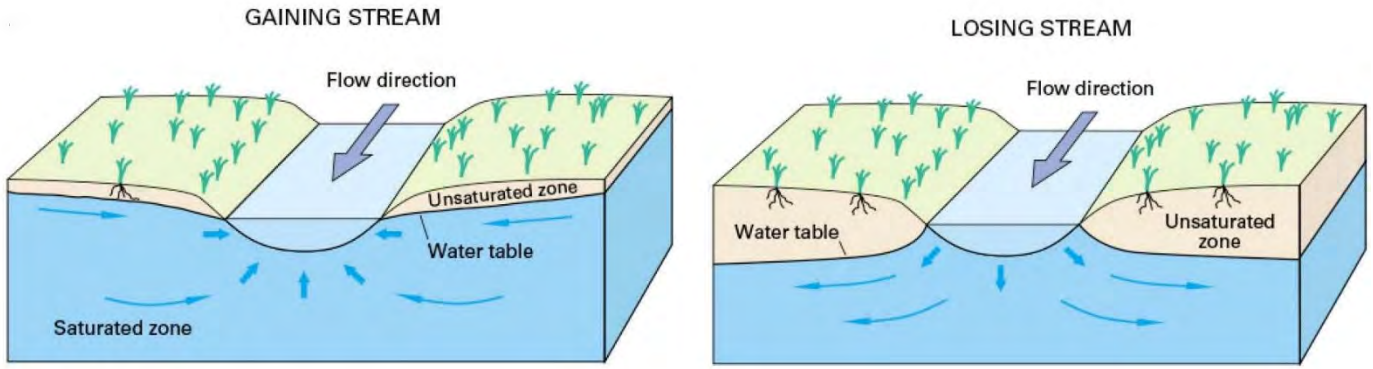
Interconnected Surface Water Mapping– Andy Rich

What is Interconnected Surface Water?

- “Interconnected surface water refers to surface water that is hydraulically connected at any point by a continuous saturated zone to the underlying aquifer and the overlying surface water is not completely depleted.” (23 CCR § 351)

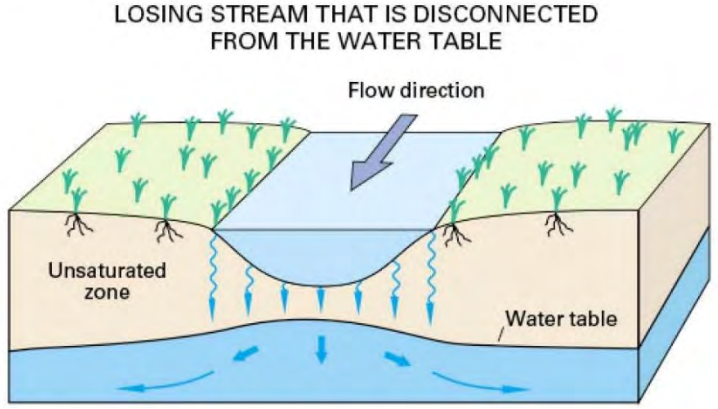
What is Interconnected Surface Water?

Many surface water bodies are ***interconnected with groundwater*** and exchange water between each reservoir.



Some surface water systems can be completely ***disconnected from groundwater***.

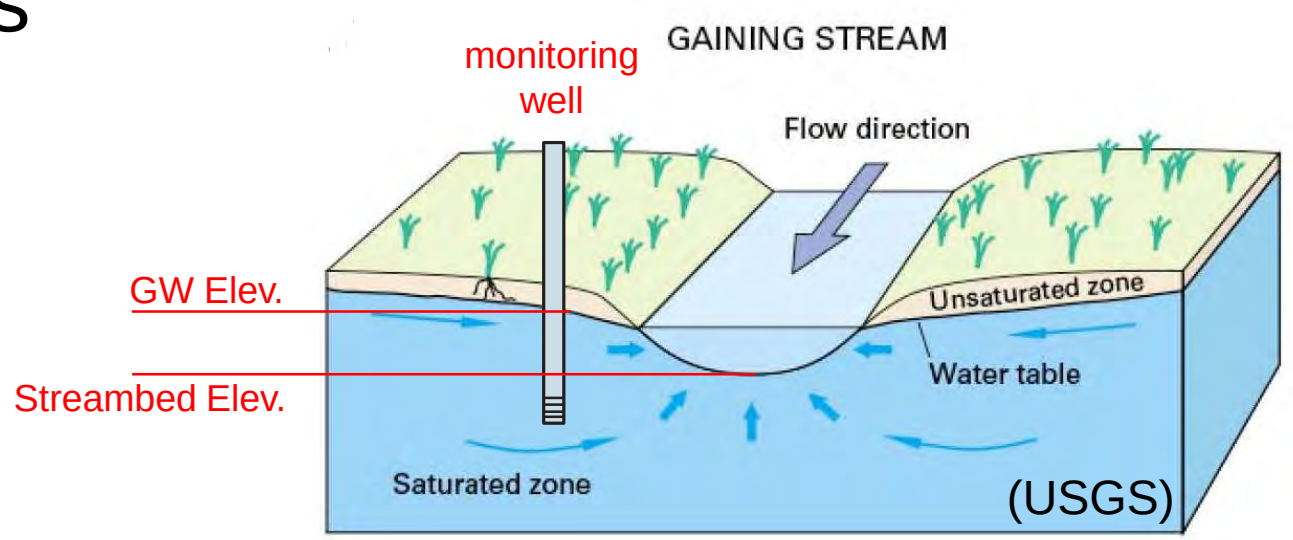
A surface water body may be connected to groundwater during some periods and disconnected during other periods.

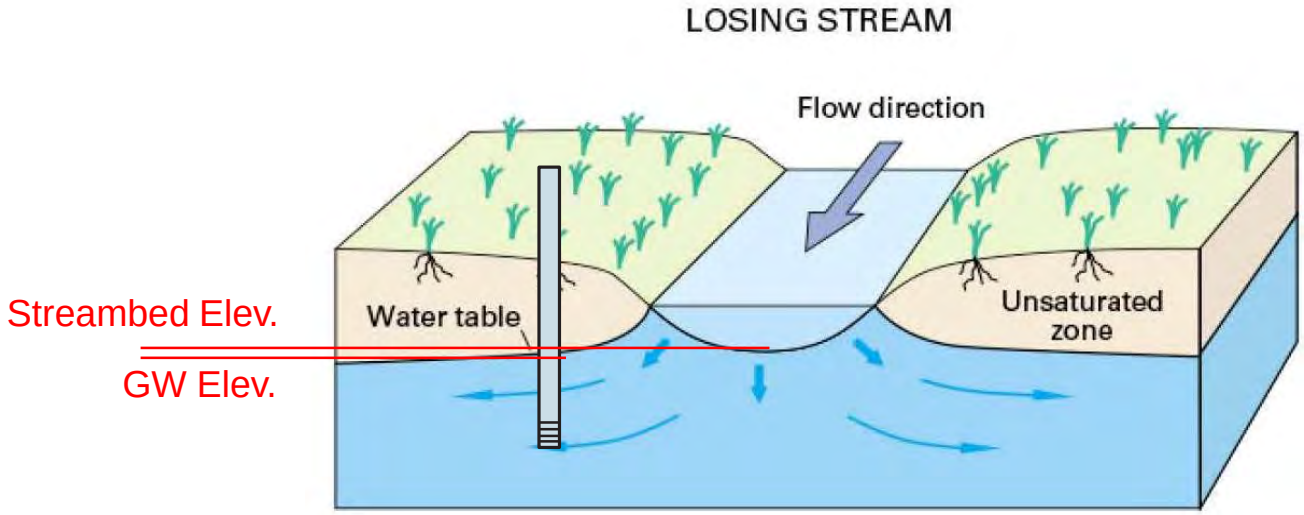


(USGS)

Shallow GW monitoring wells can help characterize ***local*** gaining/losing conditions

Interconnected surface water is either ***gaining*** or ***losing*** water from groundwater, depending on the gradient, as measured by shallow monitoring wells.





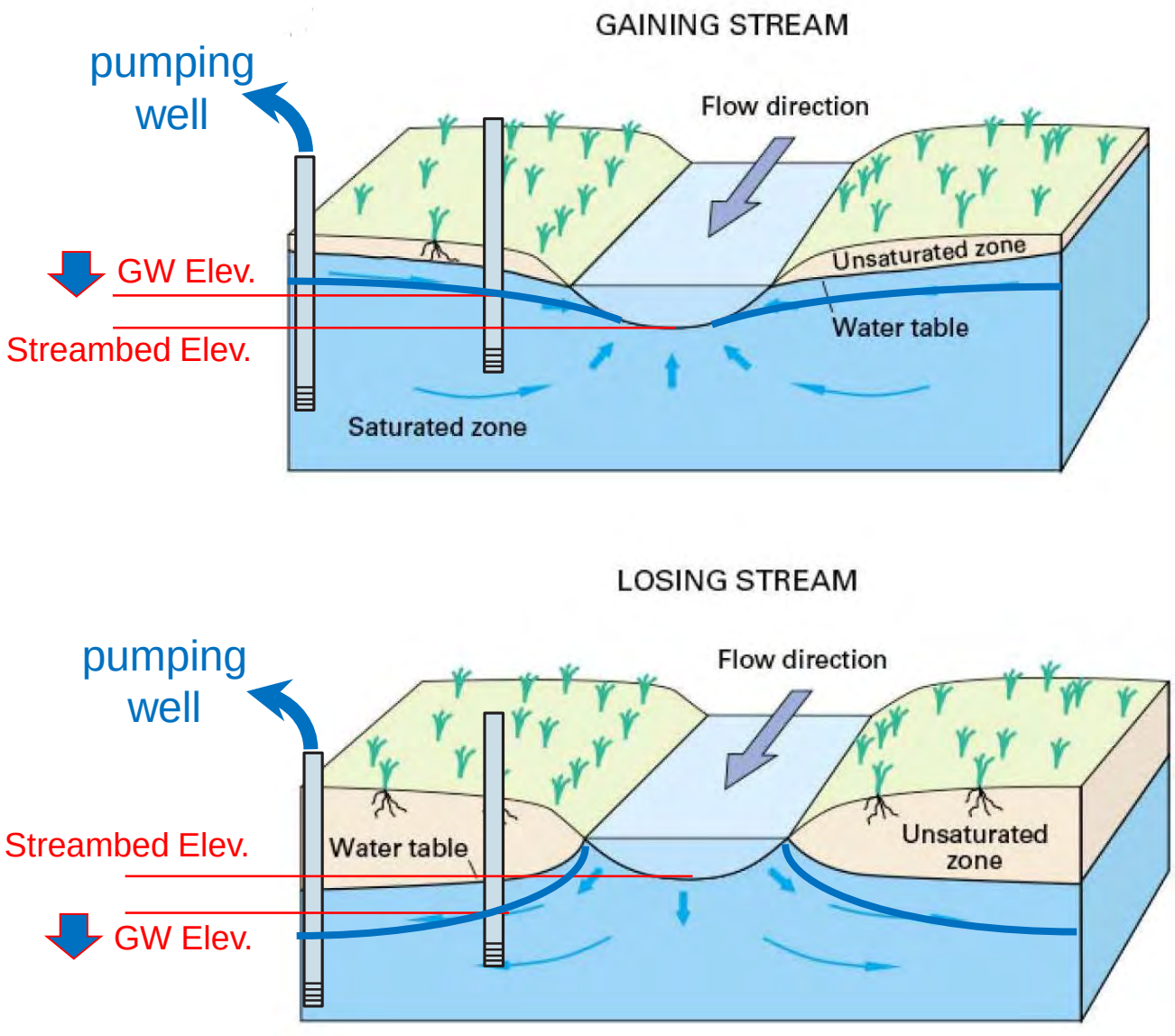
How can pumping at a well impact streamflow?

Pumping can ***decrease groundwater gains*** to surface water, or ***increase surface water losses*** to groundwater …

… phenomenon known as "Surface Water Depletion"

Depletion is a function of multiple factors:

- proximity to the river
- pumping rate
- climatology
- local geology
- geomorphology



Interconnected Surface Water – Requirements and Approach

Defined in the GSP Regulations as ***surface water that is hydraulically connected at any point by a continuous saturated zone to the underlying aquifer and the overlying surface water is not completely depleted*** (DWR, 2016).

Define with available data/existing tools using multiple lines of evidence (tools and datasets vary for each basin)

Sonoma Valley Approach

(1) results of seepage run monitoring;

(2) frequency of observed or measured streamflow;

(3) comparison of interpolated groundwater levels within the shallow aquifer system and streambed elevations; and

(4) high frequency groundwater level observations from shallow monitoring wells located near streams.

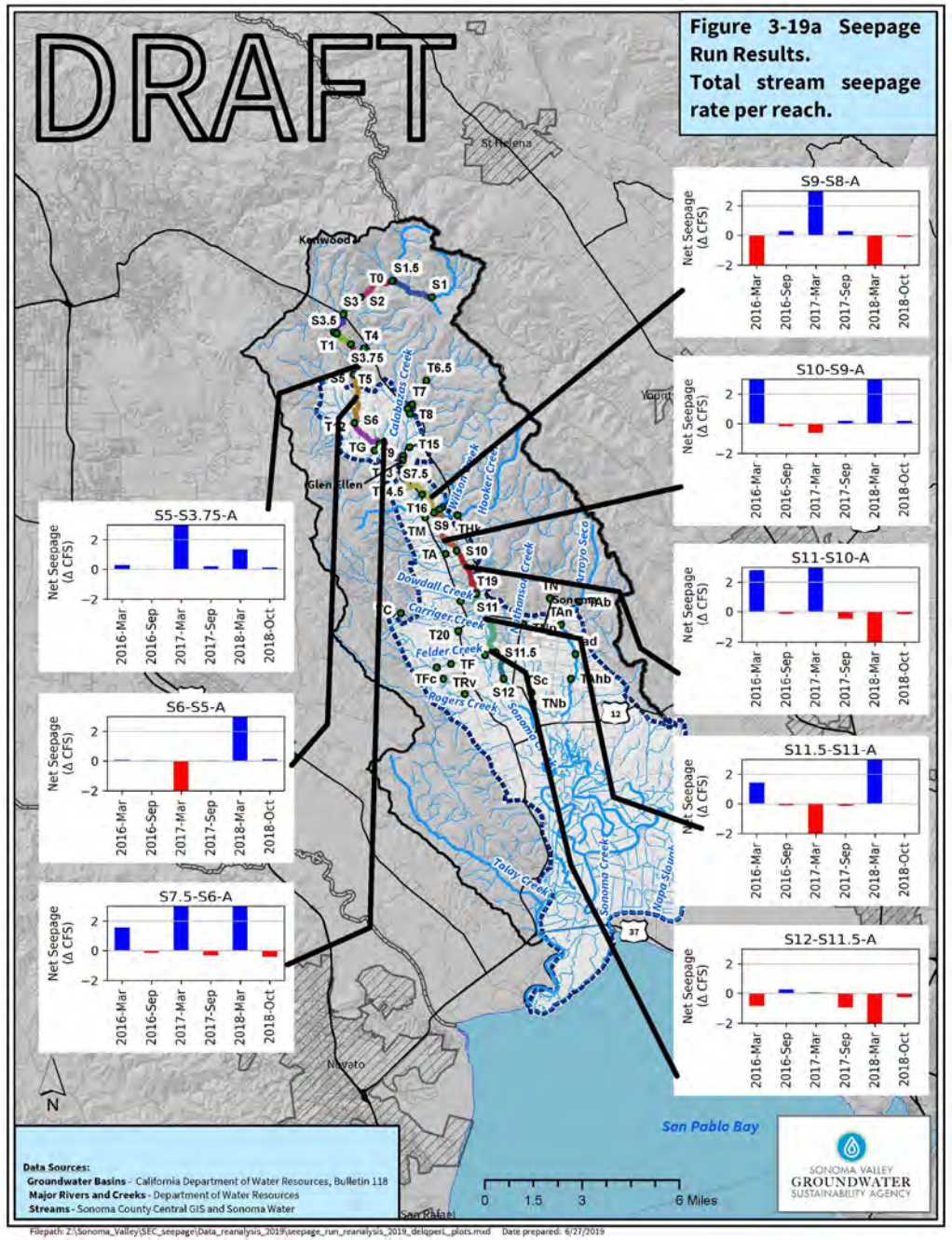
Did not use modeled interactions

Santa Rosa Plain Approach

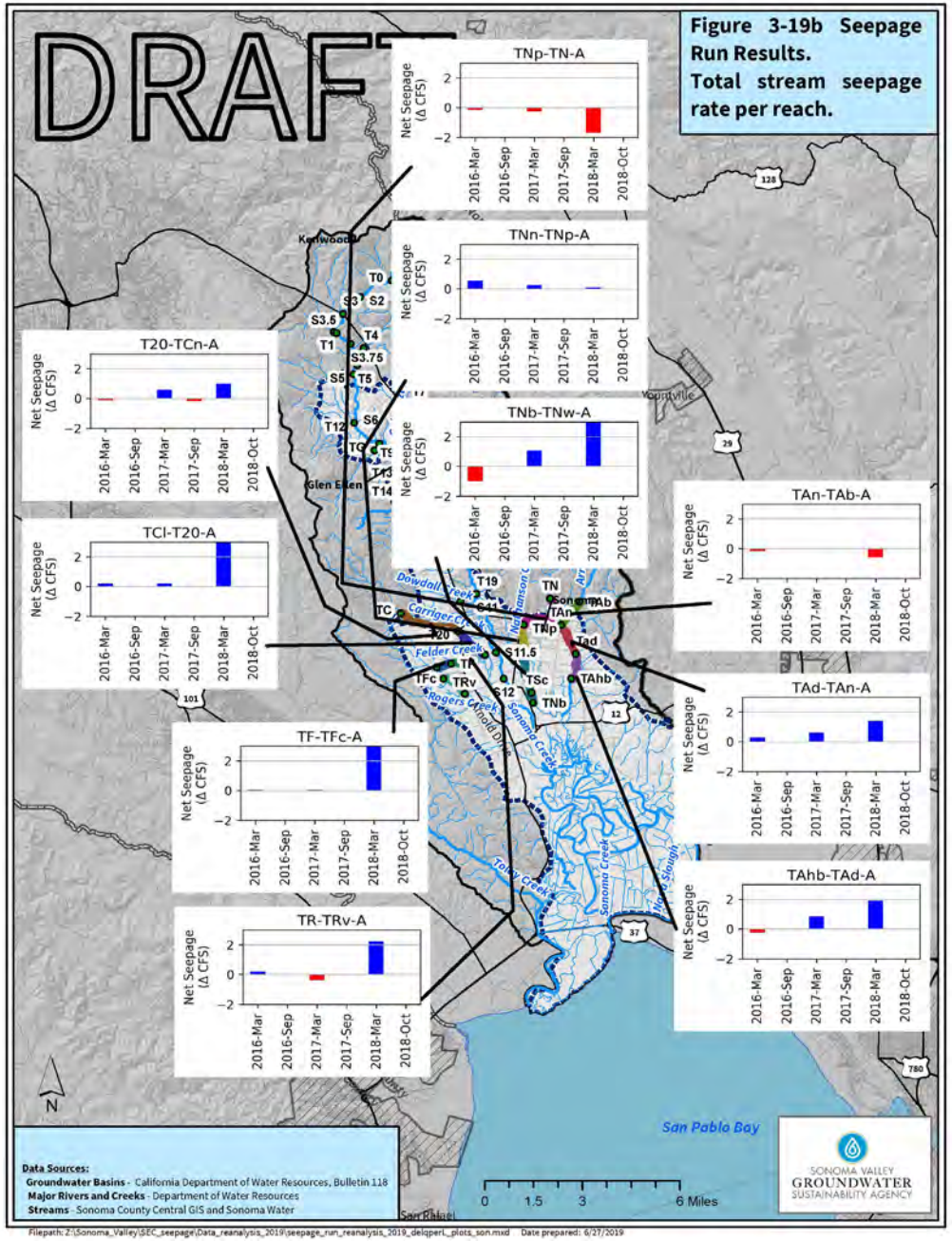
1) measured groundwater level and streambed elevation differences
2) modeled output derived from Wolfenden et al (2014)
    - Percent of time stream is gaining
    - Median streamflow
    - Surface leakage

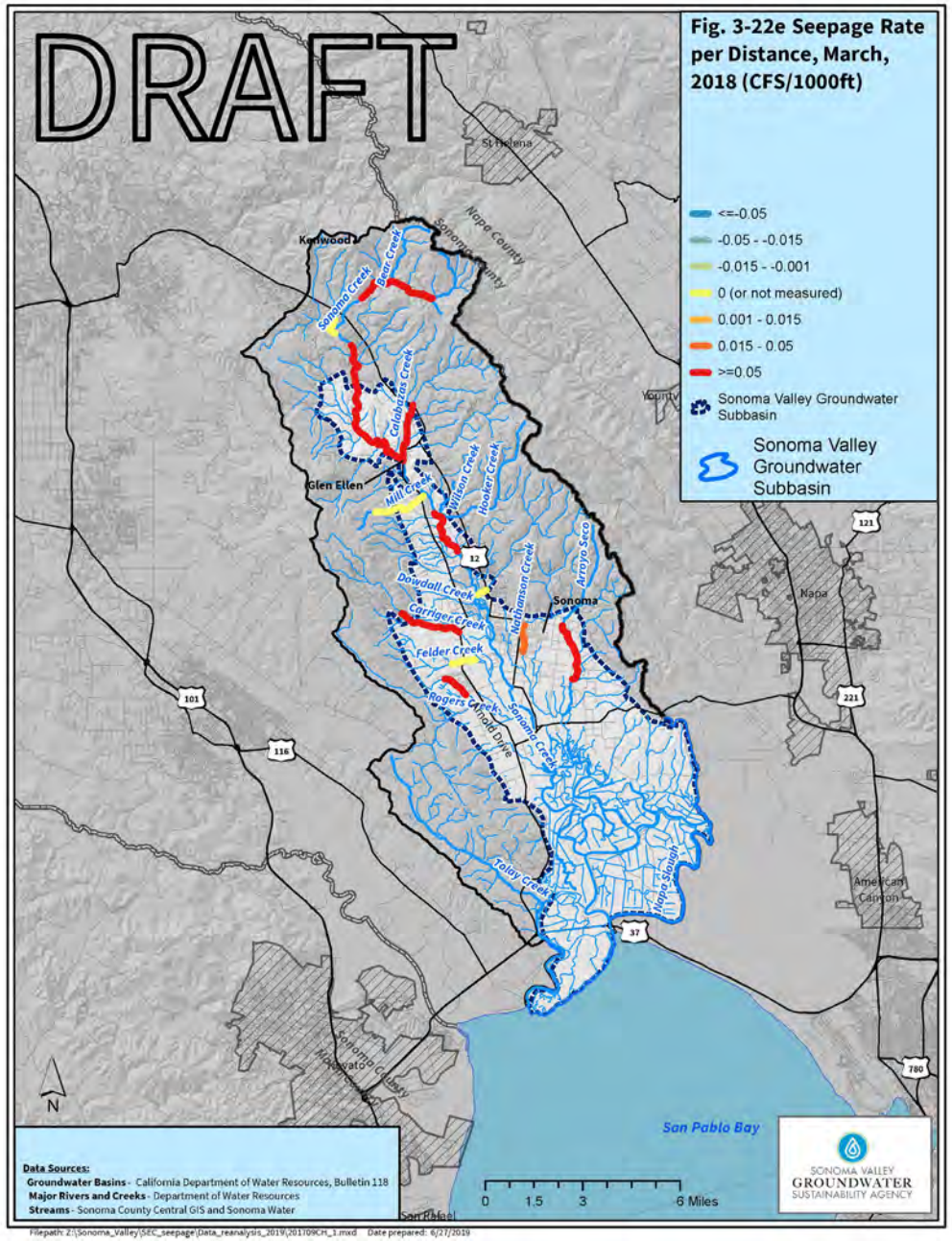
Additional information used in the assessment:

- streamflow seepage exchange through differential gaging
- baseflow separation of observed streamflow records

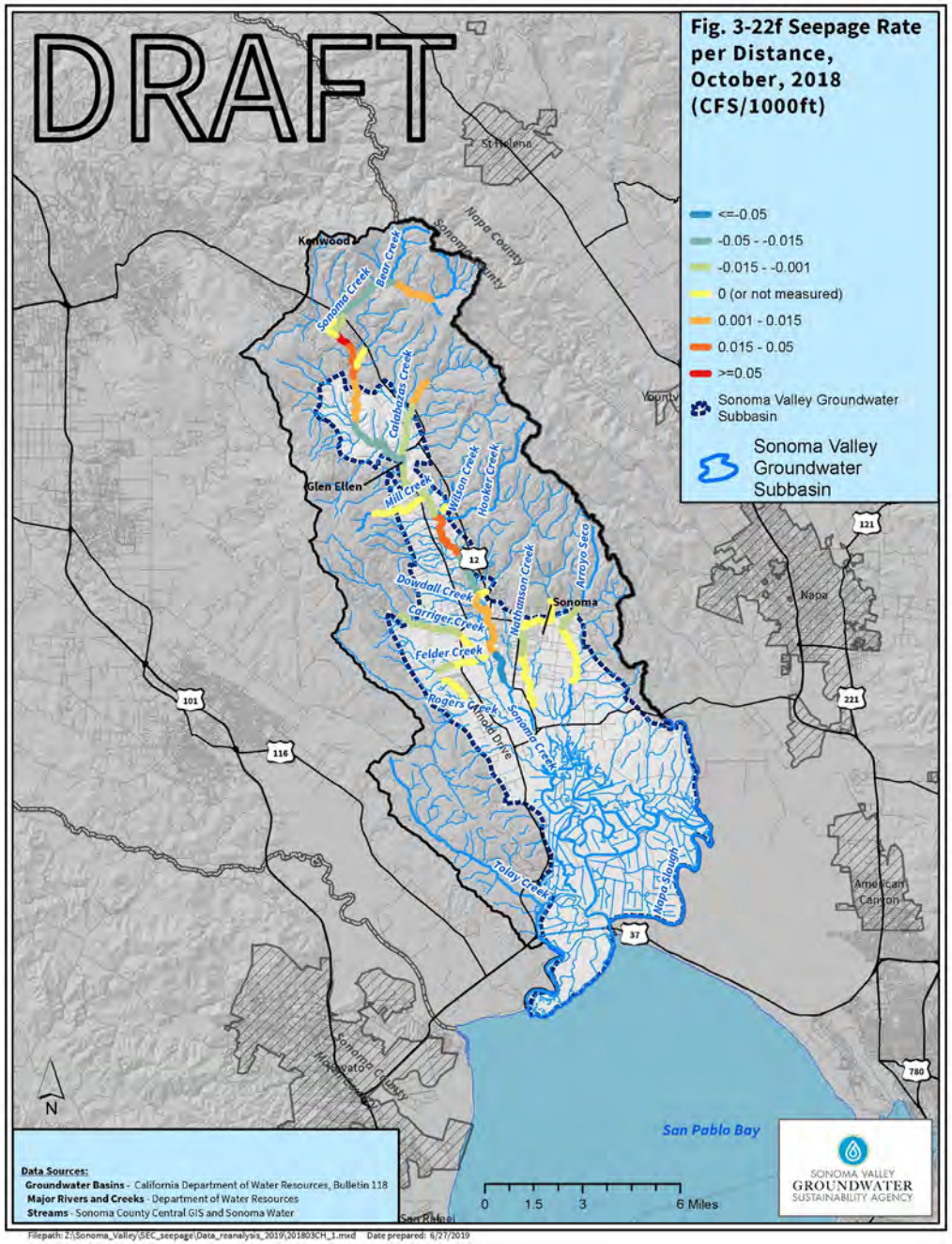


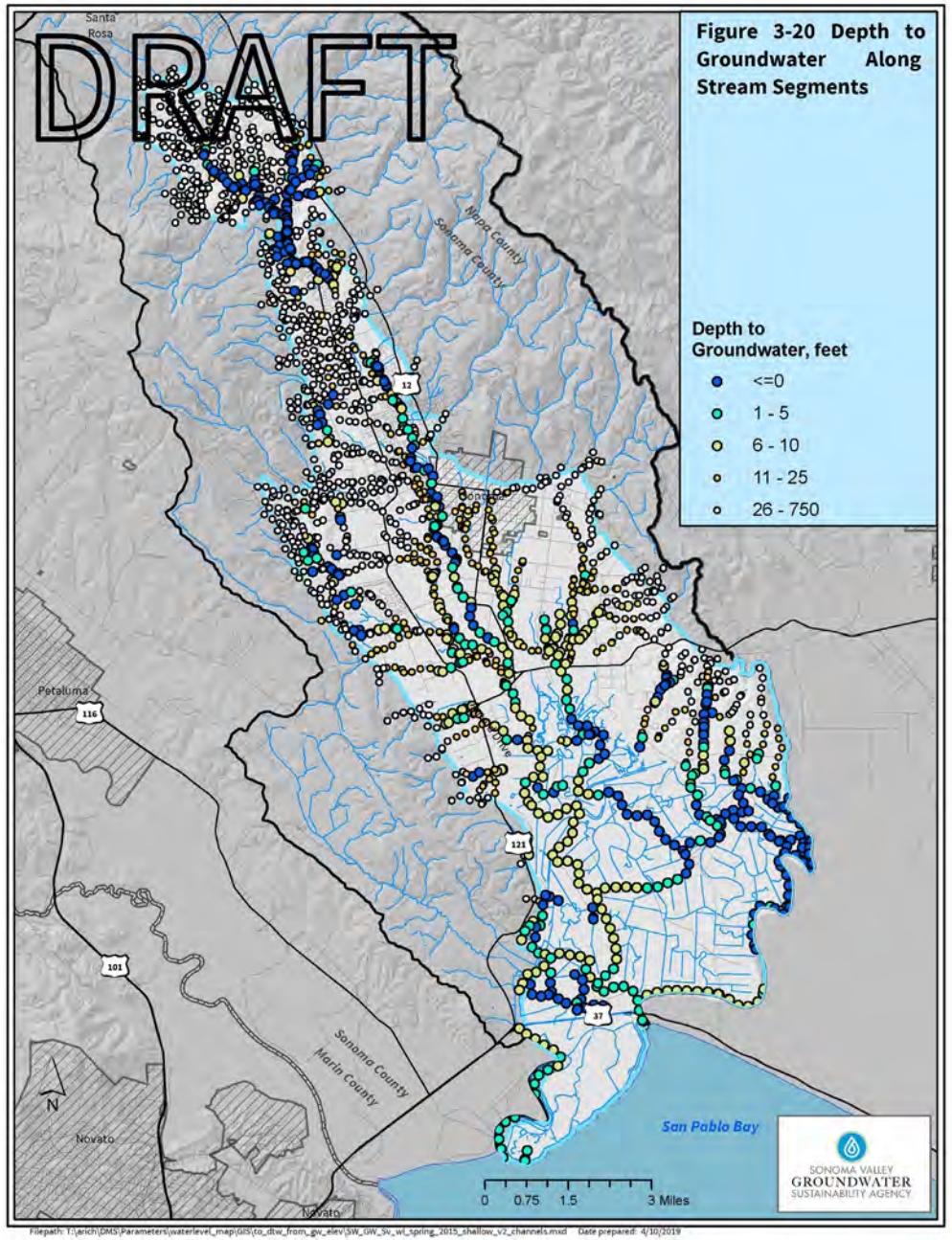
Sonoma Valley Seepage Runs: Total Seepage Rate per Reach



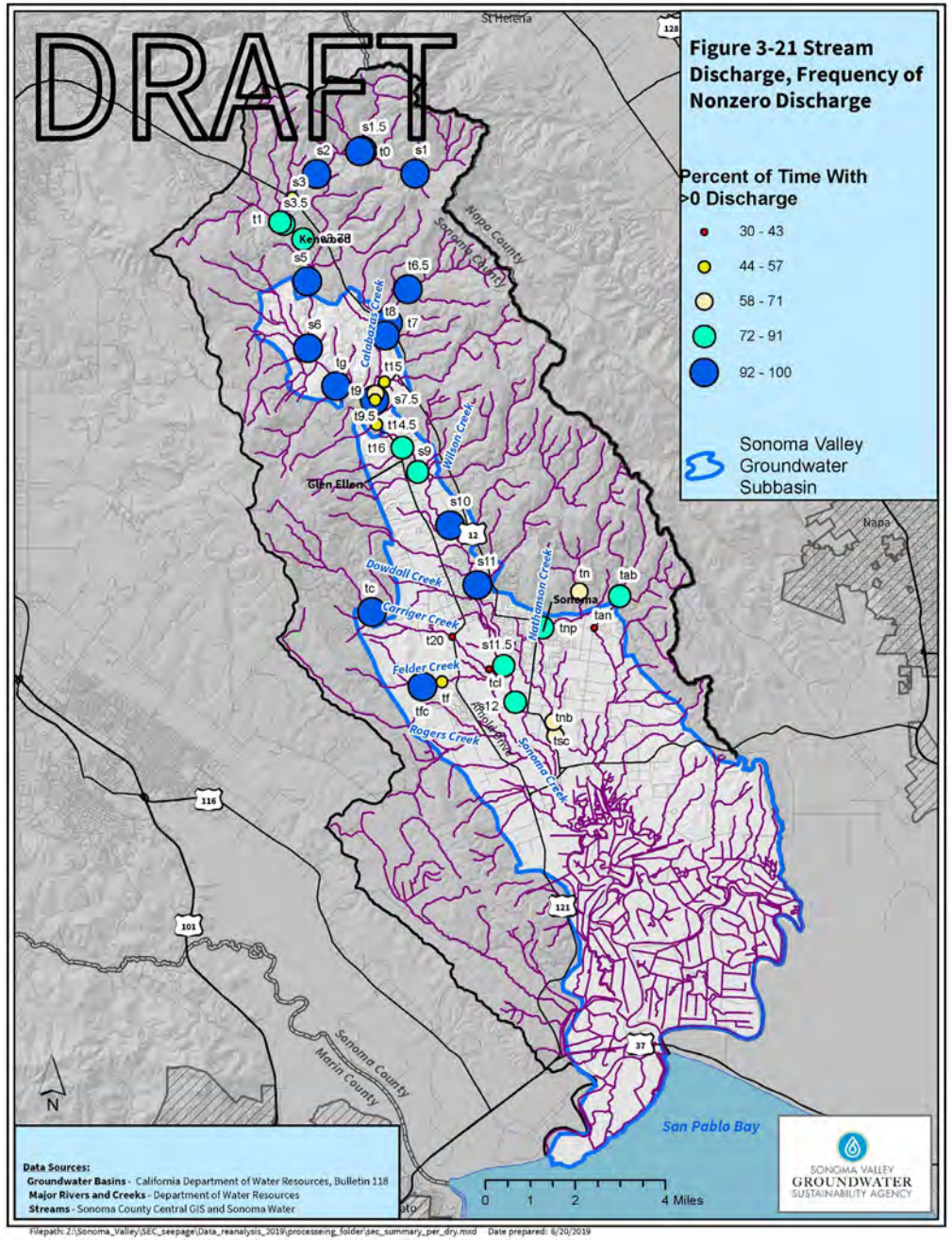


Sonoma Valley Seepage Runs: Total Seepage Rate Distance





Sonoma Valley Depth to Groundwater along Stream Segments & Frequency of Nonzero Discharge



Sonoma Valley Interconnected Surface Water Map

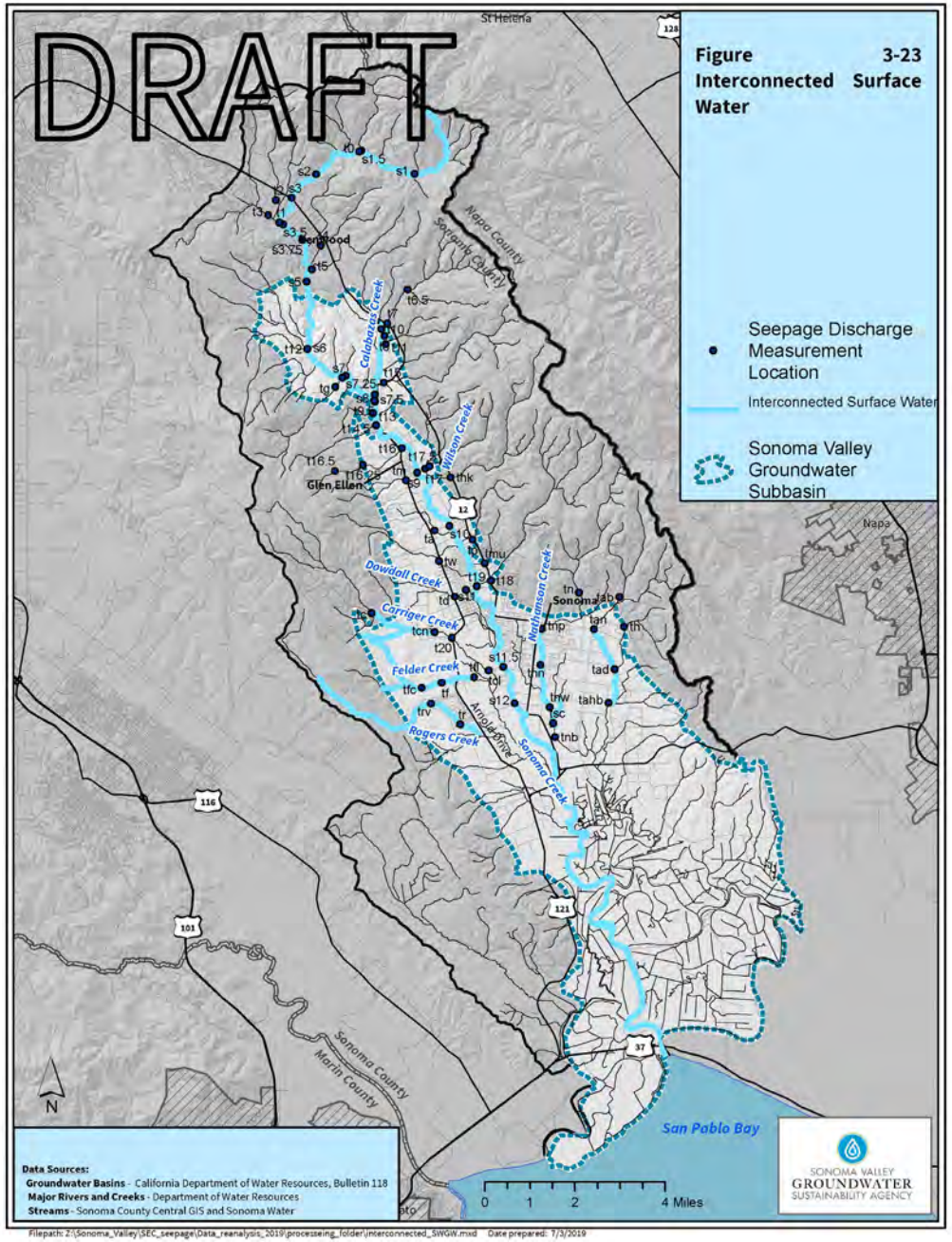


Figure 3-18b Percent of time Stream is Gaining, from 2000 to 2010

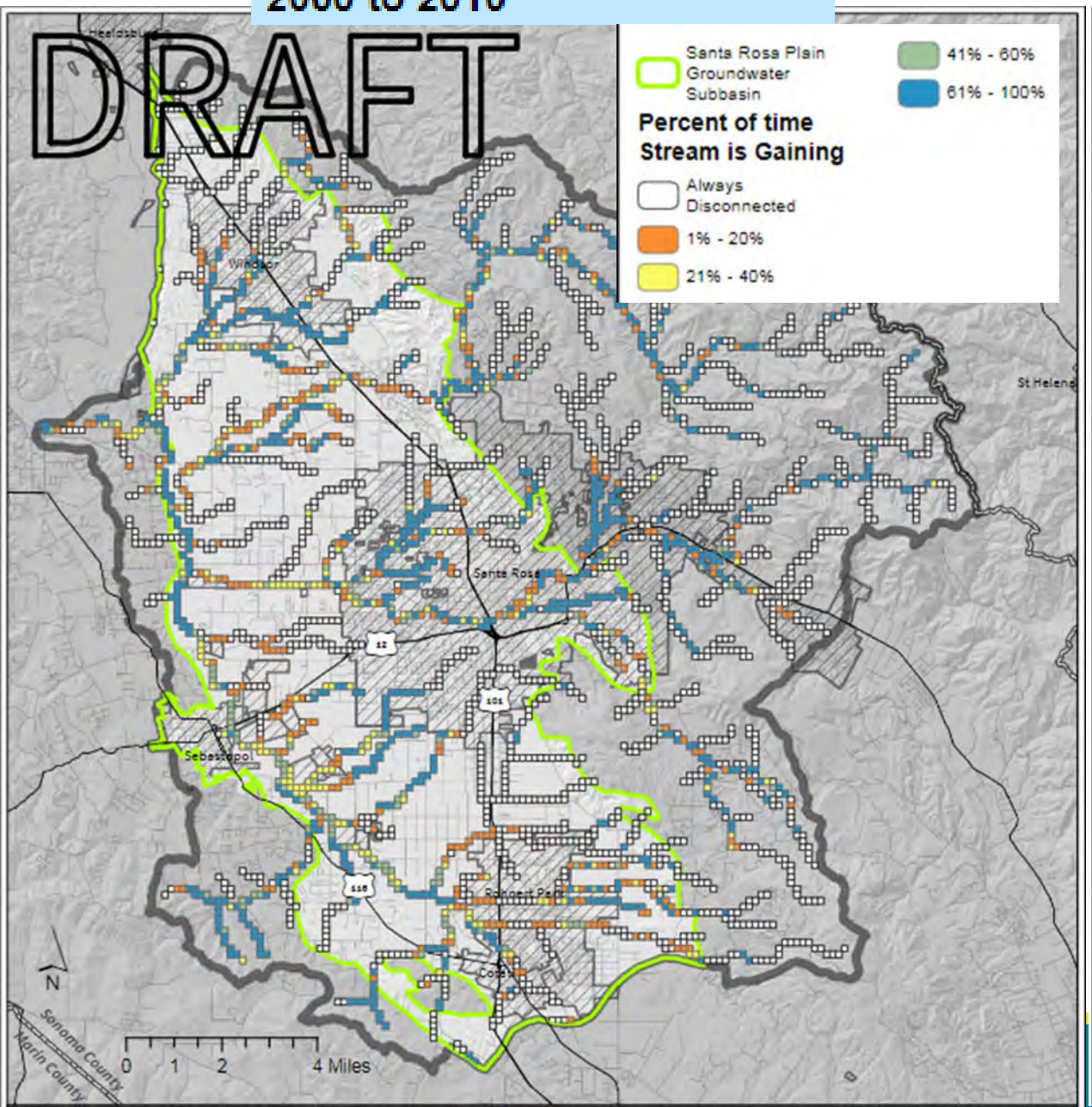


Figure 3-18a Depth to Water Along Stream Channels, Spring 2015

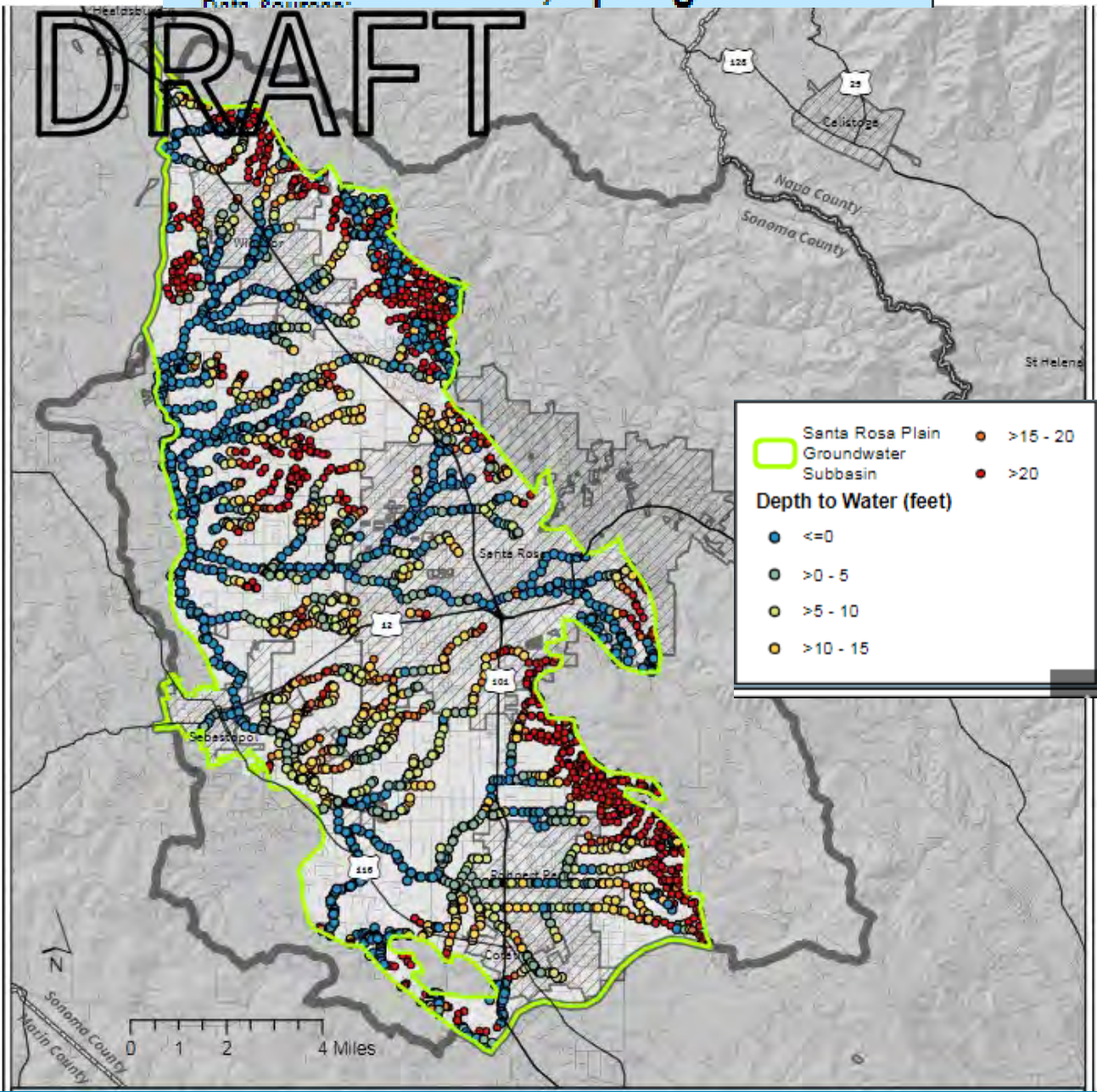


Figure 3-18d Surface Leakage, 2006

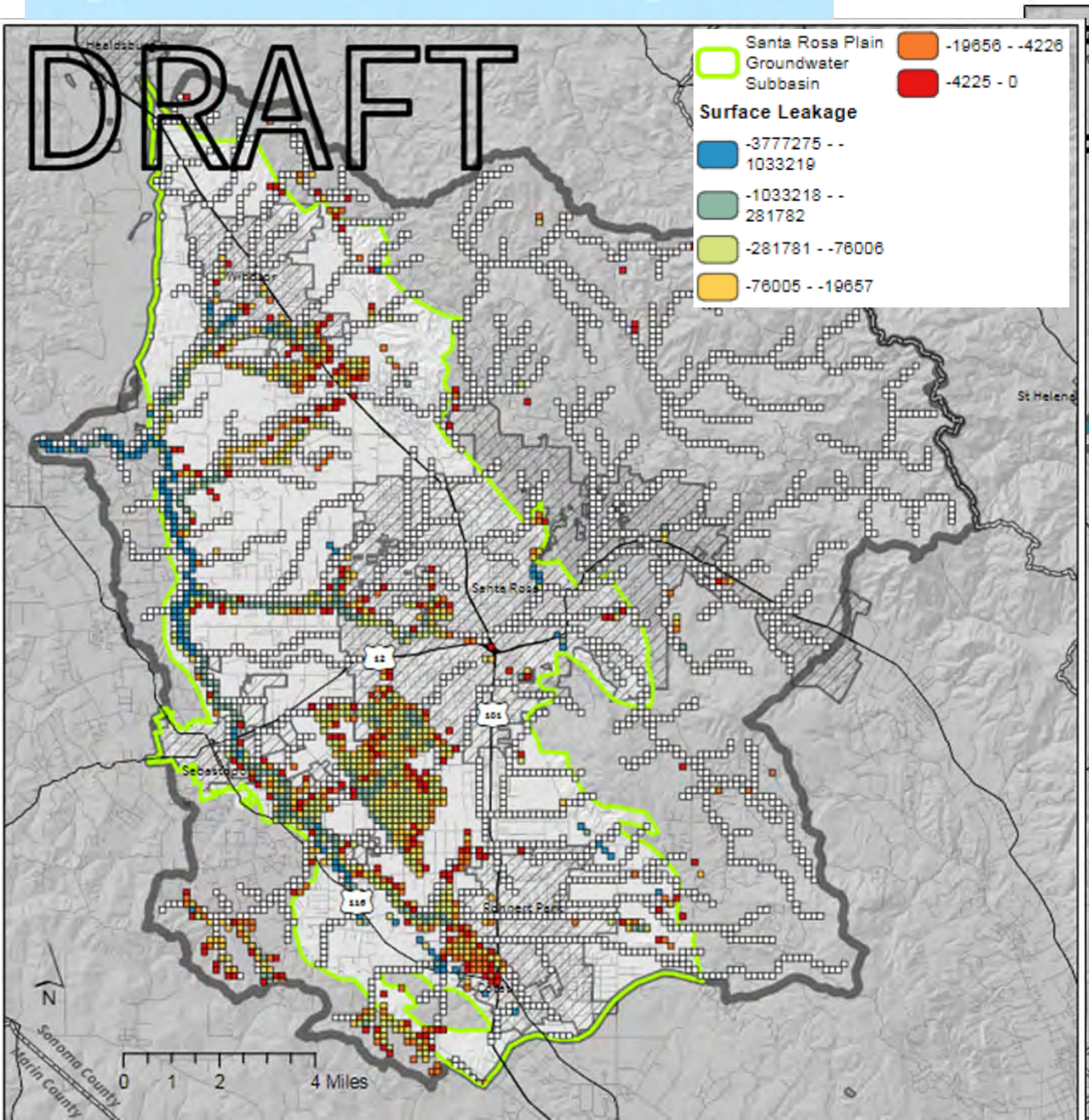
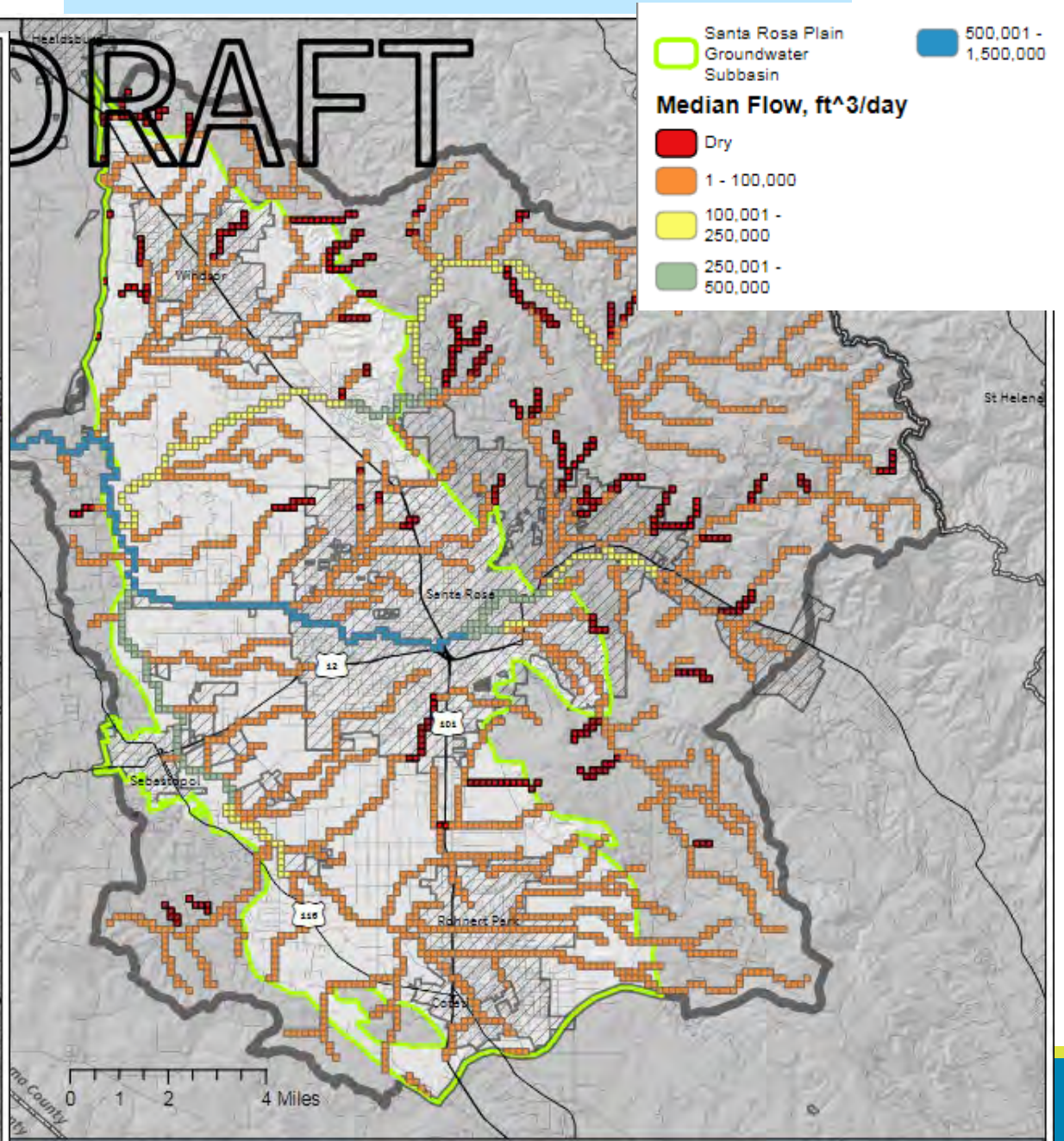


Figure 3-18c Median Flow, from 2000 to 2010



Santa Rosa Plain Interconnected Surface Water Mapping:

- Initial selection of Interconnected Surface Water based on Stream Reaches with 7 or more points (orange –colored cells

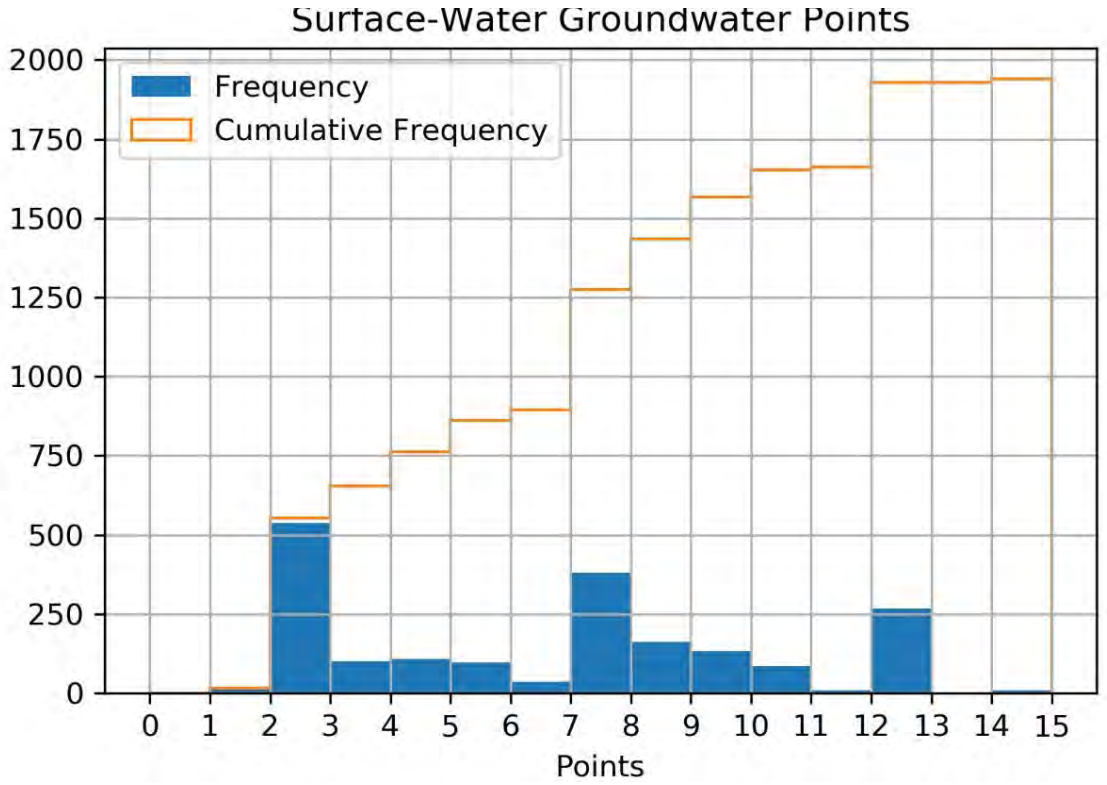
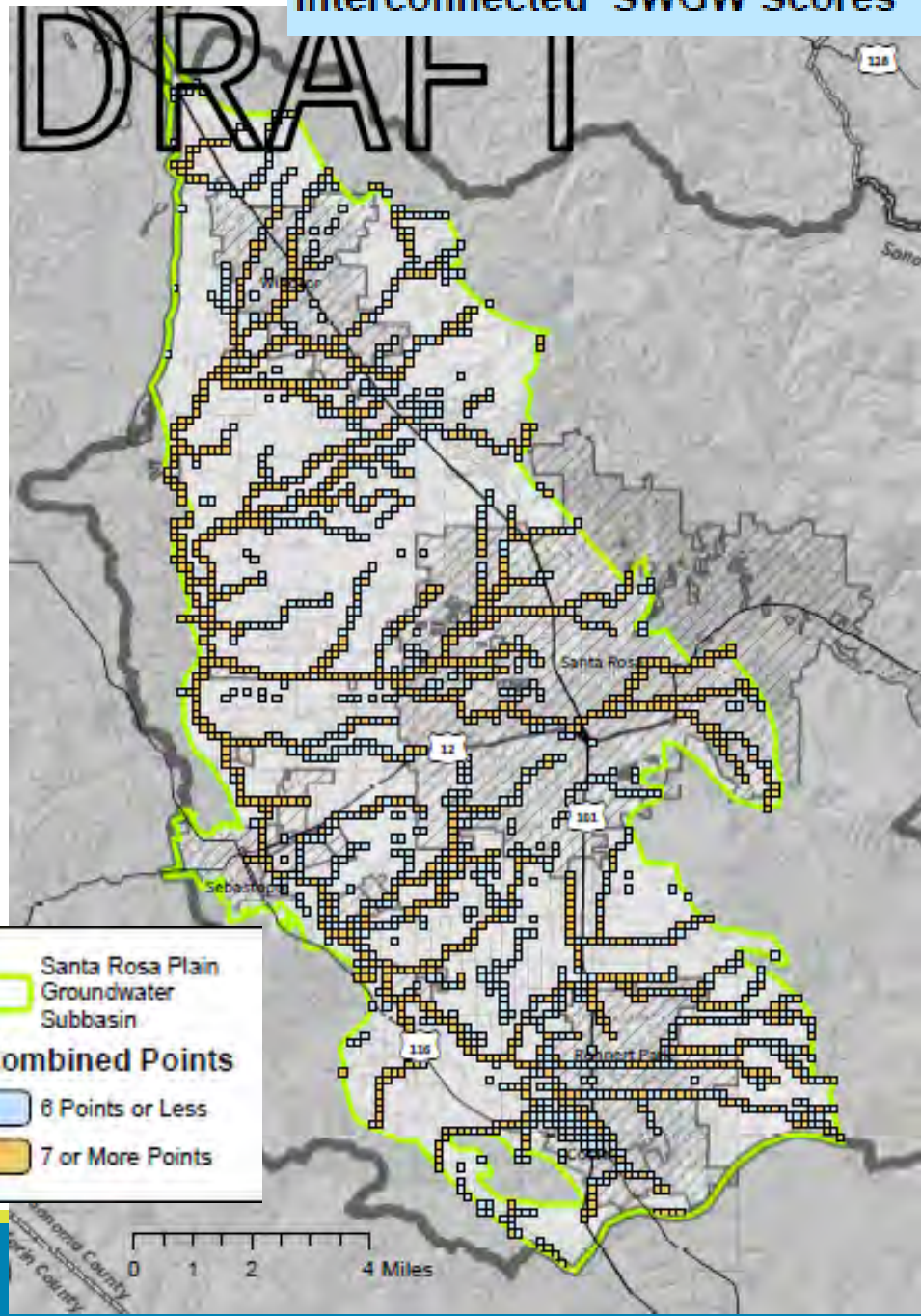


Figure 3-18f Combined Interconnected SWGW Scores

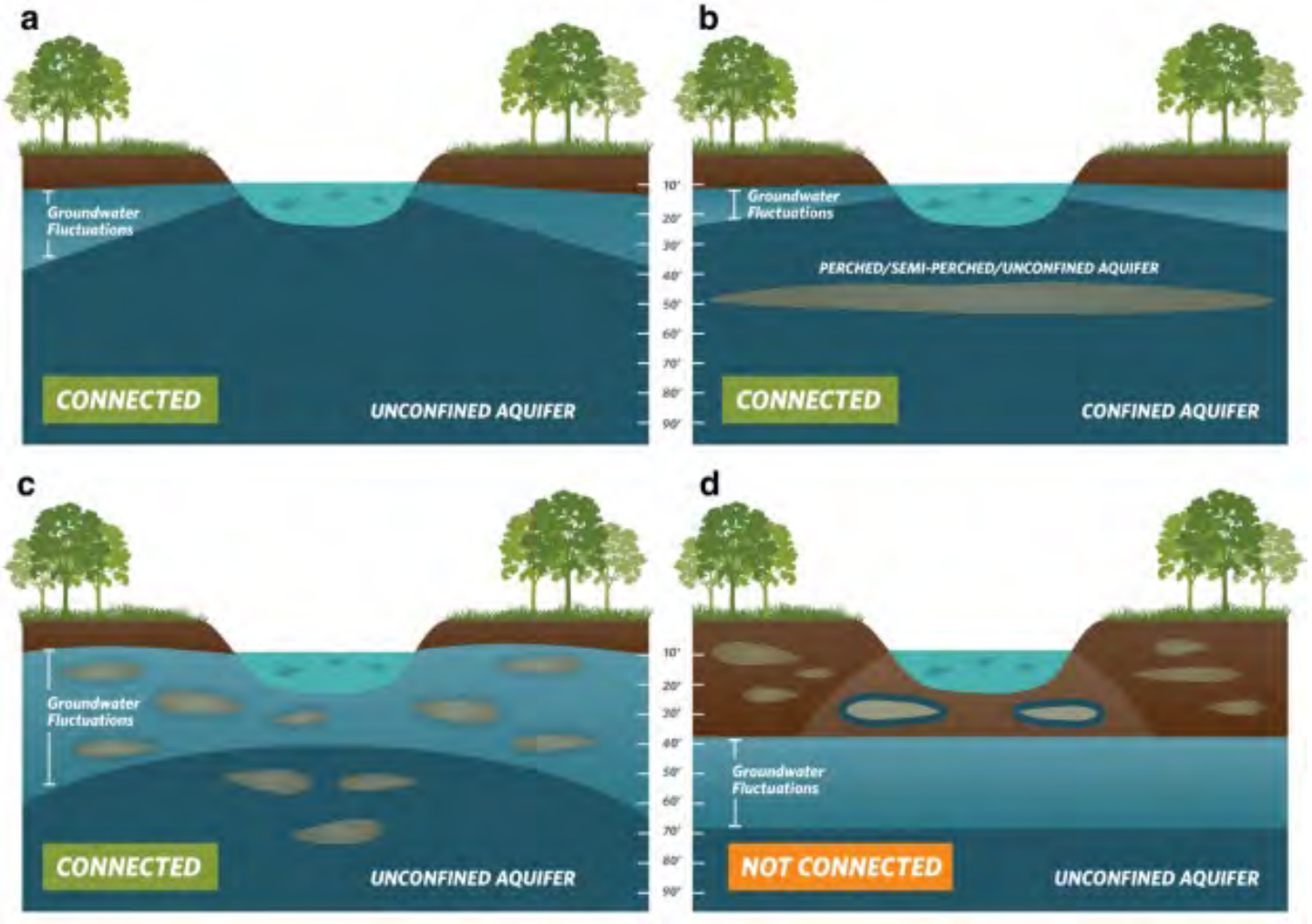


Questions/Discussion

Update on GDE Mapping – Marcus Trotta

Proposed Approach for GDE Mapping

- Focus on ecosystems that can be affected by groundwater conditions and management and are within jurisdiction of GSAs
- Utilize available statewide and local datasets to develop best available information
- Consider using “indicator” species and/or grouping of GDEs with similar characteristics/habitat needs
- Prioritize GDEs for consideration in developing SMCs for Surface Water Depletion (separate workgroup)



https://groundwaterresourcehub.org/

Source: The Nature Conservancy, Identifying GDEs Under SGMA Best Practices for using the NC Dataset, 2019

.

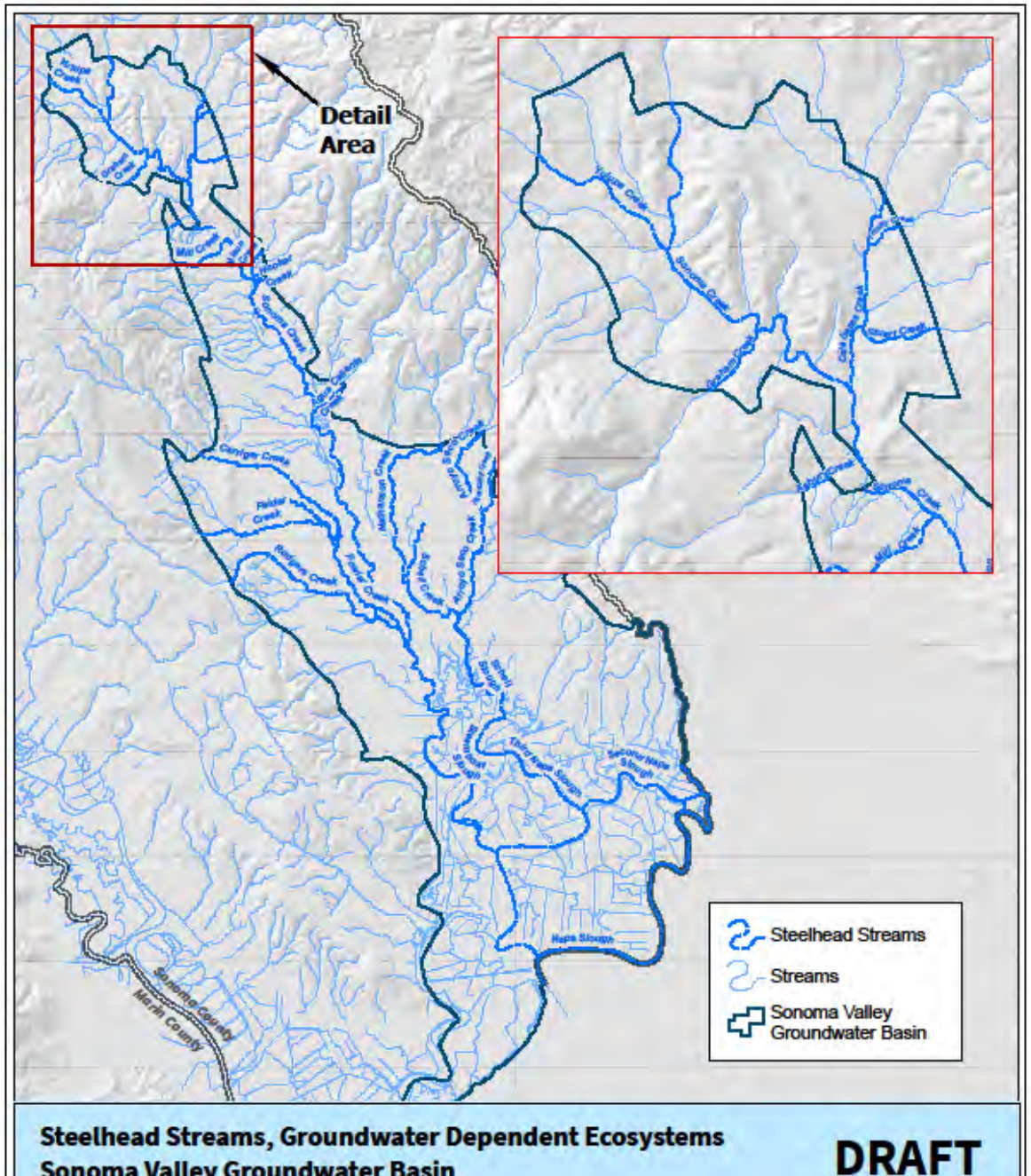
Preliminary Aquatic Groundwater Dependent Species Update

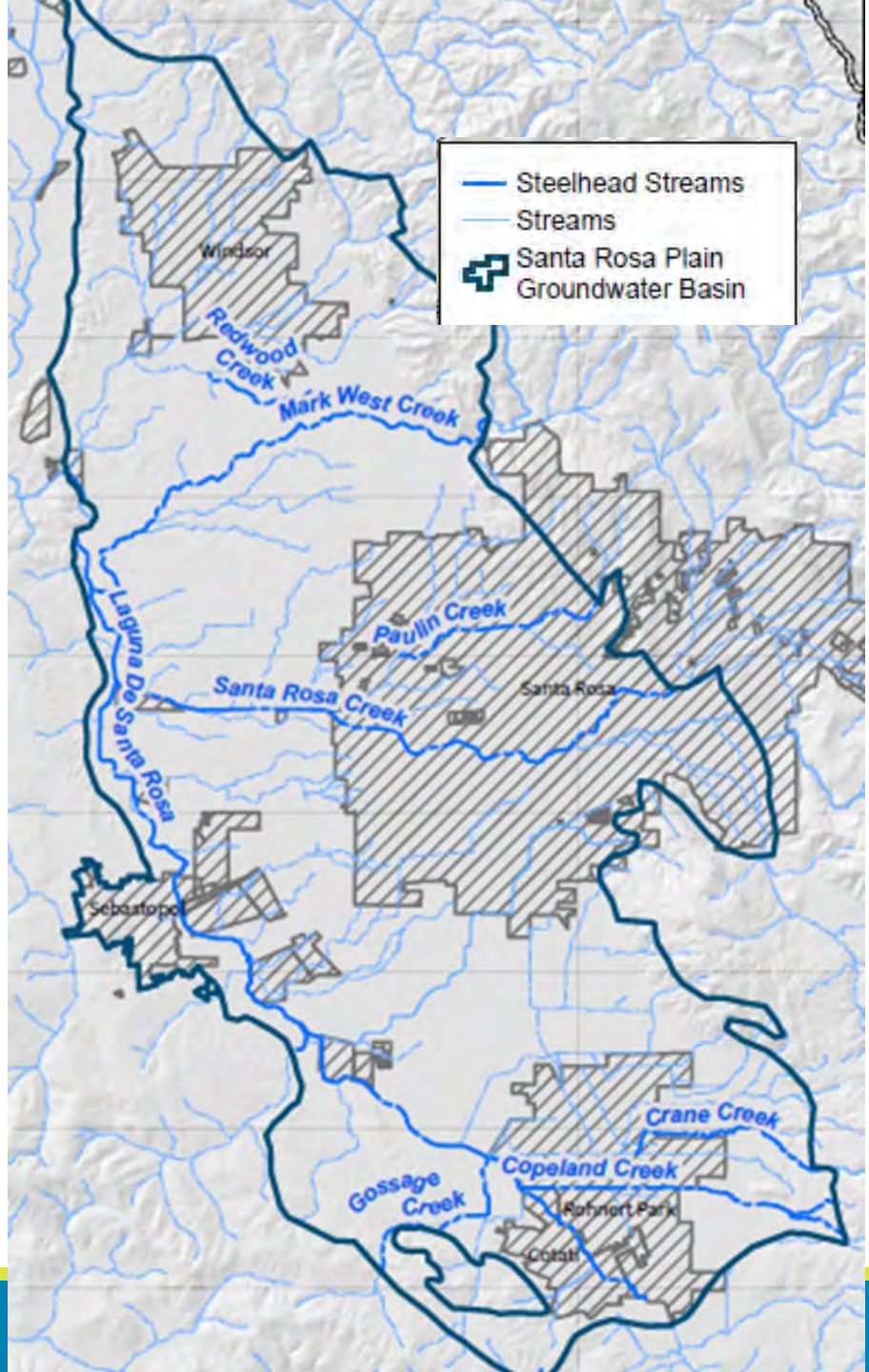
- Animals considered are listed in Critical Species LookBook (Rohde et al. 2019)
  - steelhead, Chinook salmon, coho salmon, California red-legged frog, and California tiger salamander.
  - Also, endangered California freshwater shrimp considered at the request of resource agency staff.
  - California tiger salamander excluded because species has “no known reliance on groundwater” (Rohde et al. 2019).
- Distribution of target species is based on:
  - Leidy et al. (2005), Salmonid Sample Frame Development for Coastal Monitoring Plan Implementation in the Russian River Watershed.
  - California Natural Diversity Data Base.

Preliminary Aquatic Groundwater Dependent Species (continued)

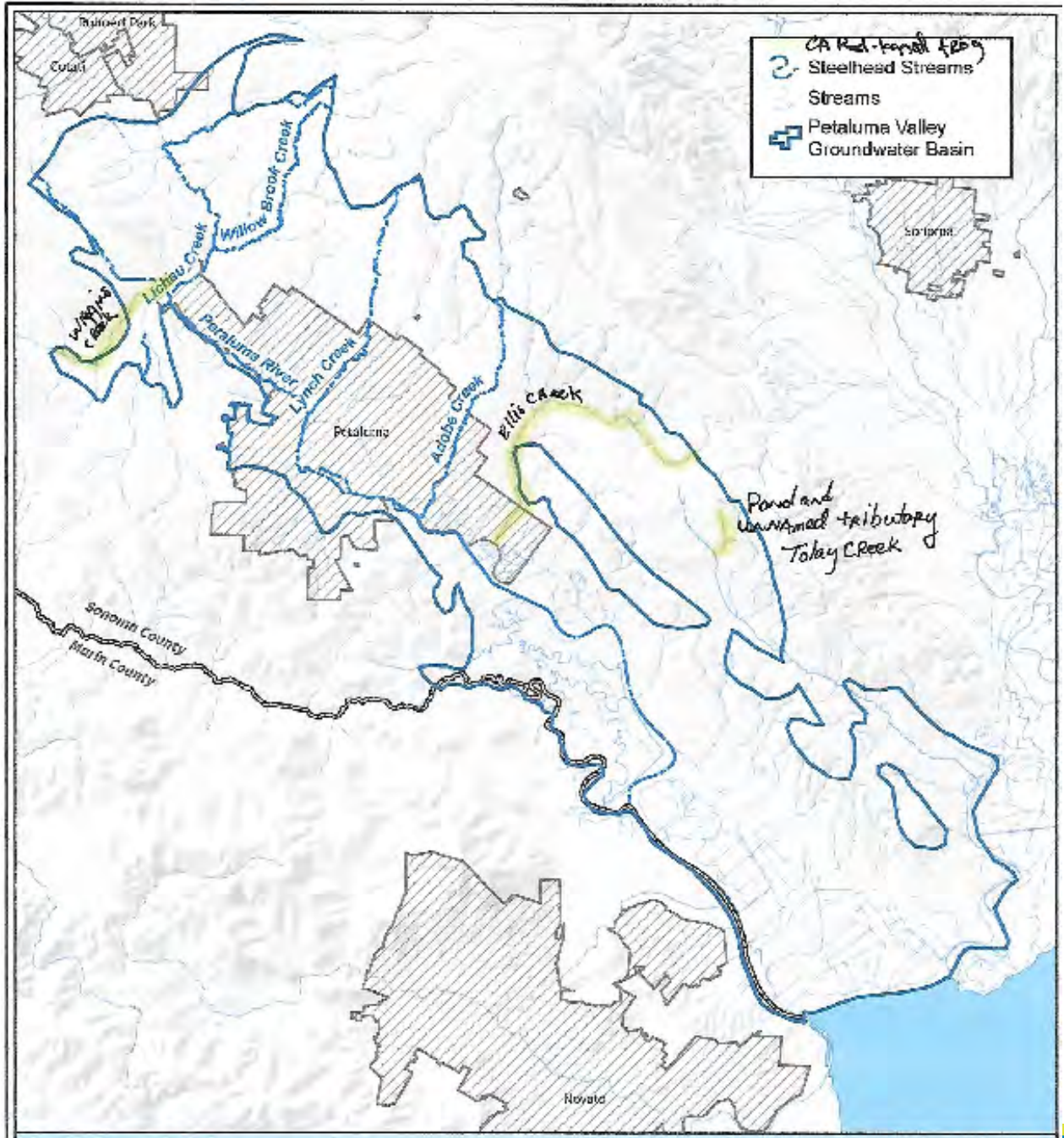
- A total of 35 streams were identified as habitat for at least one target species.
- Steelhead was the most wide spread species occurring in 32 (91%) of all streams.
- In Petaluma Valley, California red-legged frog occur in three streams not identified as a steelhead stream.
  - Wiggins Creek and Ellis Creek
  - Pond on unnamed tributary of Tolay Creek (recommend removal)
- Distribution of Chinook salmon, coho salmon, and California freshwater shrimp overlap entirely with steelhead streams.

Preliminary Aquatic Groundwater Dependent Species





Preliminary Aquatic Groundwater Dependent Species: Petaluma Valley



Vegetation Mapping Update

Summary of Methodology

- Map classes used in initial draft maps removed from consideration as GDEs (e.g. vernal pools).

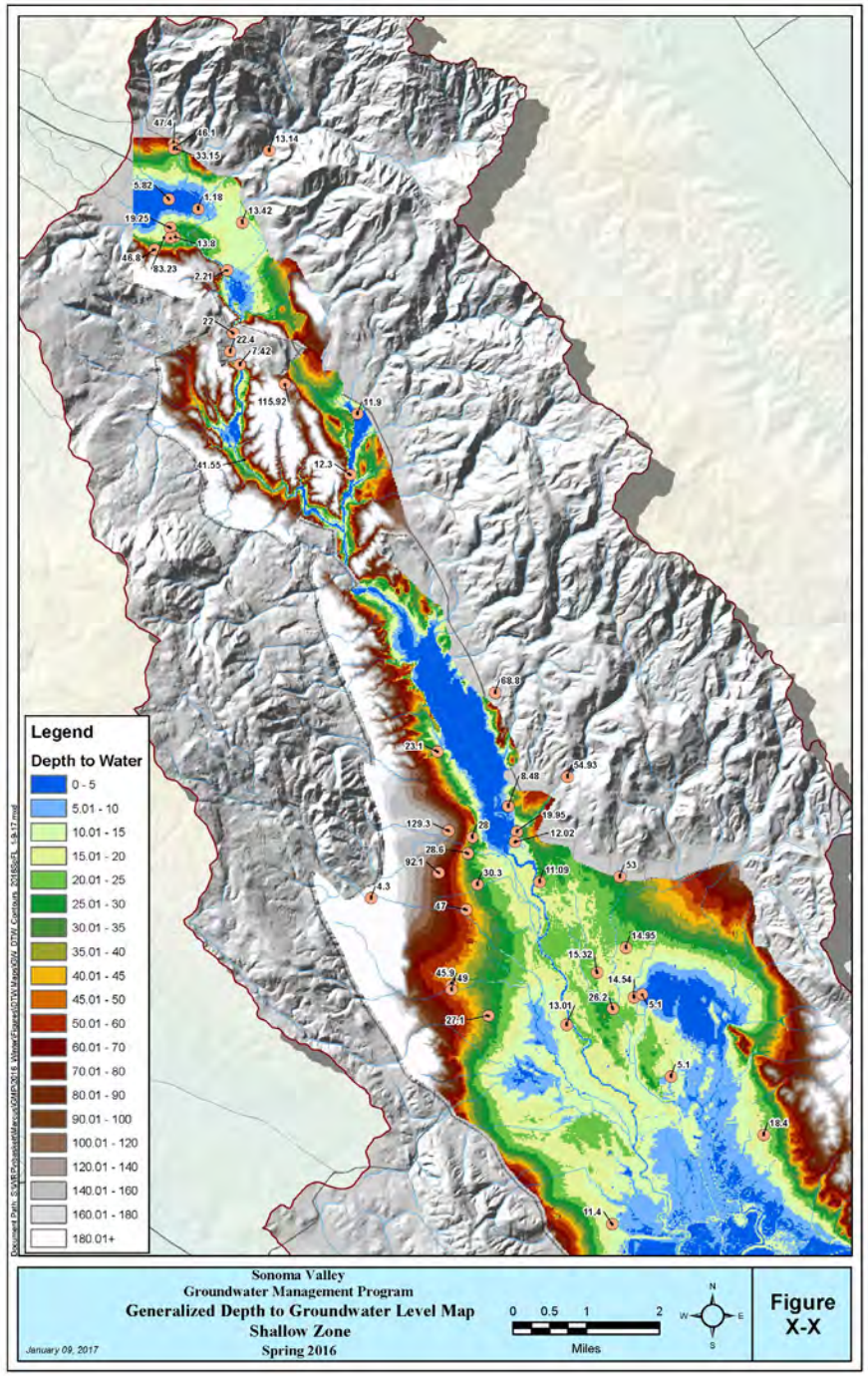
- Incorporate root depths of common tree species as available and compare to depth-to-groundwater (DTW) mapping.

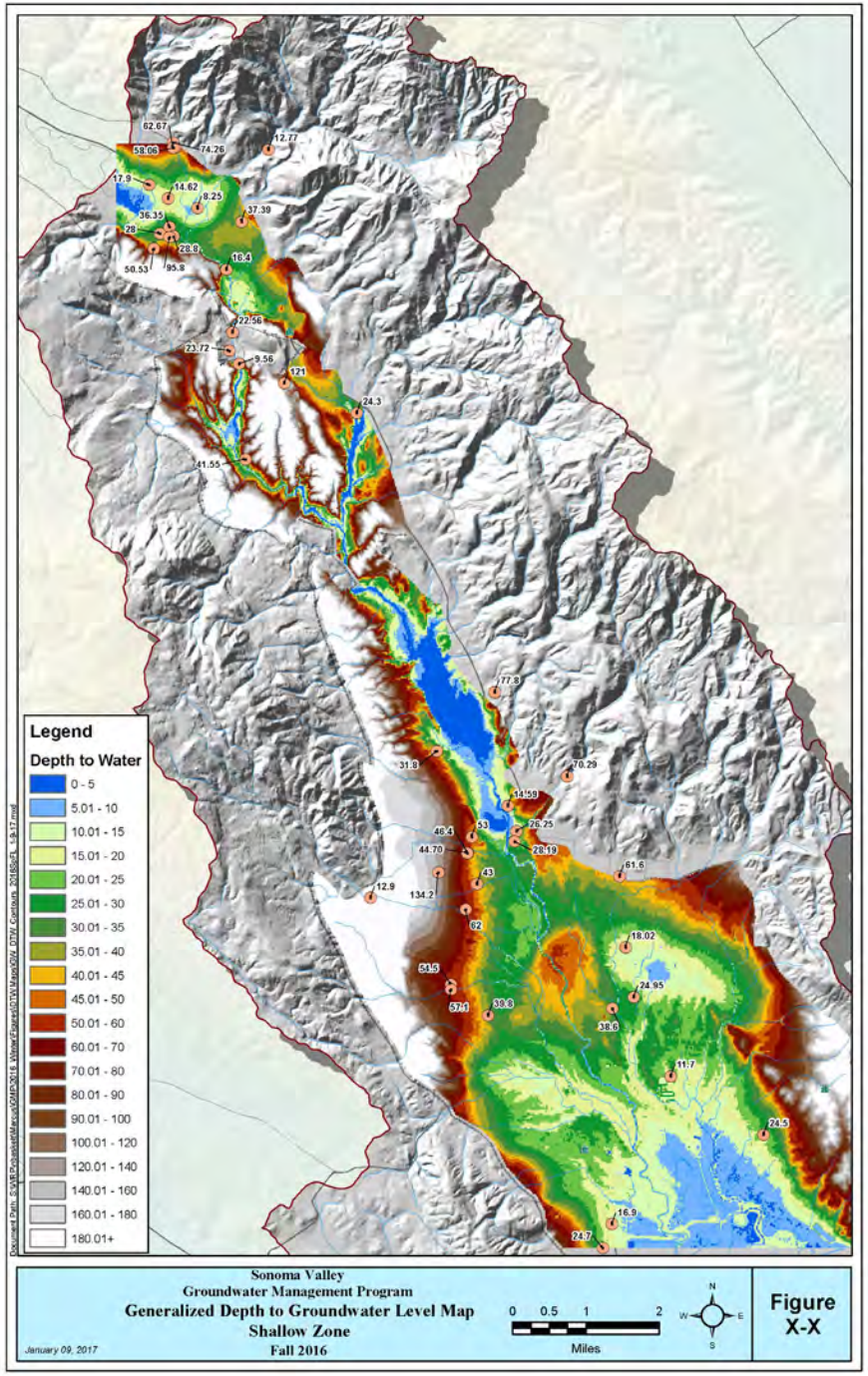
    -Minimal information of rooting depth of riparian tree species
    -Presumably riparian species have relatively shallow root systems
    -*Q. agrifolia* and *Q. lobata* are phreatophytes and common in riparian areas throughout Sonoma County.

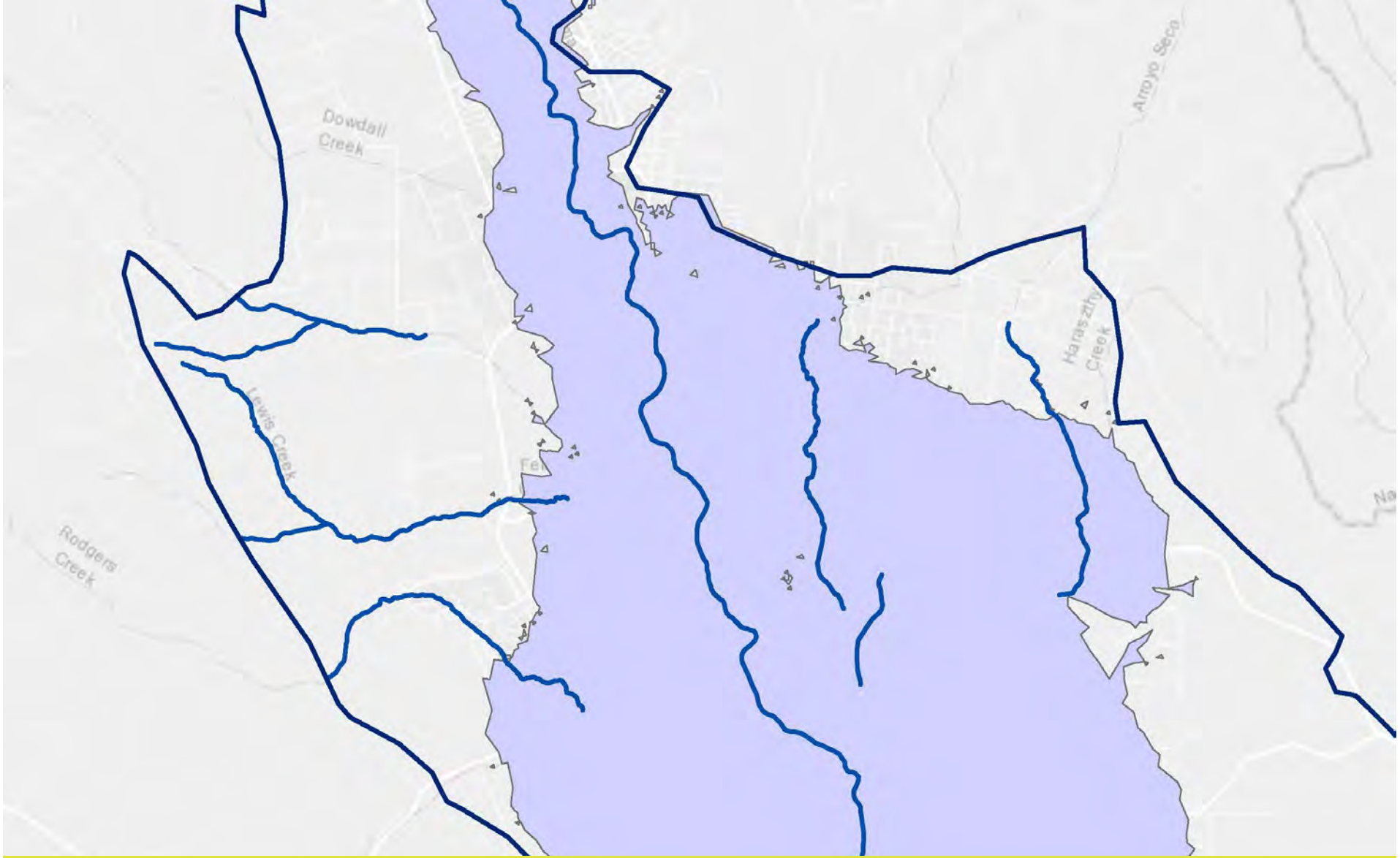
- Selected potential GDEs from areas mapped with depth to groundwater of 30 feet or less.

- Included Riparian Woodland and Oak Woodland habitat within 100 feet of mapped interconnected surface waters.

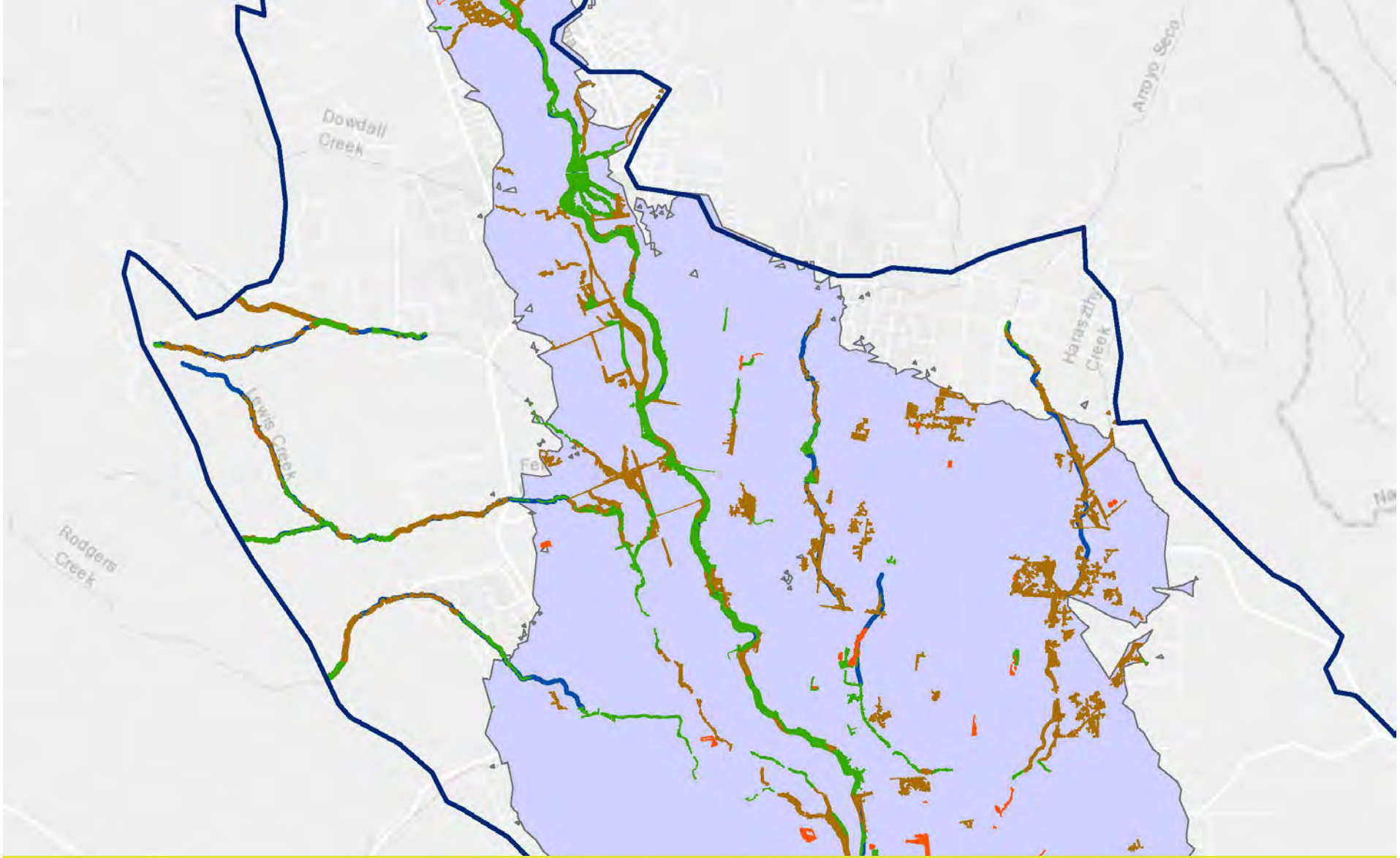
Depth-to-Groundwater Maps for Shallow Unconfined Aquifer System: Sonoma Valley – Spring and Fall 2016



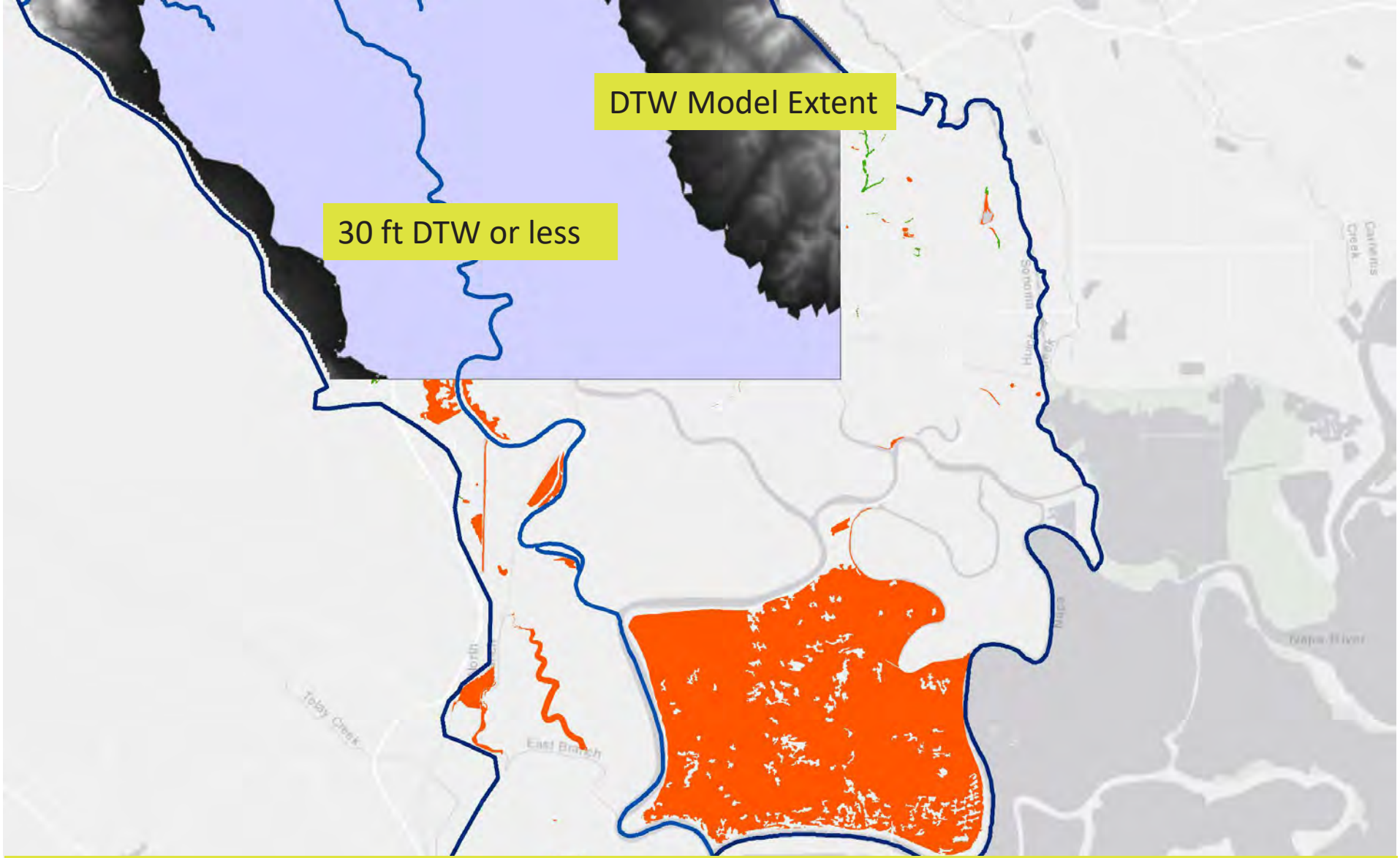




Interconnected surface waters and areas with depth to groundwater 30 feet or less (shaded blue).

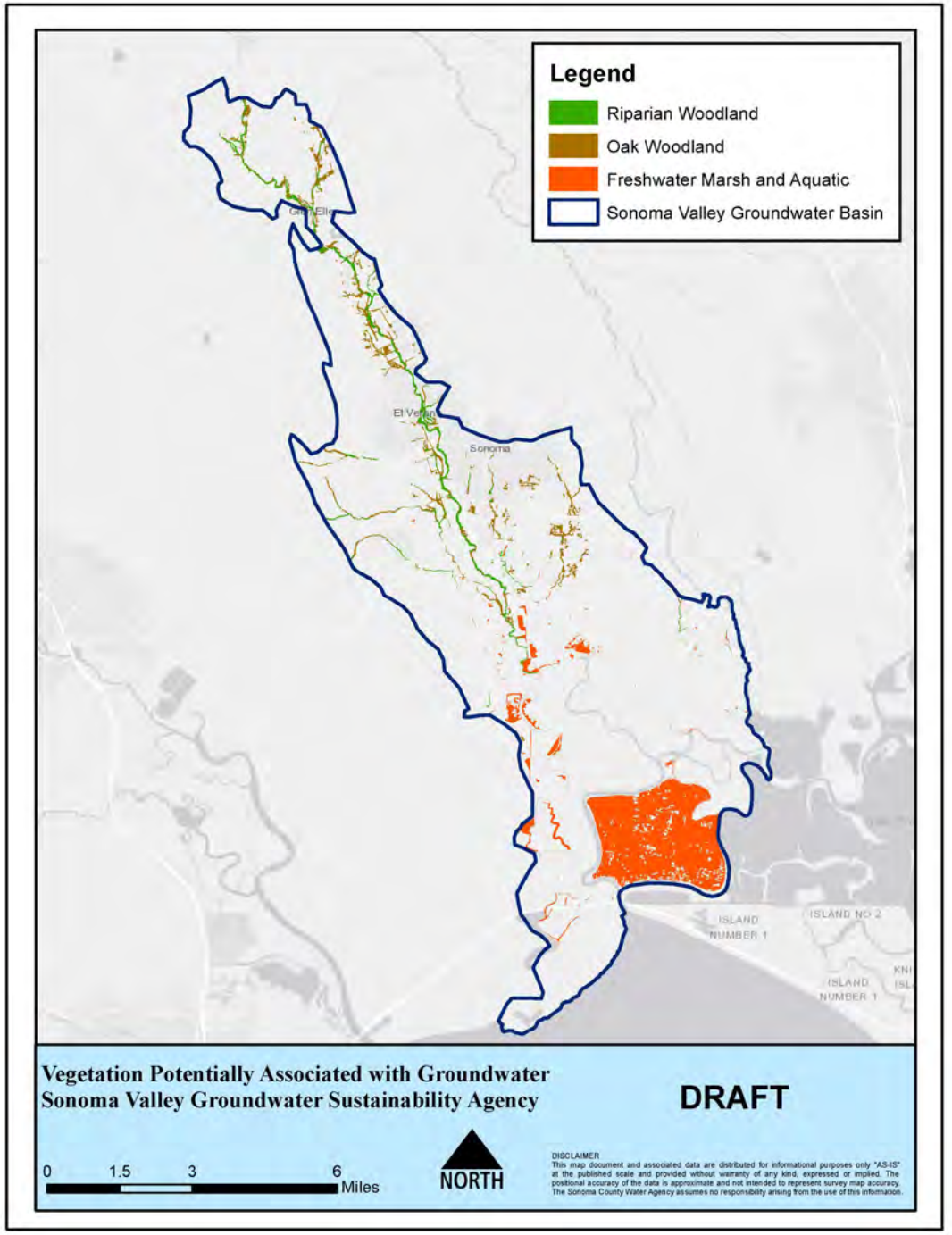


Vegetative Classes within interconnected surface waters (100ft buffer) and areas with depth to groundwater 30 feet or less (shaded blue).



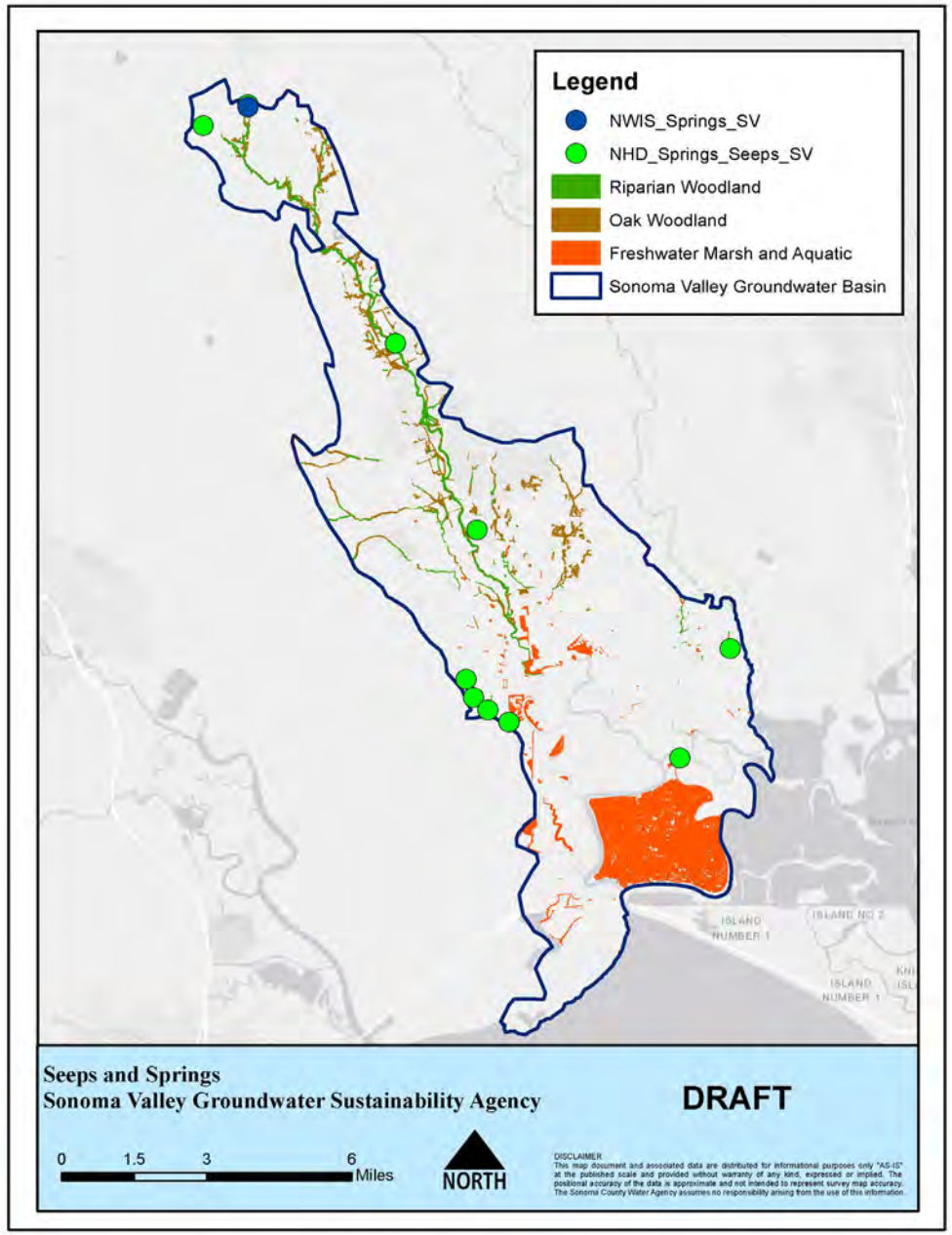
All Riparian Woodlands, Oak Woodlands, and Freshwater Marsh and Aquatic habitat were included in areas lacking depth to groundwater models were included in the draft map.

Results


Legend
Riparian Woodland
Oak Woodland
Freshwater Marsh and Aquatic
Sonoma Valley Groundwater Basin
Sonoma
ISLAND NUMBER 1
ISLAND NO 2
Vegetation Potentially Associated with Groundwater
Sonoma Valley Groundwater Sustainability Agency
DRAFT
0 1.5 3 6 Miles
NORTH
DISCLAIMER
This map document and associated data are distributed for informational purposes only "AS-IS" at the published scale and provided without warranty of any kind, expressed or implied. The positional accuracy of the data is approximate and not intended to represent survey map accuracy. The Sonoma County Water Agency assumes no responsibility arising from the use of this information.

Seeps and Springs

- Not particularly informative using NWIS and NHD data.
- A few were located within potential GDEs, others located in developed areas.
- Ground-truthing would be necessary to determine if there are GDEs associated with springs and seeps.



Next Steps in GDE Mapping

- Complete vegetation mapping for Santa Rosa Plain and Petaluma Valley
- Integrated maps with proposed vegetation and aquatic species GDEs
- Comparison mapping with TNC datasets
- Consideration of grouping GDEs based on habitat needs (timing, proximity to known and estimated groundwater pumping, etc.)
- Initial draft narrative describing process and how mapping will be used in GSP
- Share maps and approach with Surface Water Depletion SMC Workgroup

- What additional data collection is recommended for implementation phase of GSP?

Possible Approaches to Developing SMC
– Marcus Trotta & Stephen Maples

Motivation

Objective: Identify opportunities for using shallow GW wells as a proxy for GW/SW interactions

Approach:

1. Characterize GW/SW interactions using paired shallow GW and gage data
2. Develop regression relations between data and larger-scale stream-aquifer responses from the calibrated model.
3. Use regression relation to infer stream-aquifer responses in near-real-time with an indicator well (i.e., GW levels as a proxy).

How can we leverage measurements and models to characterize GW/SW interactions and SW depletion?

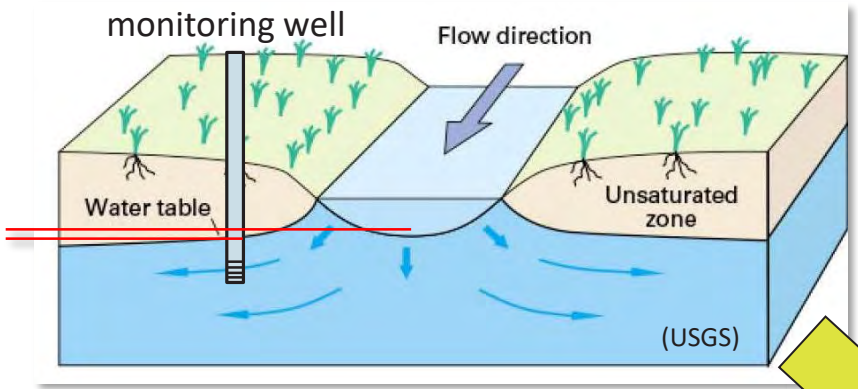
SGMA requires …

1. An understanding of the exchanges of groundwater and surface water within the basin (i.e., groundwater/surface-water interactions).
2. An assessment of the impact of groundwater management on groundwater/surface-water interactions.

Interactions of groundwater and surface water are typically …

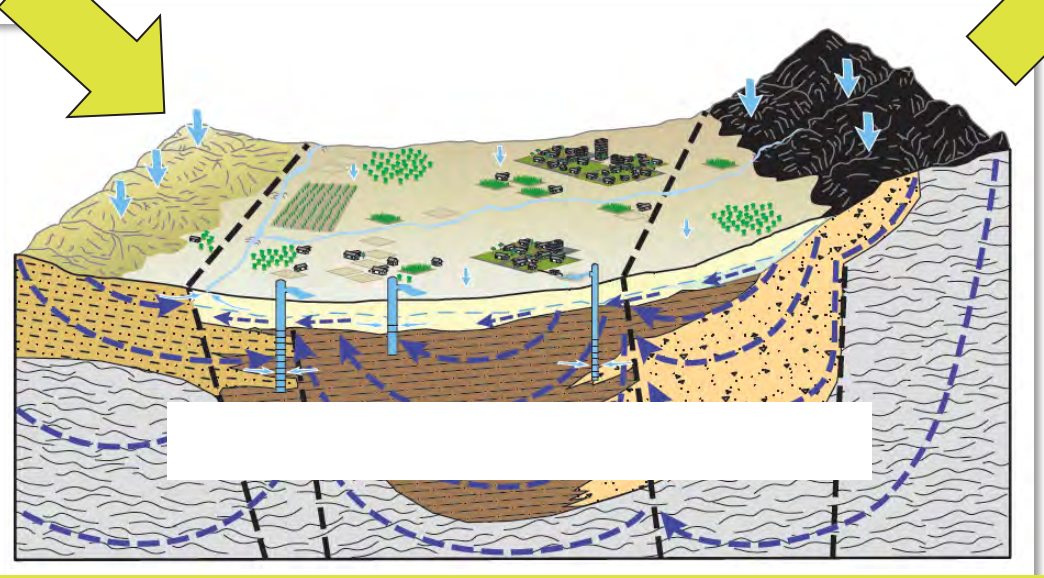
1. Highly variable in space and time.
2. Typically characterized directly at only a few locations.
3. Challenging to simulate with models, resulting in significant uncertainty.

How can we leverage measurements and models to characterize GW/SW interactions and SW depletion?

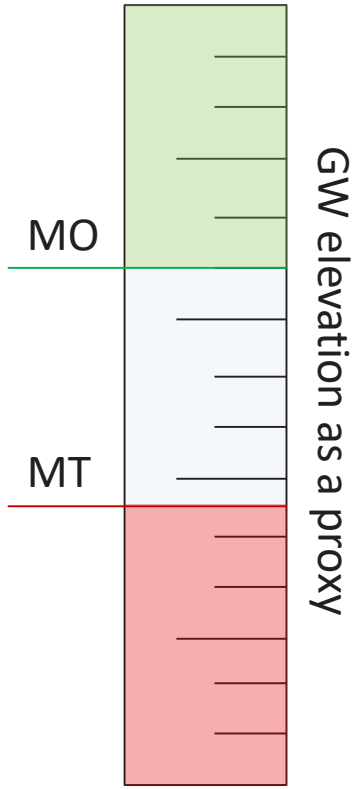


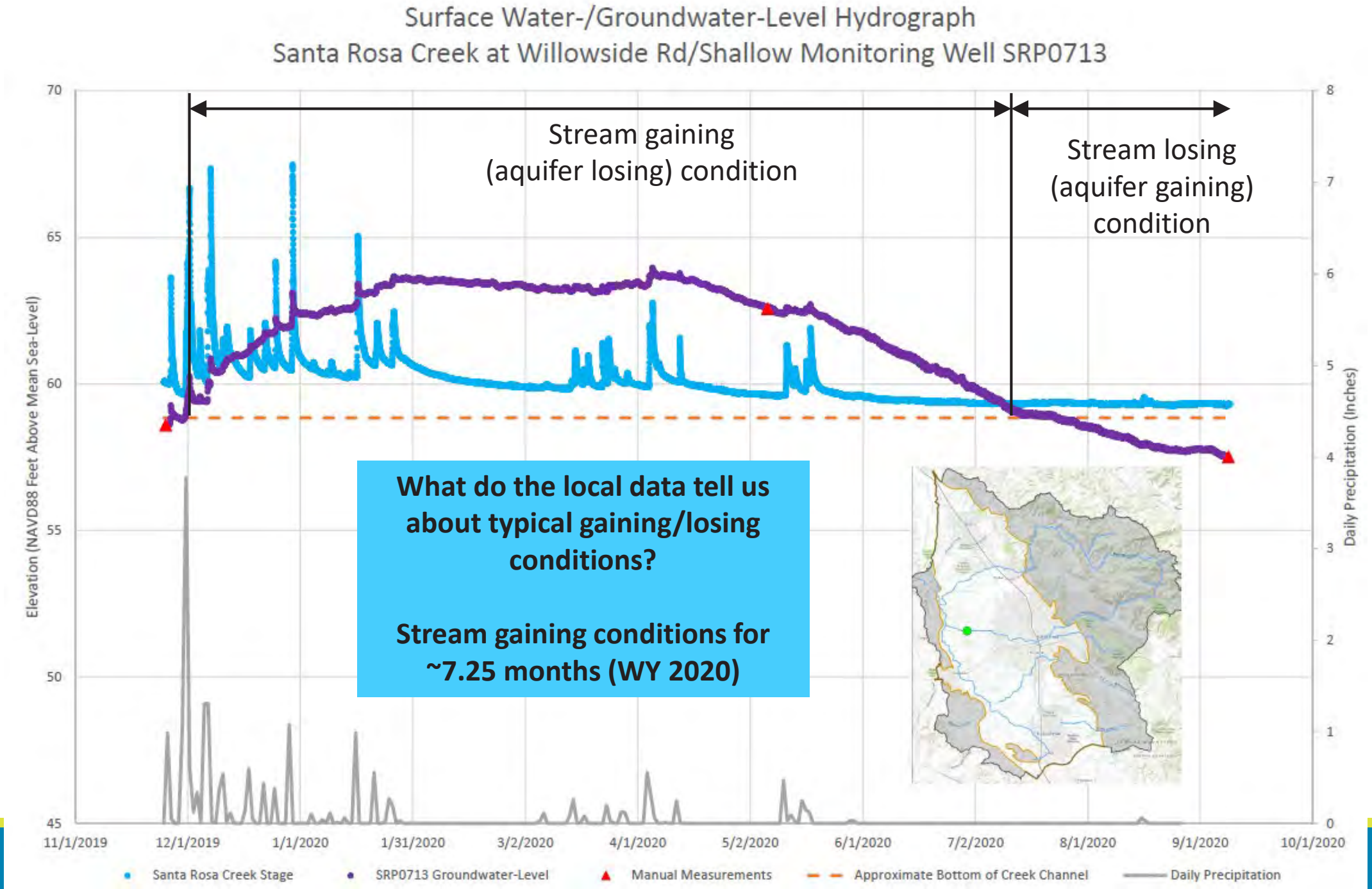
Local **GW/SW interaction characterization (measured)**

Regional **GW/SW interaction characterization (simulated)**



SMCs are tied to GW elevations and informed by simulation results

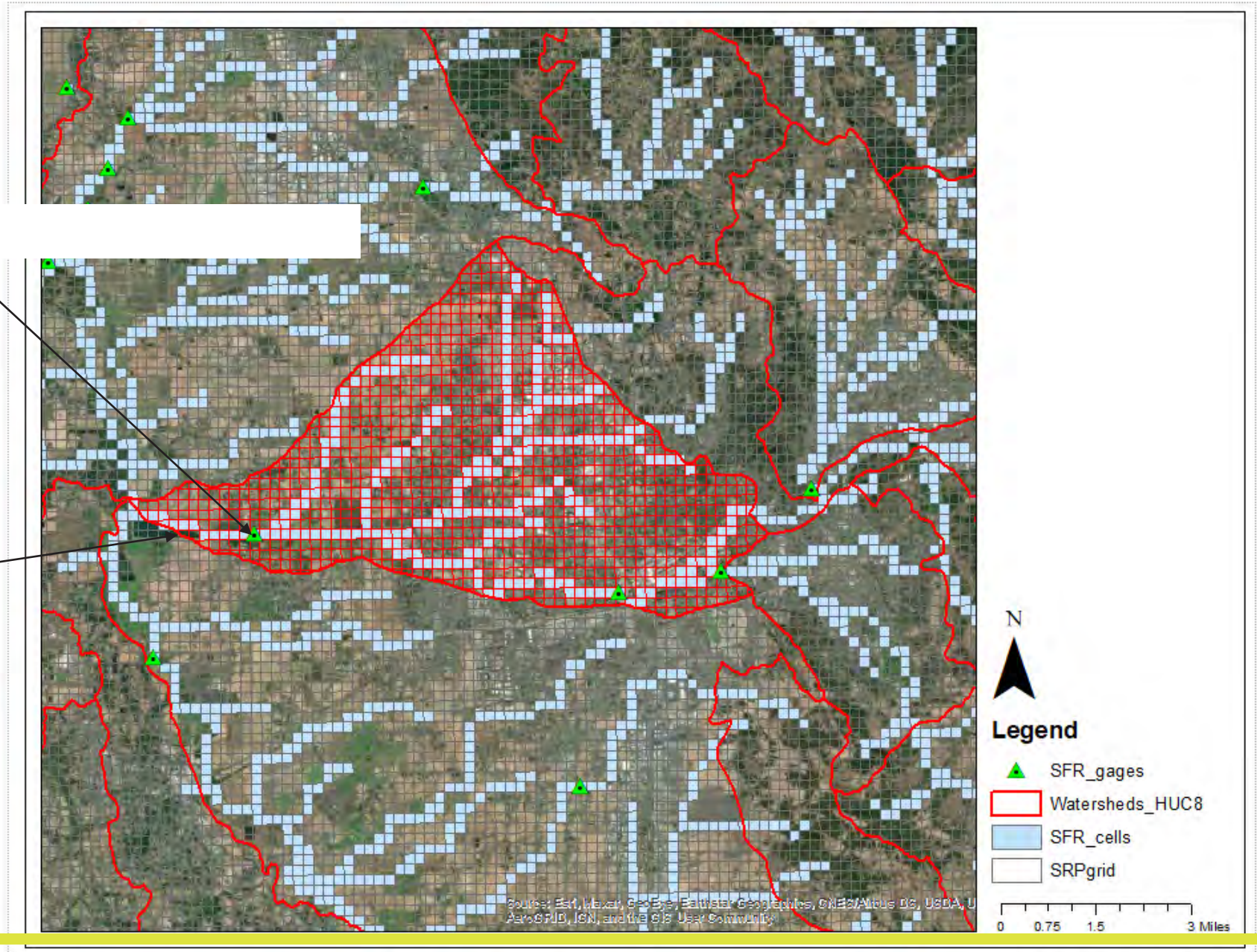


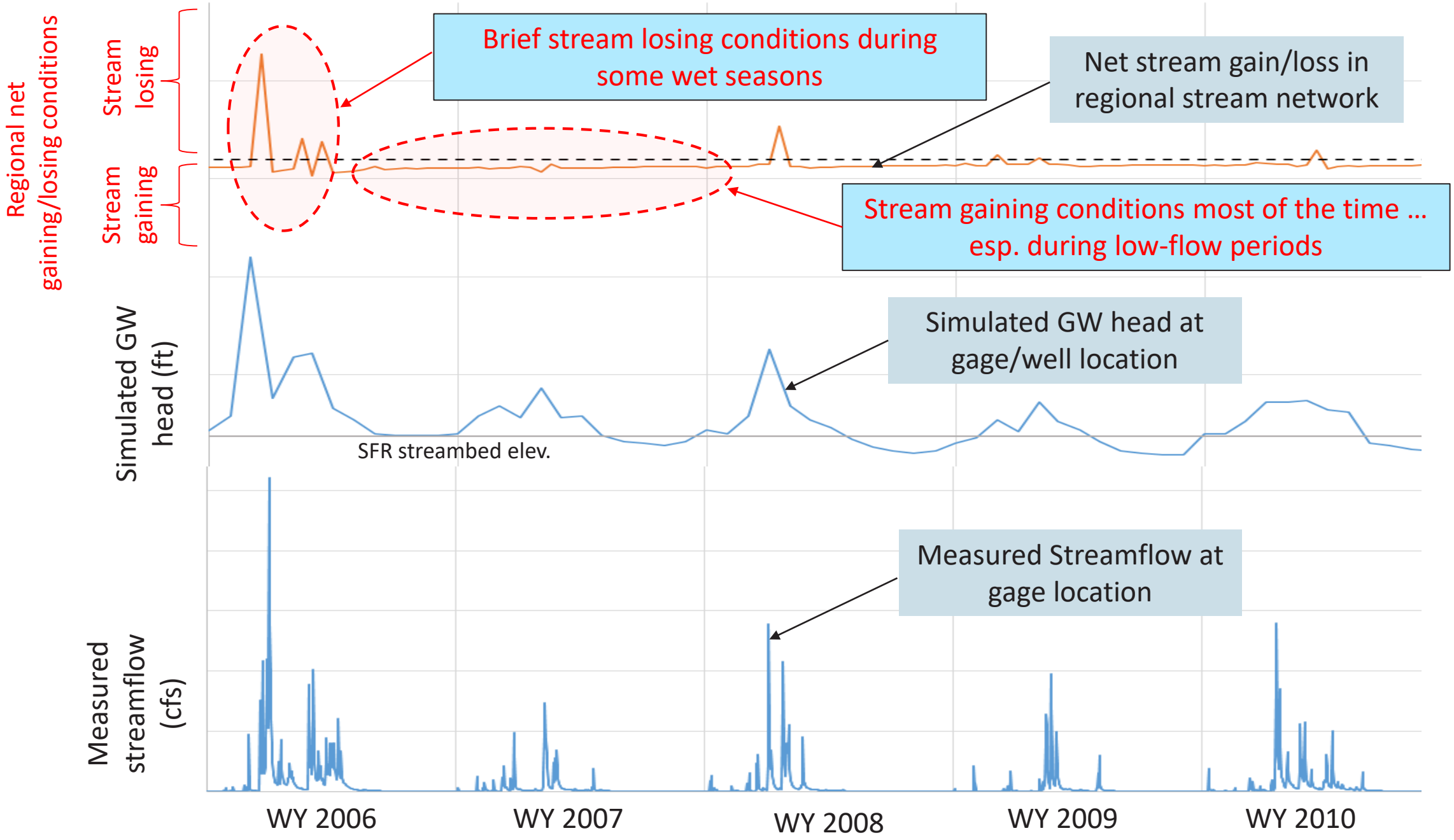

Surface Water-/Groundwater-Level Hydrograph
Santa Rosa Creek at Willowside Rd/Shallow Monitoring Well SRP0713
Stream gaining
(aquifer losing) condition
Stream losing
(aquifer gaining)
condition
What do the local data tell us about typical gaining/losing conditions?
Stream gaining conditions for ~7.25 months (WY 2020)
Elevation (NAVD88 Feet Above Mean Sea-Level)
Daily Precipitation (Inches)
70
65
60
55
50
45
8
7
6
5
4
3
2
1
0
11/1/2019
12/1/2019
1/1/2020
1/31/2020
3/2/2020
4/1/2020
5/2/2020
6/1/2020
7/2/2020
8/1/2020
9/1/2020
10/1/2020
Santa Rosa Creek Stage
SRP0713 Groundwater-Level
Manual Measurements
Approximate Bottom of Creek Channel
Daily Precipitation

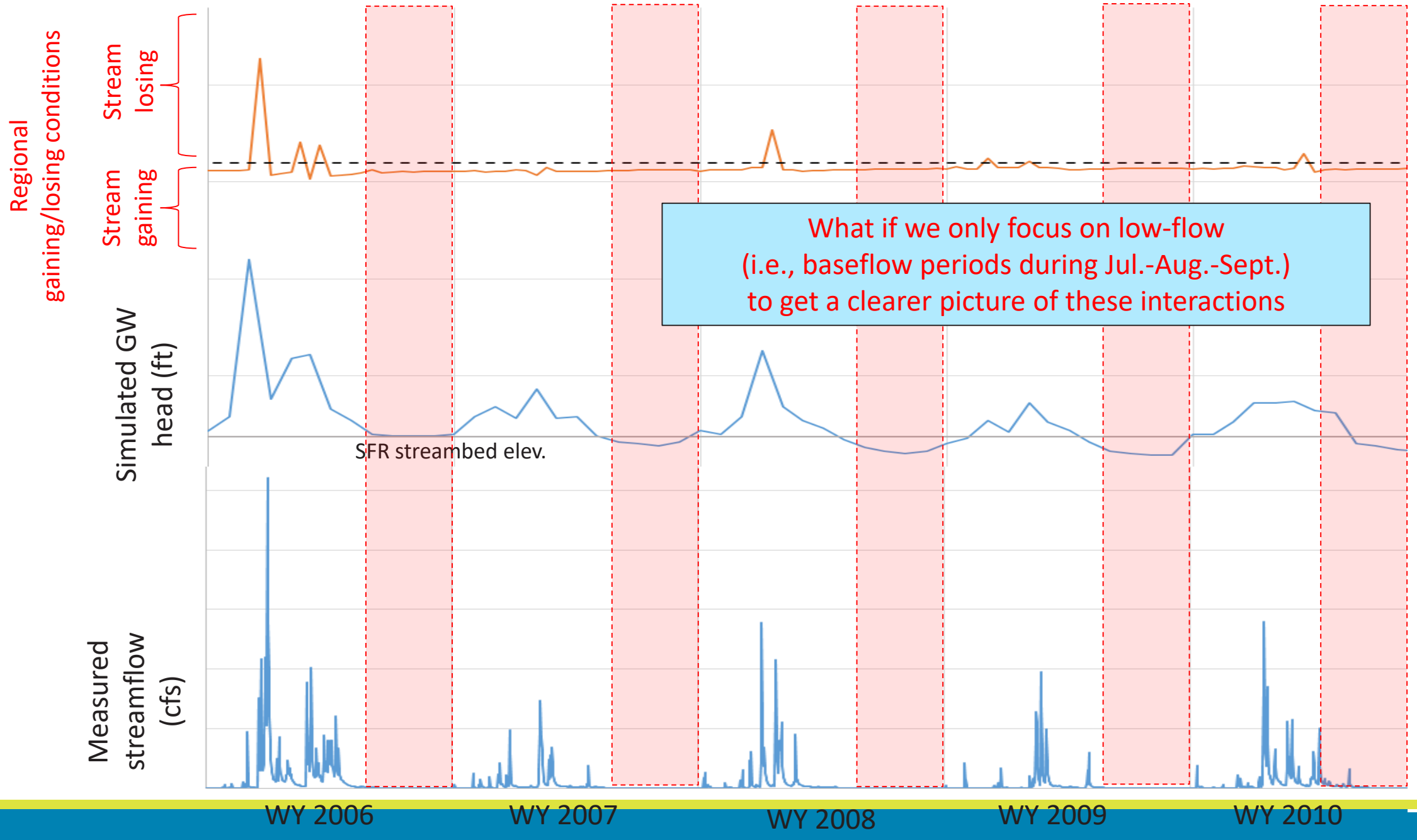
What does the model tell us about gaining/losing conditions over the greater region?

Paired gage/shallow GW well at Santa Rosa Cr. and Willowside Rd.

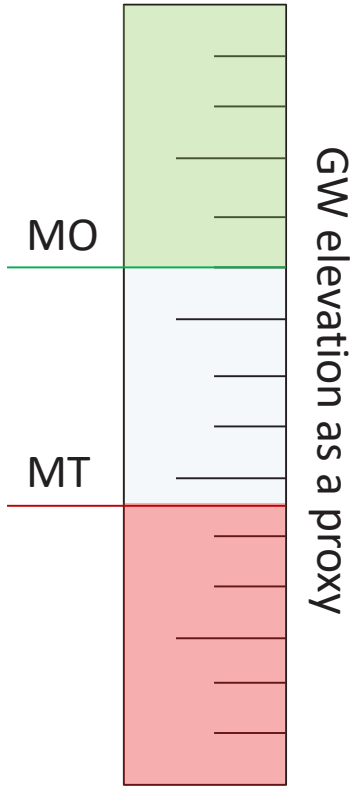
MODFLOW/SFR cells included within greater HUC8 boundary



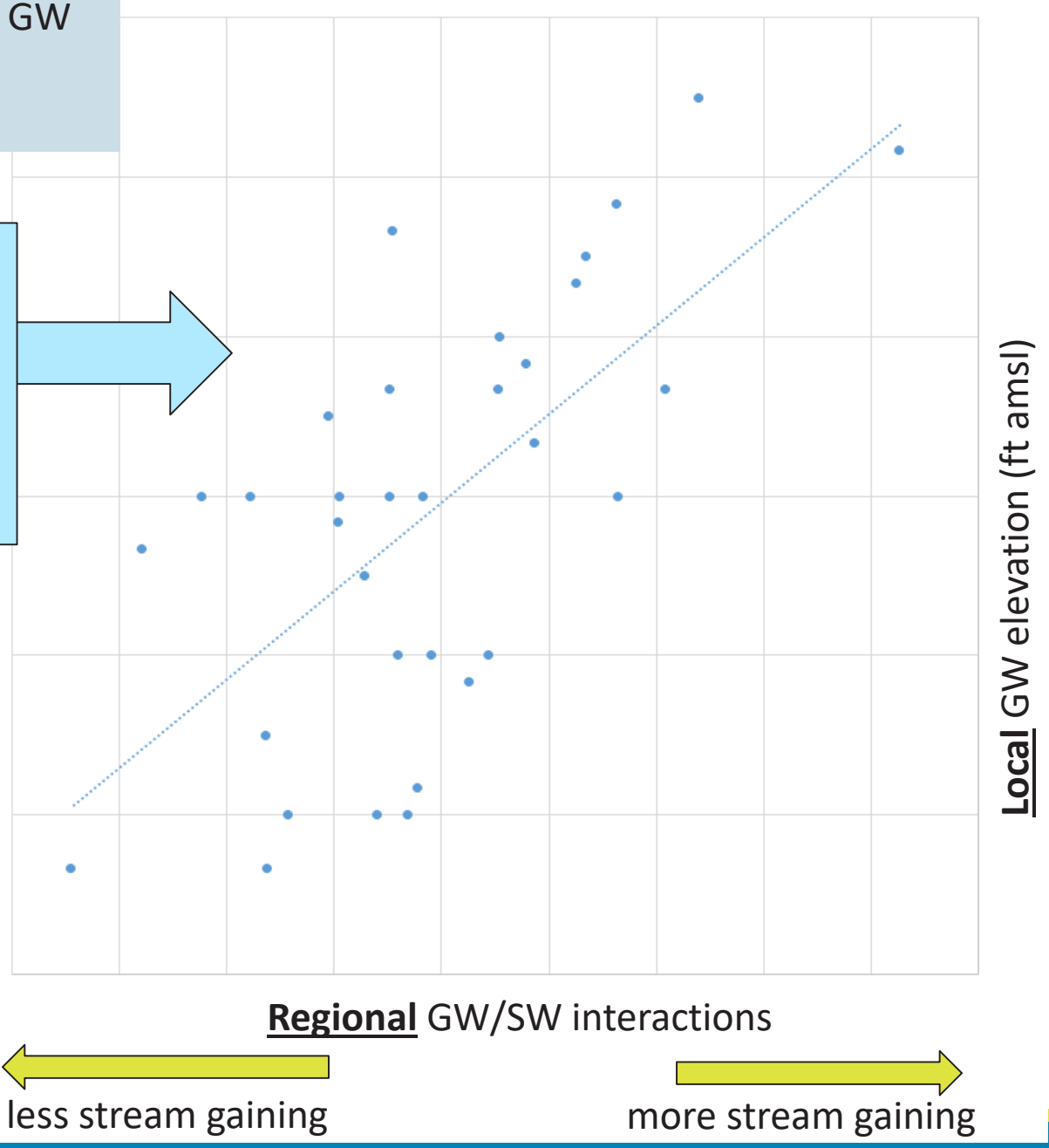

Regional net gaining/losing conditions
Stream losing
Stream gaining
Brief stream losing conditions during some wet seasons
Net stream gain/loss in regional stream network
Stream gaining conditions most of the time … esp. during low-flow periods
Simulated GW head (ft)
Simulated GW head at gage/well location
SFR streambed elev.
Measured streamflow (cfs)
Measured Streamflow at gage location
WY 2006
WY 2007
WY 2008
WY 2009
WY 2010


Regional gaining/losing conditions
Stream losing
Stream gaining
Simulated GW head (ft)
SFR streambed elev.
Measured streamflow (cfs)
What if we only focus on low-flow
(i.e., baseflow periods during Jul.-Aug.-Sept.)
to get a clearer picture of these interactions
WY 2006
WY 2007
WY 2008
WY 2009
WY 2010

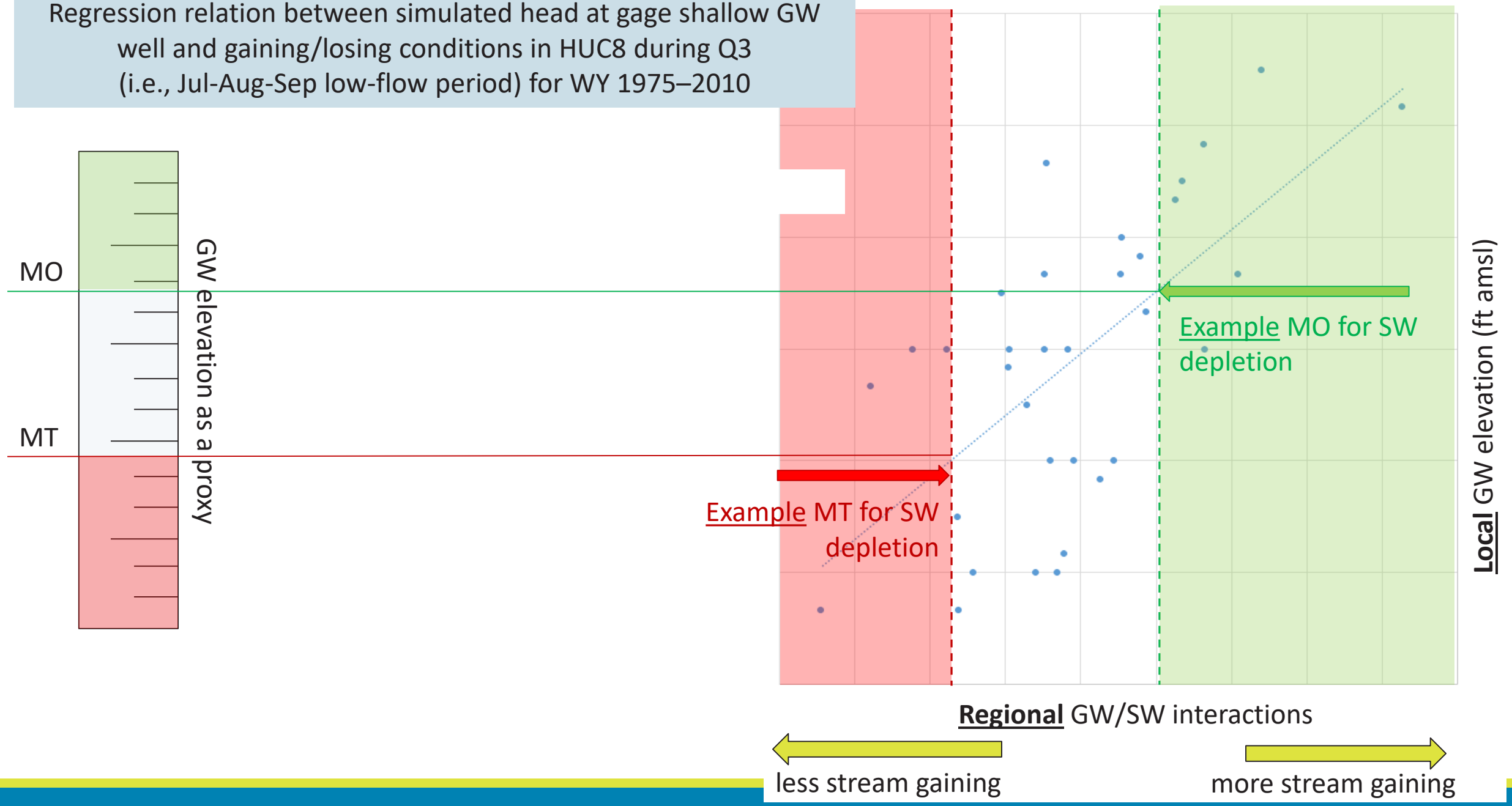
Regression relation between simulated head at gage shallow GW well and gaining/losing conditions in HUC8 during Q3 (i.e., Jul-Aug-Sep low-flow period) for WY 1975–2010



Example regression relation between local GW heads and simulated regional GW/SW interactions be used to inform SMCs



Regression relation between simulated head at gage shallow GW well and gaining/losing conditions in HUC8 during Q3 (i.e., Jul-Aug-Sep low-flow period) for WY 1975–2010



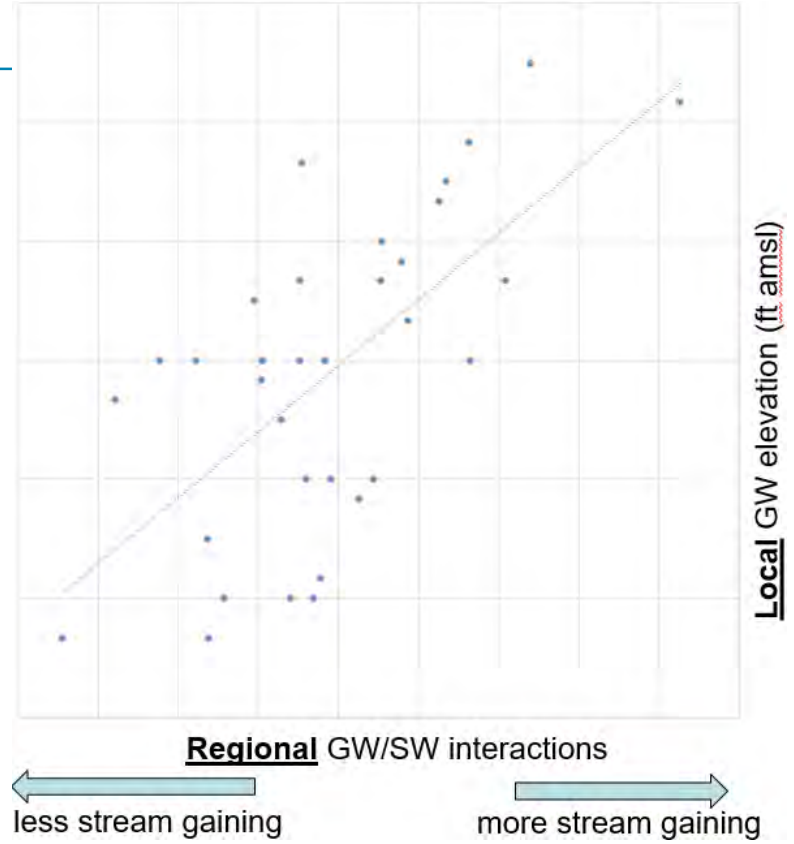
Outstanding Questions & Next Steps …

1. Are (1) simulated/observed heads in good enough agreement and (2) the regression relation robust enough to perform this assessment?

2. Can a regression be developed to assess other metrics, like for the GW/SW gradient? Or duration of interconnection?

3. Are different regression relations needed for different periods within a year (i.e., wet/dry periods)? Or for differing water year types?

4. What is the best approach for assessing the contribution from GW pumping? Differencing multiple simulations?



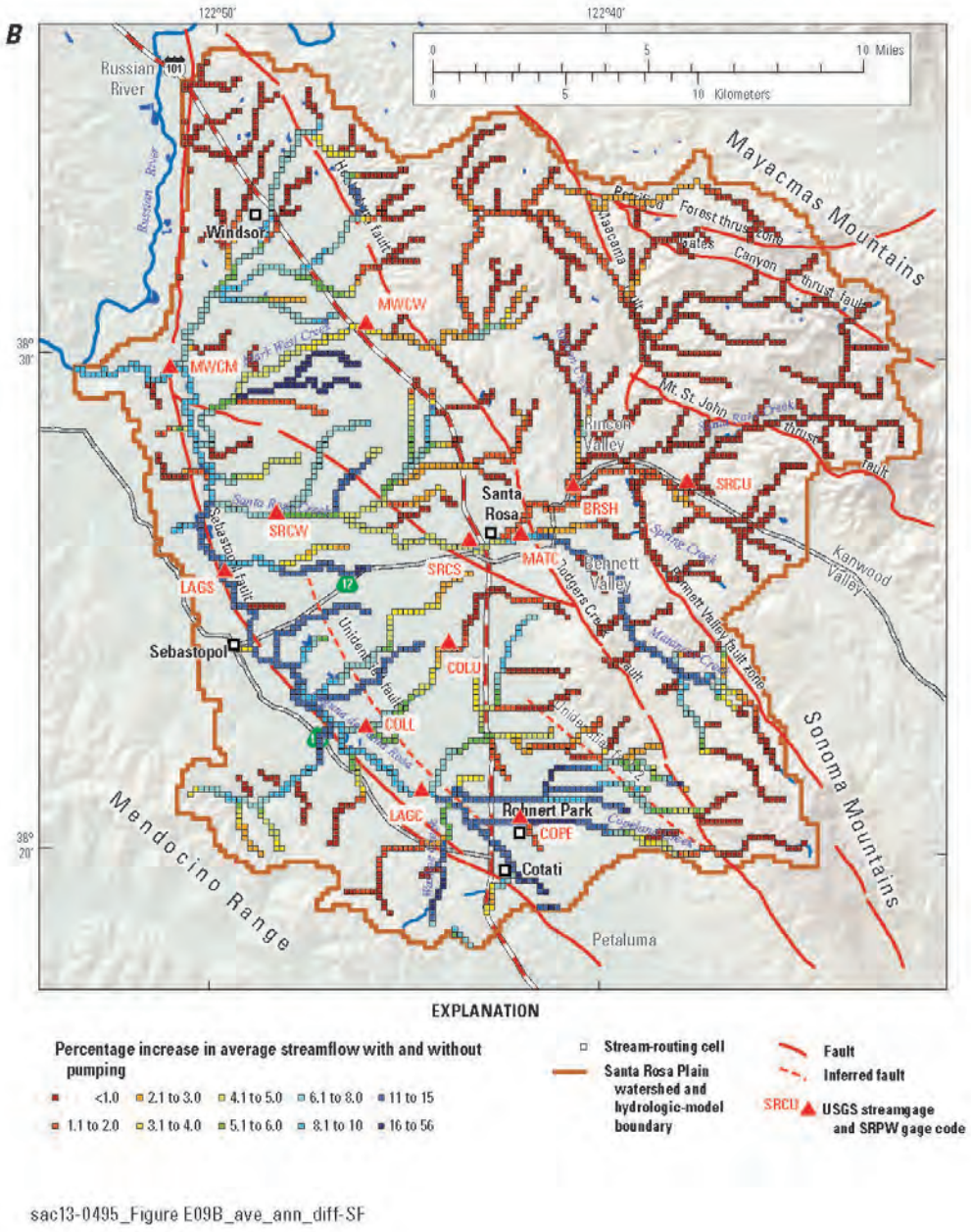
Questions/Discussion

Initial Discussion of Data Gaps

1. Are there other existing data sources that should be included for GSP?
2. What additional data collection is recommended for implementation phase of GSP?

Simulated Change in Streamflow With and Without Groundwater Pumping (USGS, 2014)

- Average 8% change in total simulated streamflow (35 year simulation)



sac13-0495_Figure E09B_ave_ann_diff-SF

SMC for Depletion of Interconnected Surface Water

Friday, December 11, 2020

Meeting Notes

Contact: Sam Magill, Practitioner Work Group Facilitator

Agenda Review and Work Group Introductions

Jay Jasperse welcomed the group and expressed his appreciation for the participants taking time out of their busy schedules to join the meeting.

Sam Magill, Work Group Facilitator walked through the agenda and meeting protocol then suggested a round of introductions.

Summary of ISW SMC Work Group Input to Date

Sam Magill provided a summary of initial work group input from the October 7 meeting.

Review and Discuss Draft Significant and Unreasonable Conditions Statement

A statement of **Significant & Unreasonable** is a qualitative statement describing groundwater conditions unacceptable to beneficial uses and users of water in the basin. These describe what conditions are to be avoided and serve as an initial framework around which the quantitative SMC are developed. Marcus Trotta provided example statements from other Groundwater Sustainability Plans and initial Advisory Committee input.

Questions/Comments

Jessie Maxfield (chat) – I am curious what "biological flows" are from the Salinas example.

> Lisa Porta – The point for that agency is that they need to manage the flows on the river so the biological flows wouldn't be impacted.
> Maxfield – In terms of biology are you looking at fish?
> Porta – Yes, related to their specific biological opinion on fish on the river.

Sam Magill said that all input from the group, Advisory Committees, and ongoing staff work were put together to develop the current proposed Strawman Significant and Unreasonable statement:

"Significant and unreasonable depletion of surface water from interconnected streams, occurs when groundwater pumping within the Basin/Subbasin depletes stream flows below historical levels and adversely impacts the viability of GDEs or to other beneficial surface water users."

Marcus Trotta said he was hoping for feedback from the group on the statement.

Rick Rogers (chat) – The inclusion of "below historical levels" should be removed.
It seems like including that wording leaves the door open for a pre SGMA baseline approach which has nothing to do with trying to prevent impacts or Undesirable Results, especially ones that impact beneficial uses of surface water. Putting the two together doesn't work for me.

Maxfeld (chat) – I second Rick's comment. It could read instead ".....depletes stream flows to levels that adversely impacts the viability of GDEs or other beneficial surface water users."

Trotta – We added the language to have something to work to as we develop our technical methodology for what could be considered significant and unreasonable. We haven't received information from the basins on levels or flow requirements that would help us define adverse impacts on the viability of the GDEs or surface water users. I understand the comments.

Sam Boland – If you remove the "below historical levels" the statement still works as a good strawman proposal because you still need to figure out how to define what adversely impacts these things and how they can be quantified in a measurable way. The challenge is equally difficult with or without the "historical levels".

Maurice Hall – If you remove "below historical levels", it seems like you are saying that pumping significant and unreasonable depletion of stream water from interconnected streams occurs when groundwater pumping occurs. I think some reference to historical levels is appropriate given the way SGMA is written. The depletion of stream flows below historical levels of streamflow – It seems to be linking groundwater pumping to stream flow when many other things affect stream flow. My recommendation would be to tie it to historical groundwater depletions of stream flows.

Val Zimmer – I think of something like surface water such as wetlands that may or may not be connected to groundwater or stream flows year-round, you might have OK streamflow but if you drying out wetland that is adjacent to it, it might be a different thing even though it is near it. I wonder if the language around stream flow needs to be adjusted.

Trotta – Both those points are helpful. Maybe something like "results in more depletion of surface water than has occurred historically" rather than reference the flows.

Georgina King – The indicator is surface water, so it does cover both, wetlands and stream flow. A lot of the metrics you propose to use is stream flow as an indicator, it is hard to do with a surface water body. In general, if it is groundwater affecting stream flow that is connected directly to the stream, a wetland is often separate from the stream. If it is separate from the stream it would come under "Groundwater Level".

Zimmer – I think speaking to an expert on wetlands would be useful.

Rogers (chat) - The problem is that in these med/high basins, streamflow depletion is likely impacting beneficial uses (and ESA-listed species) currently. Managing to a historical point in time does not ensure you are avoiding these impacts but would likely lead to a situation where the current impacts are continued or worsened (most proposed pre-SGMA baselines are chosen during our recent drought).
He added verbally – In most of these basins that are undergoing SMGA right now in where stream flow depletion has an impact, that impact is occurring right now and should be addressed. Using a point in time in the past as a management point, doesn't do anything to deal with the potential impact especially if the point in time chosen is during our past drought.

Rogers – I would suggest a different way of looking at this. What are some of the beneficial uses of surface water that would be significant and unreasonable? It seems it would be much more consistent with the definition within the regulations as to how you would solve the problem.

Boland - I agree with Rick, just replacing significant and unreasonable with adverse impacts, it doesn't take you much further than the original statements. The other suggestion is it seems the viability of GDEs and beneficial uses of surface water are synonymous here. GDEs that aren't in the surface water body – I

am not sure they are in scope for this Undesirable Result like they would be addressed by water level considerations.

Trotta – I think some of the details are things we thought about. Rather than including all GDEs, it sounds like focus on GDE fish and other animals within the surface water itself rather than riparian vegetation outside.

Boland – Yes, I meant GDEs in this context is a subset of beneficial uses.

Maxfield – The Dept. supports not using historic levels or conditions but using stream flows appropriate for the different life stages rather than looking at historic levels or a certain point in time.

Rohde – I am trying to see this statement as a goal statement. This statement is more like an "I want to get fit" statement and not very helpful for guiding what Minimum Thresholds and Measurable Objectives should be. It should be a little more explicit about what would constitute that.

King – Melissa – your analogy – isn't that more the Undesirable Result? The Significant and Unreasonable is supposed to be general.

Melissa – I thought in Santa Cruz County we were more specific in the process. Maybe I am getting the two mixed up.

King – Yes, we got a lot more specific in the Undesirable Results.

Boland – Could you remind me of the distinction between Undesirable Results and Significant and Unreasonable.

King – The Significant and Unreasonable are conditions you don't want in the basin, a general guiding statement. If you didn't know anything about SGMA, you would think they are very similar. In the SGMA process, the Undesirable Results are defined as a combination of Minimum Threshold exceedances. You can have Minimum Thresholds set in your monitoring wells, and these Undesirable Results allow you to fall below the Minimum Thresholds a certain number of times without being classified as Undesirable. It is a definition of how many times you can exceed Minimum Thresholds.

Potential Methodology for Determining ISW SMC

Marcus Trotta provided an overview of the technical work staff has been doing and what we need to do to move forward with this Sustainable Management Criteria. He presented the Strawman methodology for determining Interconnected Surface Water SMC.

Stephen Maples, Sonoma Water went into detail on work completed so far and presented model results intended to help indicate surface water behavior that might be occurring in the basin. Maples explained the goal is to leverage measurements and models to characterize groundwater – surface water interactions and surface water depletion.

Marcus Trotta suggested it might make sense to set interim SMC while working to build datasets and model capabilities during GSP implementation.

1. For Remote Monitoring Points where we have less than five years of data, use autumn groundwater-level contour maps of shallow aquifer system from year with greatest simulated SWD (e.g., autumn 2015 for SRP) to pick Minimum Threshold elevations at the locations of the Remote Monitoring Points
2. For any Remote Monitoring Points with more than five years of data, use measured historical low elevations

3. For Measurable Objectives, pick a year representative of lower values of surface water depletion or set "aspirational" Measurable Objectives of maintaining groundwater levels above streambed?
4. Include a detailed plan in the GSP for how we will build our datasets and improve simulation capabilities to more fully incorporate the correlation assessment methodology we have tested.

Sam Magill then asked for feedback and reactions from the group about what Stephen presented.

Questions/Comments

Hall (chat) - What does RMP mean again?

Trotta (chat) – Representative Monitoring Point, which is where SMCs are set and monitored.

Maurice Hall – You indicated your modeling didn't overlap with the monitoring period. I am guessing that will be corrected and you extend your model into the monitoring period?

Trotta – We recently updated the model through 2018 conditions for the GSP. We will be making refinements and extending the model period during the implementation phase of the GSP so we can better capture more recent high-resolution data once we have more than one year's data to calibrate.

Rogers – How will the relationship between stream flow depletion and impact of surface water beneficial uses be fleshed out? Are there plans in the future?

Trotta – I think Stephen's analysis show that some of the metrics could be incorporated into setting the groundwater level as an SMC are potential increases of streamflow at certain times of the year or year-round. If there are certain flow requirements for certain beneficial users in certain areas that need to be considered, I think this methodology would be well suited to address that.

Rogers – So, in the interim are we going to be flushing those out in the future or will it happen in the first couple years of the GSP? When would those thresholds be developed?

Trotta – Those thresholds are where we would need longer data sets to better correlate the model results with our observations. And to help develop what the targets and thresholds are that are considered for beneficial uses in the streams. How we do that will be detailed in the GSP.

Maples – This type of analysis can tell us if you have a flow during a certain year, what would it have been without the pumping. Based on the results of biological studies, here is what an ebb and flow should be in this tributary, then we can go back and say this is what the model is telling us.

Hall – It looks like you have some nice approaches for correlating with groundwater levels to stream depletions and an amazing set of data. Tracking as best I could from what was provided, I would say in no case would you want to set your targets at or below one of the more severe droughts on record. You would want a margin of error above thresholds, because you don't want to go that low, and there is uncertainty in the model. I would also say you should consider having target levels that vary for different year times. Seems you would want to set targets at or above historic levels and do it for different times of the year. One additional point is that SGMA does allow to continue depletions at historic levels if it is the best you can do. Adding onto the basic SGMA requirement we should try to characterize how we can go above and beyond the basic requirements and have projects that raise levels above historic levels.

Boland – On the graph that shows the water level line with and without pumping - could a similar graph be made for stream flows with and without surface diversion?

Maples– I think it would be possible. I think turning of the pumping in the model is relatively easy to do.

Boland – I don't think it is necessary for the SMC but paints a picture of what is happening in the stream system.
Maples – Yes, it could give some context to pumping relative to surface water deletion.
Boland – Certain years and times of year are more important.

Zimmer – The original SRP model modelled all diversions as groundwater pumping. We have some data from the 2014-2015 drought. Data show that surface water diversions are not the major type of diversion in the summer and groundwater pumping becomes more prevalent due to supply, there isn't enough surface water to divert. That is the pattern that surface water diversions can drop off during the summer.
Andy Rich – I think the total surface water rights is about 200 acre-feet per year total face value within the subbasin. My gut feeling is the 200 acre-feet per year value is going to be a lot smaller than the total stream flow depletion caused by overall pumping in the basin and areas outside it. I don't think removing the surface water rights will cause a big change in the overall stream flow.
Maples – The model suggests it is much more than the 200-acre feet of stream flow depletion due to pumping.
Boland – If you pair it with management actions that involve coordinate surface water activities, it may make the depletion more reasonable.
Lisa Parker – One could also say that it is significant but not unreasonable. It could be significant for other reasons. If it doesn't affect beneficial users, then it isn't unreasonable.
Boland – I think you should keep in mind what management actions could be done.

Jasperse (chat) – What about wells pumping under riparian rights?
Boland. The Russian River is unique. Riparian rights aren't subject to the authority of SGMA. I believe the well pumping into the riparian rights would not be contributing to depletions as defined by SGMA.

Rohde – It would be good to understand what biological flow requirements are necessary for key ecological assets identified as being a GDE or endangered and seeing what their needs are when establishing aspirational measurable objectives. If people will have to reduce or cease pumping to achieve a measurable objective, it will have to be for a good reason.

Hall – I assume you are open to receiving feedback after this meeting about what was presented today?
Trotta – Yes, Stephen's presentations will be sent to you with specific questions.

Natalie Stork – You have all done some great work and I appreciate getting everyone together to provide feedback. Very helpful conversations. Thank you for sharing.

Rogers – I believe that whatever thresholds we come up with, they need to have a linkage to what the impact is to the beneficial use of the surface water. I am looking forward to working with everyone to figure out what this might be.

Andrew Renshaw – I would like to emphasize bullet #4 on slide 16. One thing to consider is developing a plan and schedule for filling data gaps and describing how you would move from an interim type SMC to something more permanent.

Representative Monitoring Point (RMP) Overview and Next Steps

Marcus Trotta shared the work currently being done related to identifying Representative Monitoring Points for surface water depletion and presented maps.

Questions/Comments

Maxfield (chat) – Can files of these maps be shared with us? I would like to look at them more closely and it is hard to read them here.

Trotta – Yes, we will send out the maps and hydrographs.

Review Meeting Action Items / Next steps

Marcus covered next steps in developing SMC for Depletion of Interconnected Surface Water that include:

1. *Continue developing DRAFT Significant and Unreasonable Statement*
2. *Complete GDE and ISW mapping*
3. *Further evaluate potential RMP network*
4. *Develop draft SMC at each proposed RMP based on potential methodology*
5. *Provide update on potential methodology at January AC meetings*

Marcus suggested Sam schedule an additional meeting for this group in early January.

Jay Jasperse reiterated there is lots of work ahead of us. He thanked the folks for participating and wished everyone happy holidays.

Questions/Comments

Hall (chat) – Thanks to you folks at the GSA - thanks for the opportunity to weigh in. I look forward to seeing the materials, digging in a bit more, and hopefully providing some useful input.

Attendees

Jessie Maxfield, CA Department of Fish and Wildlife
Natalie Stork, State Water Resources Control Board
Val Zimmer, State Water Resources Control Board
Sam Boland-Brien, State Water Resources Control Board
Maurice Hall, Environmental Defense Fund
Melissa Rohde, The Nature Conservancy
Rick Rogers, National Marine Fisheries Service
Andrew Renshaw, Dept. of Water Resources

Lisa Porta, Montgomery & Associates
Georgina King, Montgomery & Associates
Jay Jasperse, Sonoma Water
Marcus Trotta, Sonoma Water
Andy Rich, Sonoma Water
Mitch Buttress, Sonoma Water
Stephen Maples, Sonoma Water
Sam Magill, Work Group Facilitator
Simone Peters, Sonoma Water (recorder of meeting notes)

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GROUNDWATER SUSTAINABILITY AGENCIES

SUSTAINABLE MANAGEMENT CRITERIA FOR DEPLETION OF INTERCONNECTED SURFACE WATER

Time	Agenda Item
1:00	Agenda Review and Work Group Introductions Sam Magill , Work Group Facilitator All Work Group Participants
1:05	Summary of ISW SMC Work Group Input to Date Sam Magill
1:15	Review and Discuss Draft Significant and Unreasonable Conditions Statement • Review Initial Draft Statement • Summary of Previous Advisory Committee Input • Review Updated Draft Statement Marcus Trotta, Sonoma Water Sam Magill
1:35	Potential Methodology for Determining ISW SMC • Correlation Assessment of Simulated Streamflow Depletion with Groundwater Levels • Discussion of Potential Methodology Approaches for establishing minimum thresholds (MTs) and measurable objectives (MOs) Marcus Trotta Stephen Maples, Sonoma Water
2:35	Representative Monitoring Point (RMP) Overview and Next Steps Marcus Trotta, Sonoma Water
2:55	
3:00	Meeting Adjourns

Summary of ISW SMC Work Group Input to Date

Summary of Initial Work Group Input from 10/7 Meeting

- Characterizing hydrologic variability is important
- Measuring potential impacts and defining cause/effect to surface water depletion is important for establishing MTs
- Start by defining where the critical areas for preserving surface water levels; placing monitoring at these “choke points” could help define impacts
- Analysis is promising, and shows the connection between groundwater levels and stream flows
- 2015 baseline- using a dry year could lower MTs; use a variety of document water years and habitat conditions
- Think about in terms of what can be done to manage the SMC
- Recommend developing significant and unreasonable statement to guide SMC development

Review and Discuss Draft Significant and Unreasonable Conditions Statement

Significant & Unreasonable Depletion of Interconnected Surface Water

Statement of **Significant & Unreasonable** is a qualitative statement describing groundwater conditions unacceptable to beneficial uses and users of water in the basin. These describe what conditions are to be avoided and serve as an initial framework around which the quantitative SMC are developed.

As defined in the draft DWR SMC BMP (DWR, 2017), statements of significant and unreasonable conditions should identify the following:

- Who or what is impacted by significant and unreasonable conditions,
- What kind of impact constitutes significant and unreasonable,
- Over what time period are conditions significant and unreasonable, and
- Over what geographic area are conditions evaluated.

Example Statements from Other GSPs

Santa Cruz Mid-County Basin GSP:

Significant and unreasonable depletion of surface water due to groundwater extraction, in interconnected streams supporting priority species, would be undesirable if there is more depletion than experienced since the start of shallow groundwater level monitoring through 2015.

Eastern San Joaquin and Merced GSPs:

Significant and unreasonable depletions of interconnected surface water in the Eastern San Joaquin Subbasin are depletions that result in reductions in flow or levels of major rivers and streams that are hydrologically connected to the basin such that the reduced surface water flow or levels have a significant adverse impact on beneficial uses and users of the surface water within the Subbasin over the planning and implementation horizon of this GSP.

Example Statements from Other GSPs

Salinas 180/400 Subbasin GSP:

Significant and unreasonable depletion of interconnected surface water in theSubbasin is depletion of interconnected surface water flows that may prevent the MCWRA from meeting biological flow requirements in the Salinas River, or would induce an unreasonable impact on other beneficial uses and users such as surface water rights holders. The GSA does not have authority to manage reservoir releases and is not required to manage surface waters.

Cayuma Basin GSP:

Significant and unreasonable depletions of interconnected surface water are reductions in the viability of agriculture or riparian habitat within the Basin over the planning and implementation horizon of this GSP.

Significant and Unreasonable Conditions- Initial Advisory Committee Input

- **Who/what is impacted by S&U conditions?**
  - Recreation
  - Water well levels
  - Desiccation of riparian vegetation/habitat or direct impacts to species
  - Surface water rights holders (particularly in late summer/fall)
  - Specific areas of impact:
    - Nathanson Creek
    - Other?

Advisory Committee Input (cont.)

- **What kind of impact constitutes S&U?**
  - Easter San Joaquin model may be useful- maintain stream flows to protect beneficial users and uses
  - Lowering of static and dynamic well-water levels could be an early warning trend
  - Any groundwater pumping activities which stop or reverse recovery of sensitive species
  - Repeated or progressive surface water depletions impacting surface water withdrawal

Initial Advisory Committee Input (cont.)

- **Over what time period are conditions S&U?**
  - Year round- there could be negative impacts in wet months due to over pumping
  - Year-to-year surface water depletions can severely impact species (in addition to impacts within a single year)
  - Over various water-year types- impacts are dependent on how much/how little rainfall in a given year

Initial Advisory Committee Input (cont.)

- **Over what geographic area are conditions evaluated?**
  - Atascadero/Green Valley Creeks serve as recharge for Sebastopol-to-Graton GSA should be included
  - Areas near stream channels not already encroached on/urbanized
  - Critical recharge areas
  - Stream courses/wetlands with high past/current saturation zones

Current Strawman Significant and Unreasonable Statement

Significant and unreasonable depletion of surface water from interconnected streams, occurs when groundwater pumping within the Basin/Subbasin depletes streamflows below historical levels and adversely impacts the viability of GDEs or other beneficial surface water users.

Potential Methodology for Determining ISW SMC

Potential Methodology for Determining ISW SMC

1. Correlation Assessment of Simulated Streamflow Depletion with Groundwater Levels
   - Incorporates available historical data and variety of water-year types
   - Analysis of groundwater pumping effects on surface water depletion
   - Use simulation analysis and historical data together to inform selection of SMCs
   - Allow for any potential future instream flow requirements, etc.

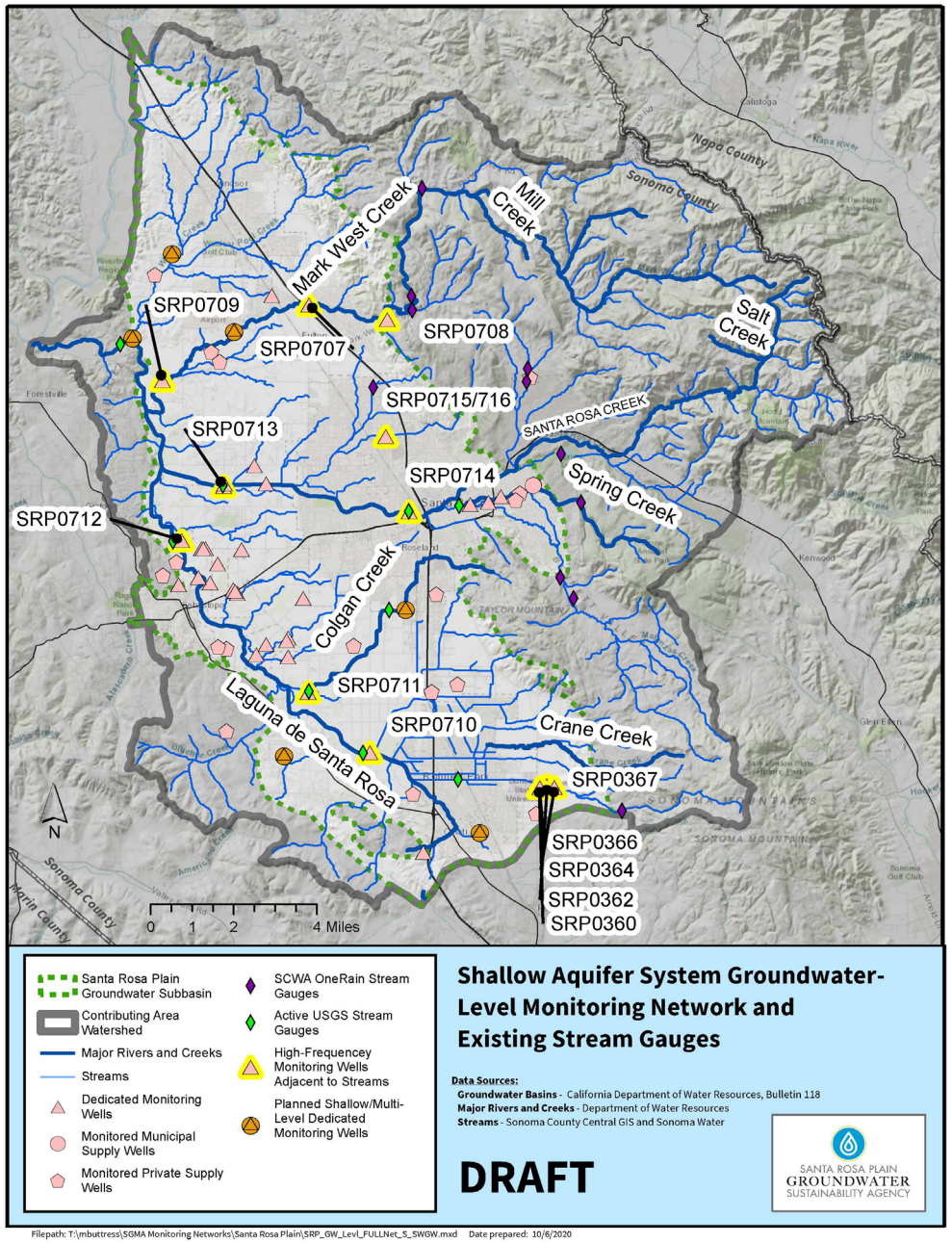
2. Discussion of potential methodology approaches for establishing minimum thresholds (MTs) and measurable objectives (MOs)

Strawman Methodology for Determining ISW SMC

Strawman proposal for setting "interim" SMCs while we work to build datasets and model capabilities during GSP implementation:

1. For RMPs where we have less than 5-years of data, use Fall groundwater-level contour maps of shallow aquifer system from year with greatest simulated SWD (eg, Fall 2015 for SRP) to pick MT elevations at the locations of the RMPs
2. For any RMPs with >5 years of data, use measured historical low elevations
3. For MOs, pick a year representative of lower values of SWD or set "aspirational" MO of maintaining GWLs above streambed?
4. Include a detailed plan in the GSP for how we will build our datasets and improve simulation capabilities to more fully incorporate the correlation assessment methodology we have tested.

Representative Monitoring Point (RMP) Overview and Next Steps


Mark West Creek
Mill Creek
Salt Creek
SRP0709
SRP0708
SRP0707
SRP0715/716
SANTA ROSA CREEK
SRP0713
SRP0714
Spring Creek
SRP0712
Colgan Creek
SRP0711
Laguna de Santa Rosa
SRP0710
Crane Creek
SRP0367
SRP0366
SRP0364
SRP0362
SRP0360
N
0 1 2 4 Miles
Santa Rosa Plain Groundwater Subbasin
Contributing Area Watershed
Major Rivers and Creeks
Streams
Dedicated Monitoring Wells
Monitored Municipal Supply Wells
Monitored Private Supply Wells
SCWA OneRain Stream Gauges
Active USGS Stream Gauges
High-Frequency Monitoring Wells Adjacent to Streams
Planned Shallow/Multi-Level Dedicated Monitoring Wells
Shallow Aquifer System Groundwater-Level Monitoring Network and Existing Stream Gauges
Data Sources:
Groundwater Basins - California Department of Water Resources, Bulletin 118
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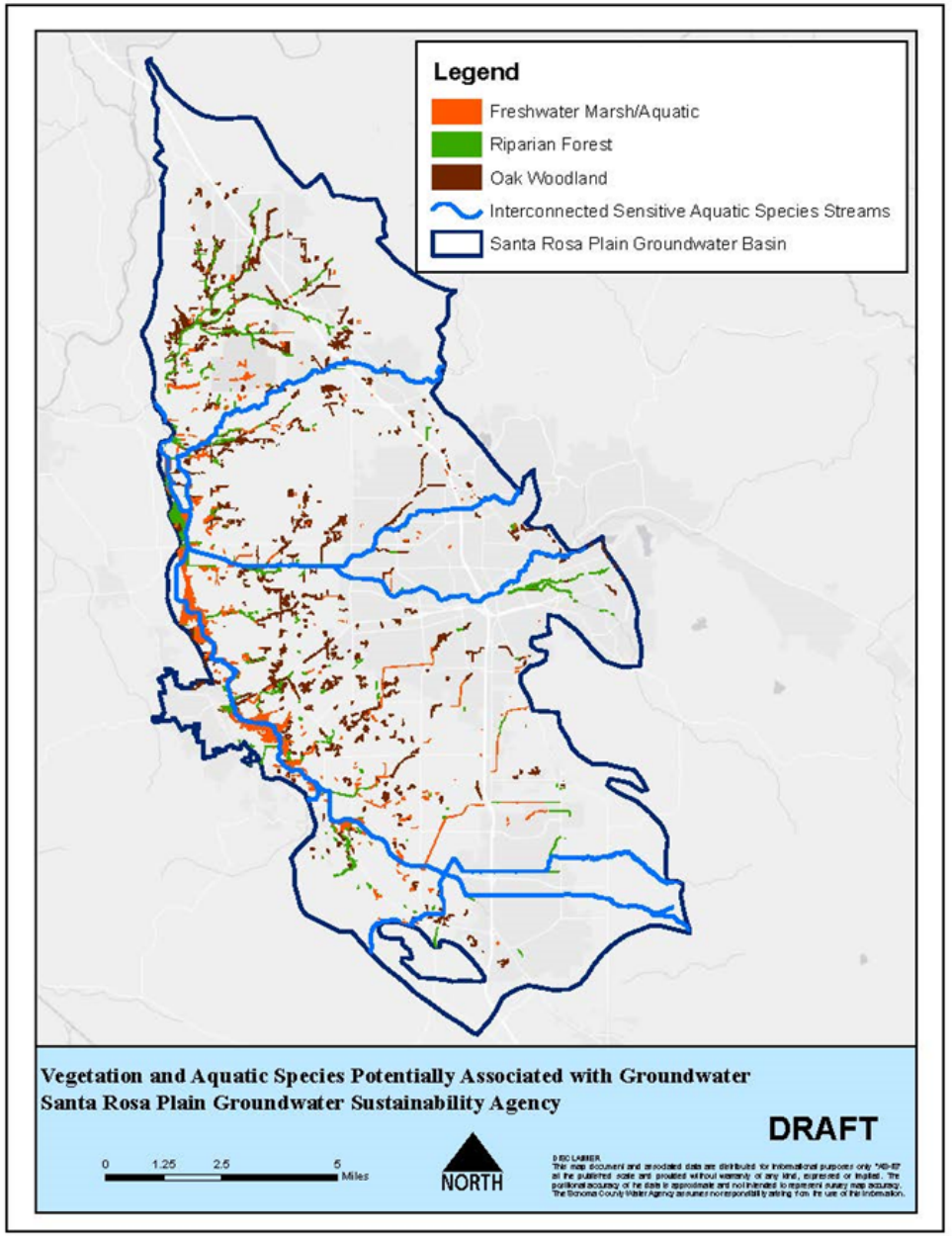
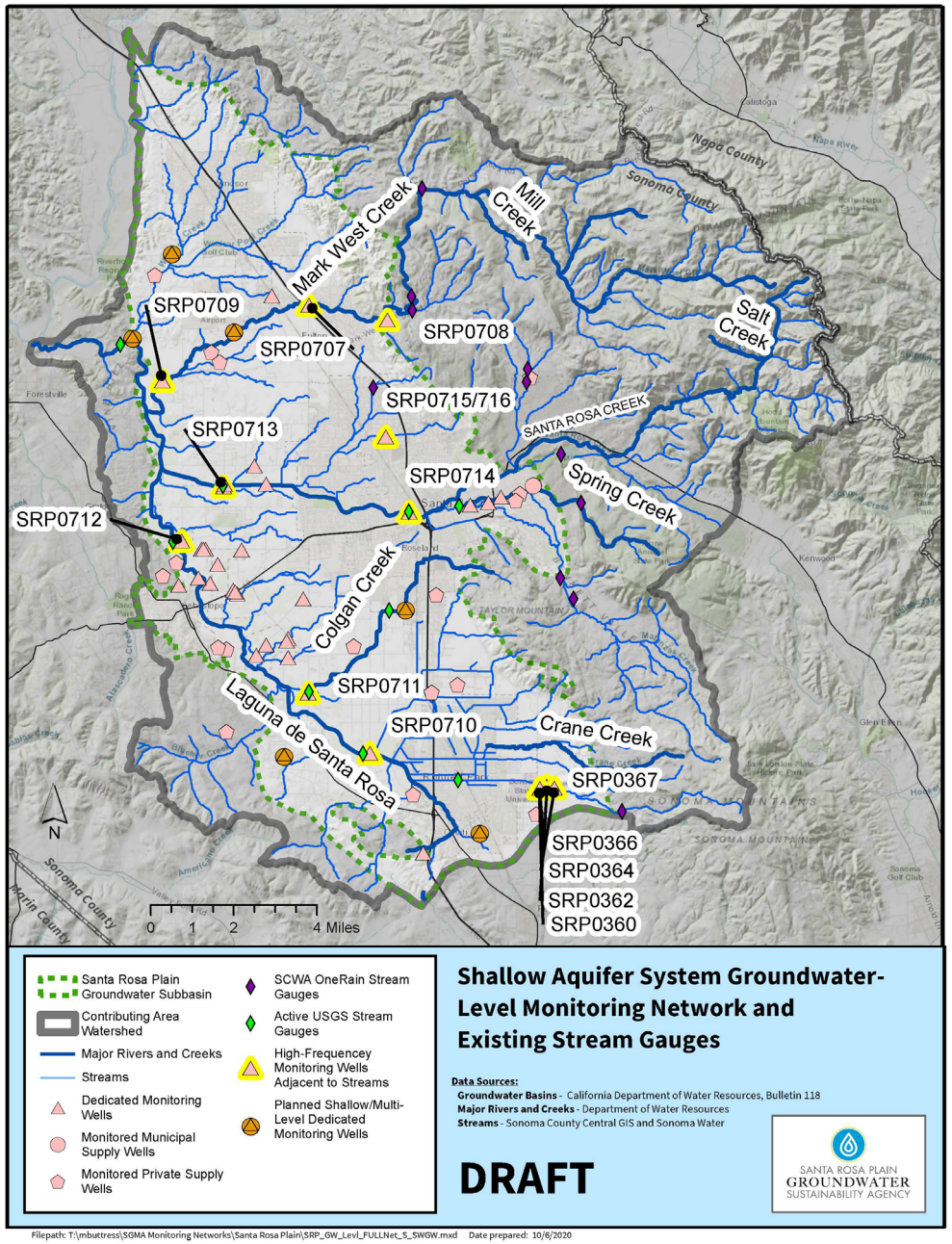
SANTA ROSA PLAIN GROUNDWATER SUSTAINABILITY AGENCY
Filepath: T:\mbuttress\SGMA Monitoring Networks\Santa Rosa Plain\SRP_GW_Levl_FULLNet_S_SWGW.mxd Date prepared: 10/6/2020


Legend
Freshwater Marsh/Aquatic
Riparian Forest
Oak Woodland
Interconnected Sensitive Aquatic Species Streams
Santa Rosa Plain Groundwater Basin
Vegetation and Aquatic Species Potentially Associated with Groundwater
Santa Rosa Plain Groundwater Sustainability Agency
DRAFT
0 1.25 2.5 5 Miles
NORTH


Mark West Creek
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SRP0367
SRP0366
SRP0364
SRP0362
SRP0360
Napa County
Sonoma County
Marin County
N
0 1 2 4 Miles
Santa Rosa Plain Groundwater Subbasin
Contributing Area Watershed
Major Rivers and Creeks
Streams
Dedicated Monitoring Wells
Monitored Municipal Supply Wells
Monitored Private Supply Wells
SCWA OneRain Stream Gauges
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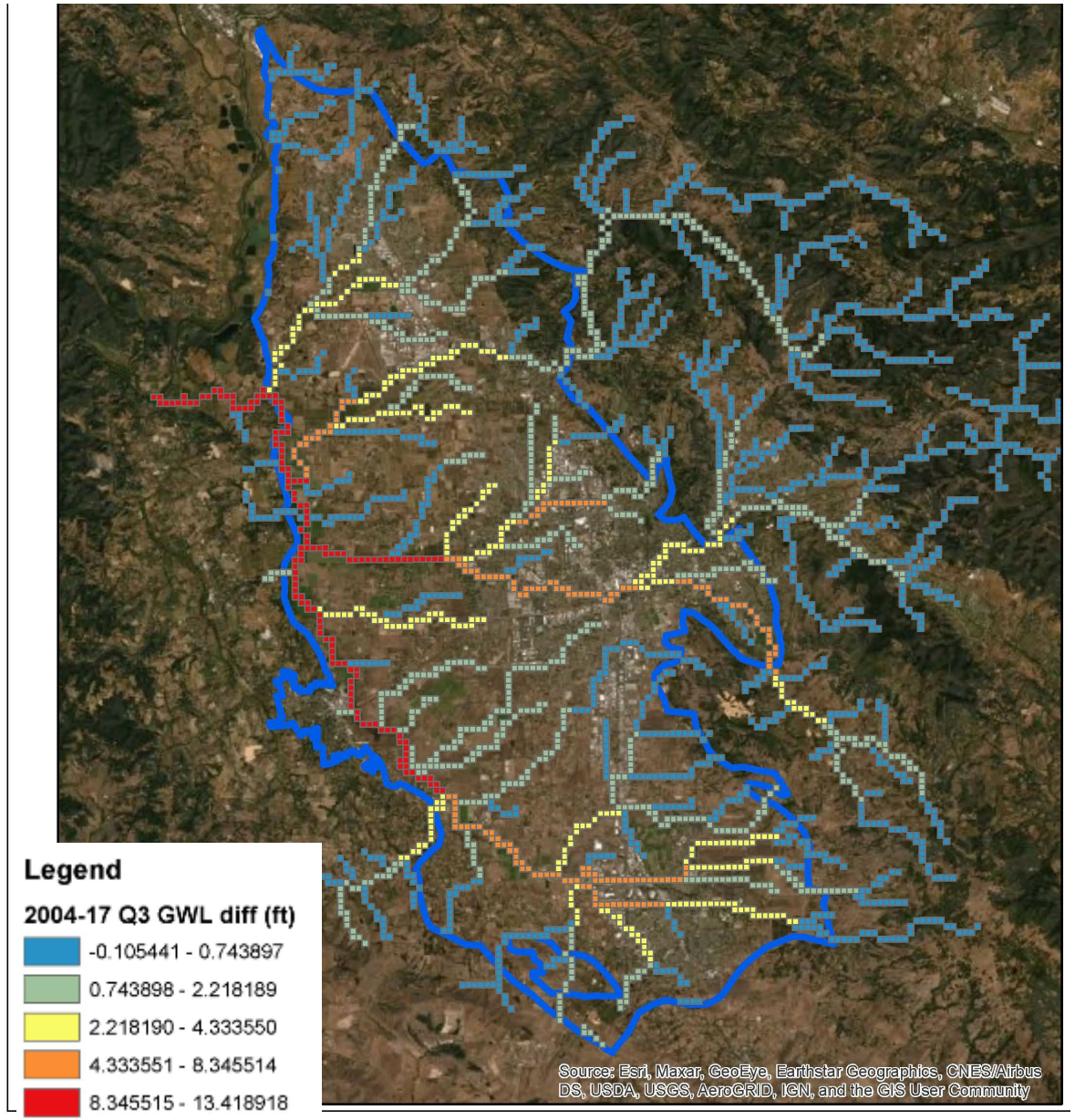
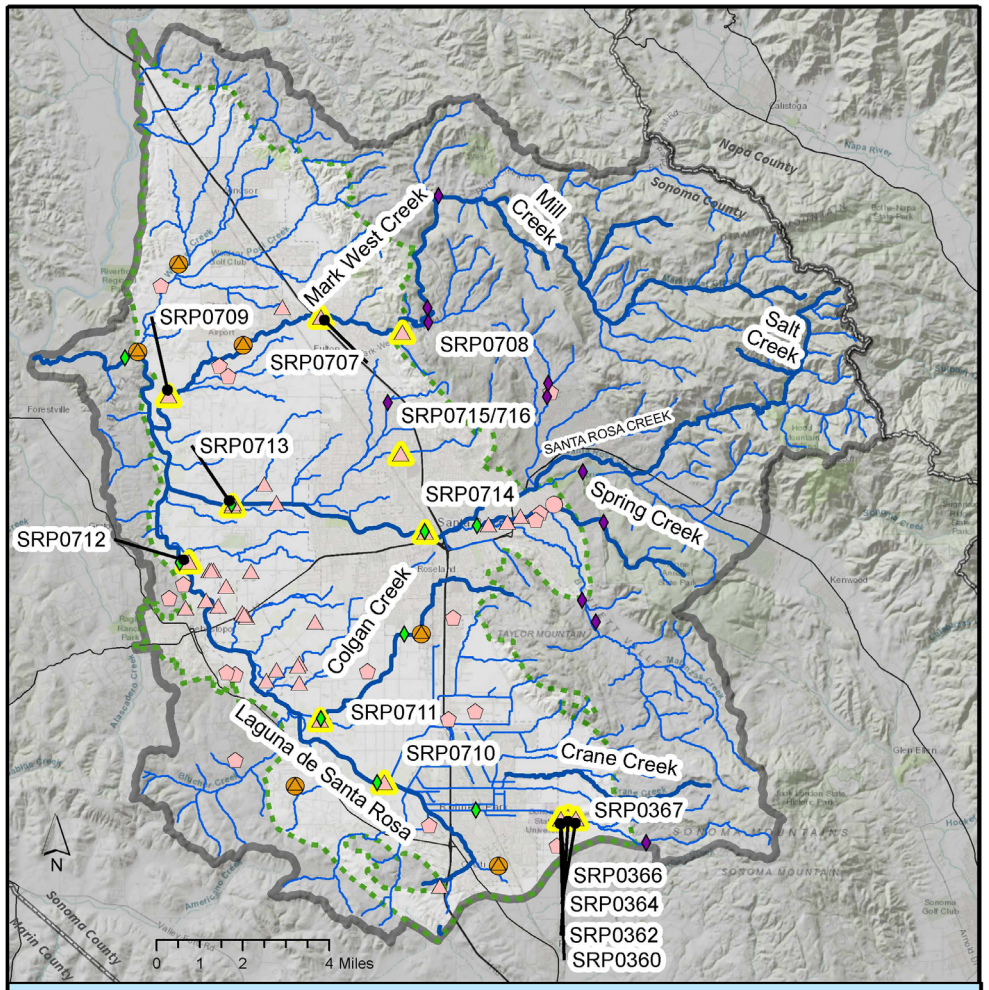
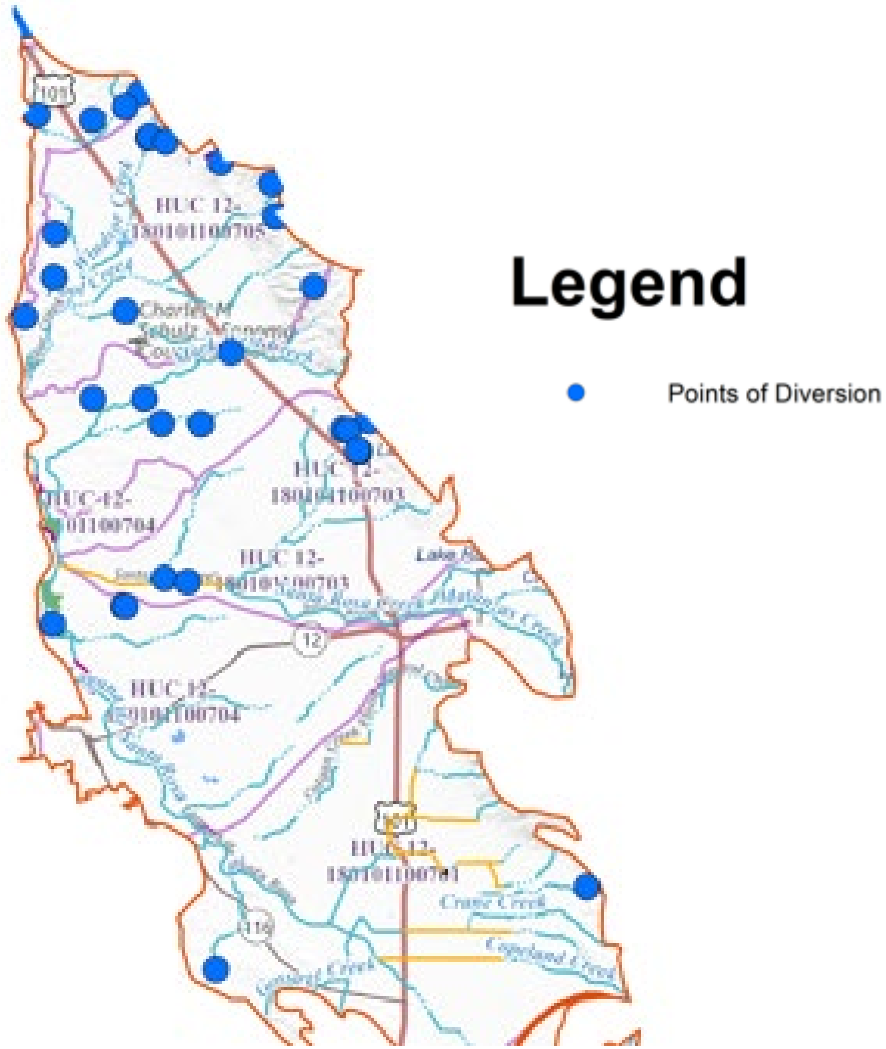

Legend
2004-17 Q3 GWL diff (ft)
-0.105441 - 0.743897
0.743898 - 2.218189
2.218190 - 4.333550
4.333551 - 8.345514
8.345515 - 13.418918
Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community





Locations of Surface Water Diversions

Next Steps in Developing SMC for Depletion of Interconnected Surface Water

1. Continue developing DRAFT Significant and Unreasonable Statement
2. Complete GDE and ISW mapping
3. Further evaluate potential RMP network
4. Develop draft SMC at each proposed RMP based on potential methodology
5. Provide update on potential methodology at January AC meetings

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GROUNDWATER SUSTAINABILITY AGENCIES

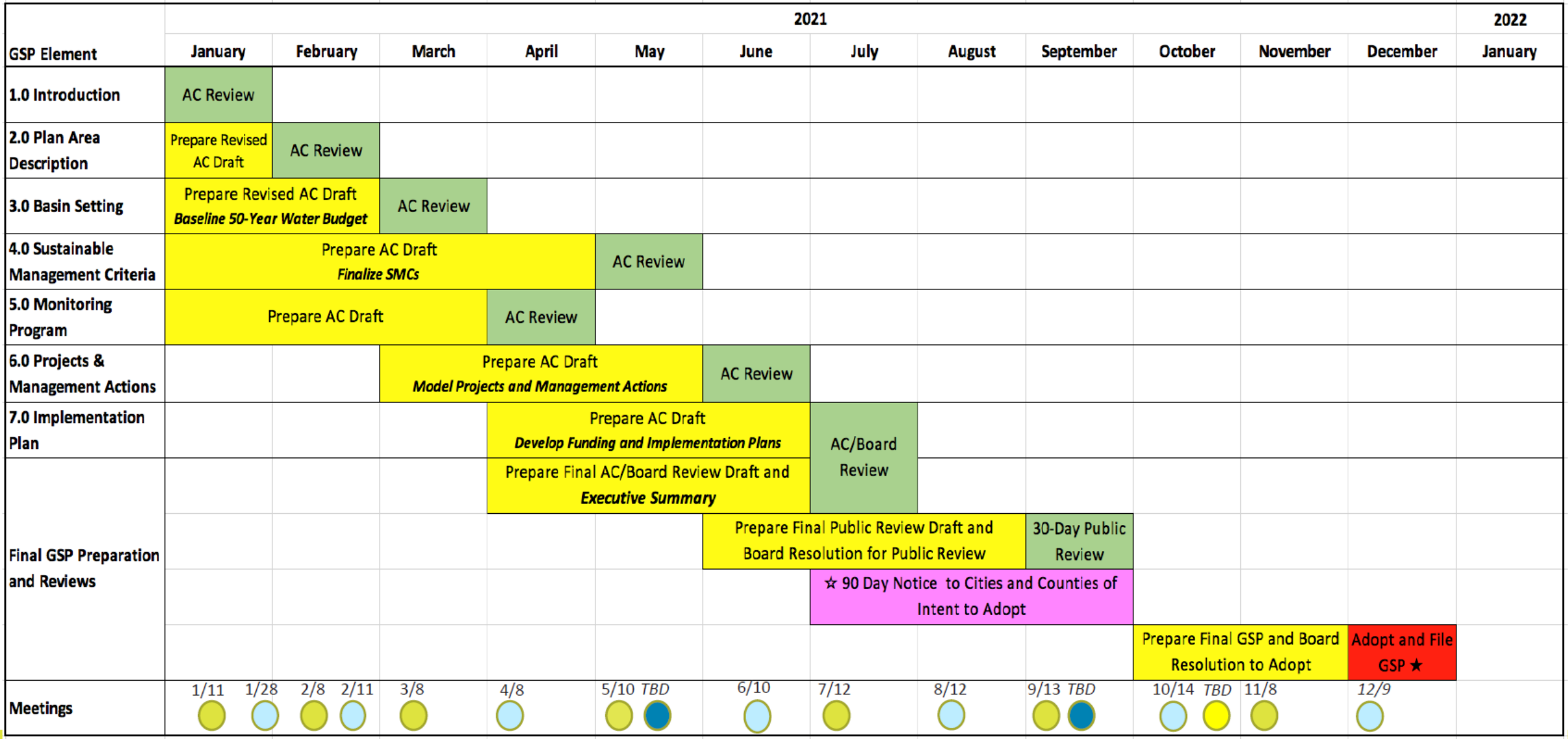
SUSTAINABLE MANAGEMENT CRITERIA FOR DEPLETION OF INTERCONNECTED SURFACE WATER

PRACTITIONER WORK GROUP MEETING #3

Agenda

1. Welcome and Intro (5 min)
2. Schedule (5 min)
3. Revisit SMC S&U and assumptions (15 min)
4. Methodology Options for MTs/MOs (45 min):
    a. Methodology descriptions with examples
    b. Discussion of benefits/issues with each example
    c. Workgroup input on approach preferences
5. Possible options for URs (20 min)
6. Data Gaps and Future Recommended Activities (30 min)
7. Next Steps

DRAFT GSP Schedule – Santa Rosa Plain



GSA Board Meeting GSA Advisory Committee Meeting GSA Community Meeting GSP Public Hearing

Work Group Schedule

January 26 Work Group Meeting (today): *Revisit Significant and Unreasonable statement, recommendations on MT/MO methodology, discuss options for URs, develop initial list of data gaps and future recommended activities for implementation plan*

February 8-10 Advisory Committee (AC) Meetings: Technical staff brief ACs on methodology approach

February 18 - Final Work Group Meeting: *Review draft MTs and MOs for each basin, develop recommendations on options for GSA Board consideration for URs, final list of data gaps and recommendations/prioritization for future activities to further develop SMC*

March 8-10 AC Meetings: Technical staff present Recommendations to ACs (Work Group members welcome to attend, help with questions)

March 11, 22, and 25 GSA Board Meetings: Technical staff present recommendations to GSA Boards for consideration (Work Group members welcome to attend, help with questions)

Revisit Significant and Unreasonable Statement

"Significant and unreasonable conditions" - phrase used to identify conditions that lead to undesirable results - not specifically defined in the GSP Regulations.

Often confused with, or used interchangeably with, undesirable results.

Significant and unreasonable conditions are physical conditions to be avoided; an undesirable result is a quantitative assessment based on minimum thresholds.

Defining significant and unreasonable conditions early in the process of developing SMC for each sustainability indicator helps set the framework by which the quantitative SMC metrics are determined.

Previous S&U Statement

Significant and unreasonable depletion of surface water from interconnected streams, occurs when groundwater pumping within the Basin/Subbasin depletes streamflows below historical levels and adversely impacts the viability of GDEs or other beneficial surface water users.

ISW SMC Practitioner Work Group 12/7/20 Feedback

- Remove reference to “stream flows below historical levels”; the goal is to be protective of stream levels independent of a historical baseline
- Maintain reference to historical levels; may provide reference point for long-term health of streams and potential impacts or fluctuations in groundwater usage
- “Stream flows” may be too restrictive; consider using “surface water” generally to cover groundwater impacts to wetlands as well
- Consider replacing “significant and unreasonable” with “adverse impacts to beneficial uses.”

Revised Strawman Significant and Unreasonable Statement

Significant and unreasonable depletion of surface water from interconnected streams occurs when surface water depletion, caused by groundwater pumping within the Basin/Subbasin, exceeds ~~depletes streamflows below~~ historical depletion ~~and~~ or adversely impacts the viability of groundwater dependent ecosystems (GDEs) or other beneficial users of surface water ~~users~~.

Notes/definitions:

- Provides guidance for technical staff to move forward with methodology based on available historical information and allows for future incorporation of flow targets or other information concerning adverse impacts to beneficial users developed by others
- "Groundwater pumping" excludes any diversions by surface water rights holders
- "Historical levels" to be defined using minimum threshold methodology
- "groundwater dependent ecosystems" defined in Basin Setting
- "other beneficial users of surface water" include surface water rights holders and recreational uses (where applicable)

Potential Methodology for Determining ISW SMC

Potential Methodology for Determining ISW SMC

Correlation Assessment of Simulated Streamflow Depletion with Groundwater Levels

- Incorporate available historical data and variety of water-year types
- Analysis of groundwater pumping effects on surface water depletion
- Use simulation analysis and historical data together to inform selection of SMCs
- Allow for any potential future instream flow requirements, etc.
- Include a detailed plan in the GSP for how we will build our datasets and improve simulation capabilities to more fully incorporate the correlation assessment methodology we have tested.

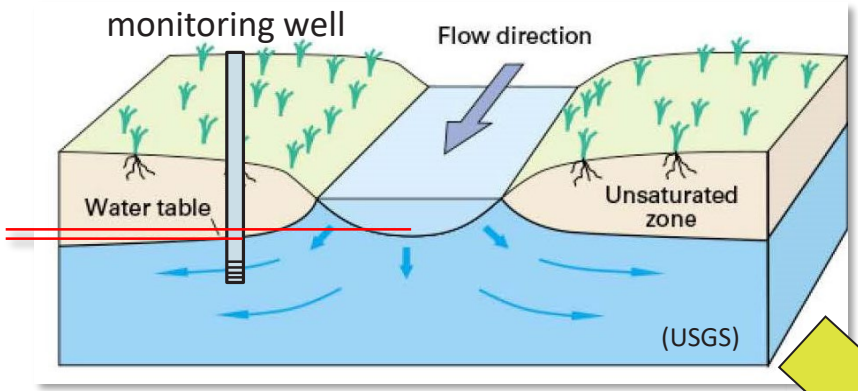
Challenges:

- At majority of potential Representative Monitoring Points (RMPs), we only have one years worth of groundwater-level data
- Variable levels of correlation between simulated streamflow depletion and groundwater levels
- Potential instream flow targets not available
- Limited data and information for assessing presence of any historical significant and unreasonable conditions

ISW SMC Practitioner Work Group Feedback on SMC Methodology Approaches

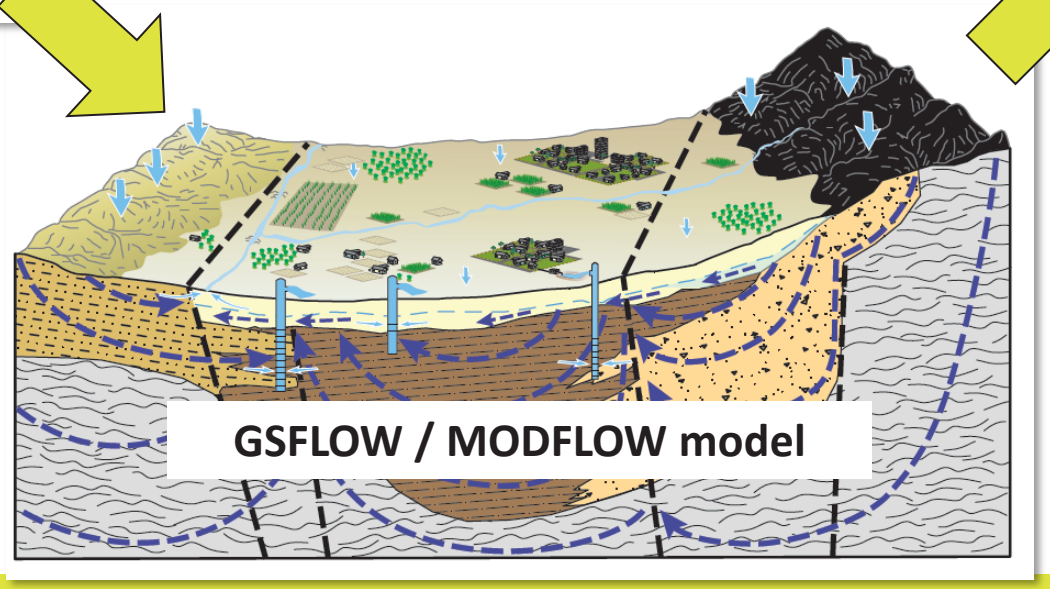
- General support for straw methodology
- Clearly linking stream flow depletion to adverse impacts from groundwater usage is important for successful implementation of the SMC
- Thresholds should not be set to one or more severe droughts in the historical records
- Linking existing biological flow requirements to the SMC may help illustrate the importance of any actions associated with the SMC
- The SMC will require an explanation of when data gaps will be filled in during the GSP implementation process

How can we leverage measurements and models to characterize GW/SW interactions and SW depletion?

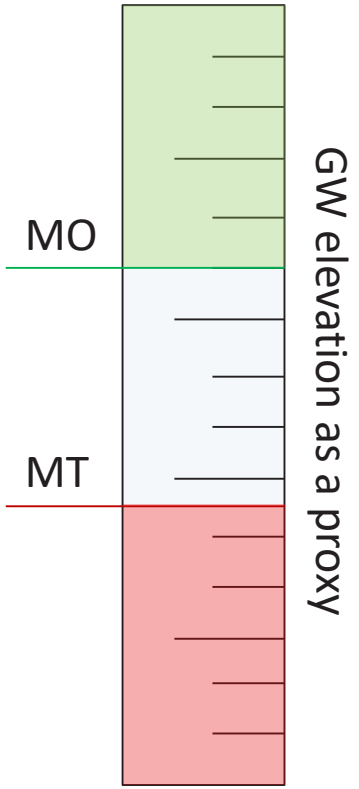


Local GW elevation (measured/simulated)

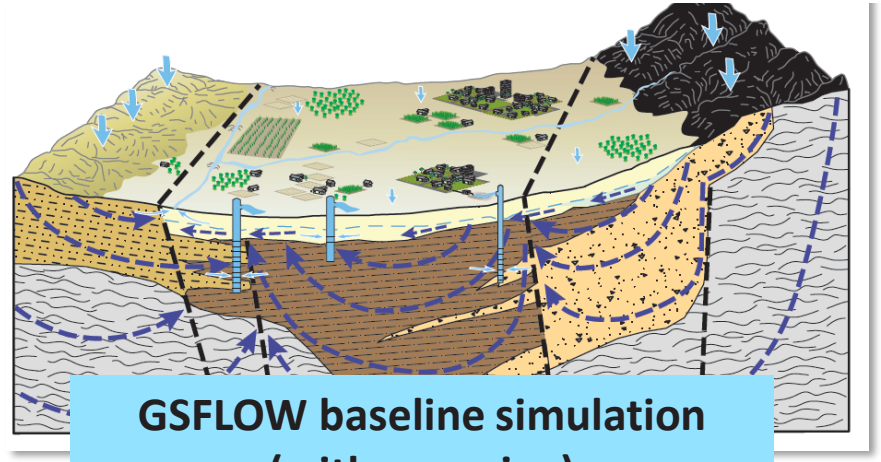
Regional SW depletion characterization (simulated)



SMCs are tied to GW elevations and informed by simulation results

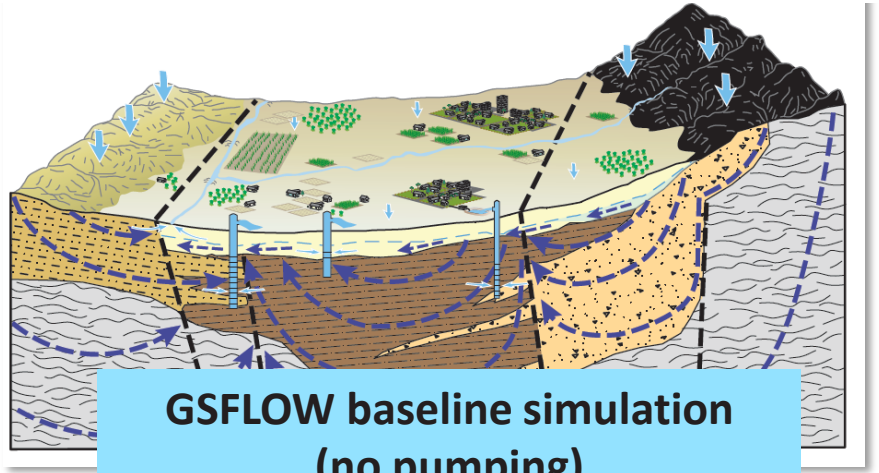


Isolate GW pumping impacts by “differencing” a historical baseline simulation (with pumping) from a identical simulation without pumping



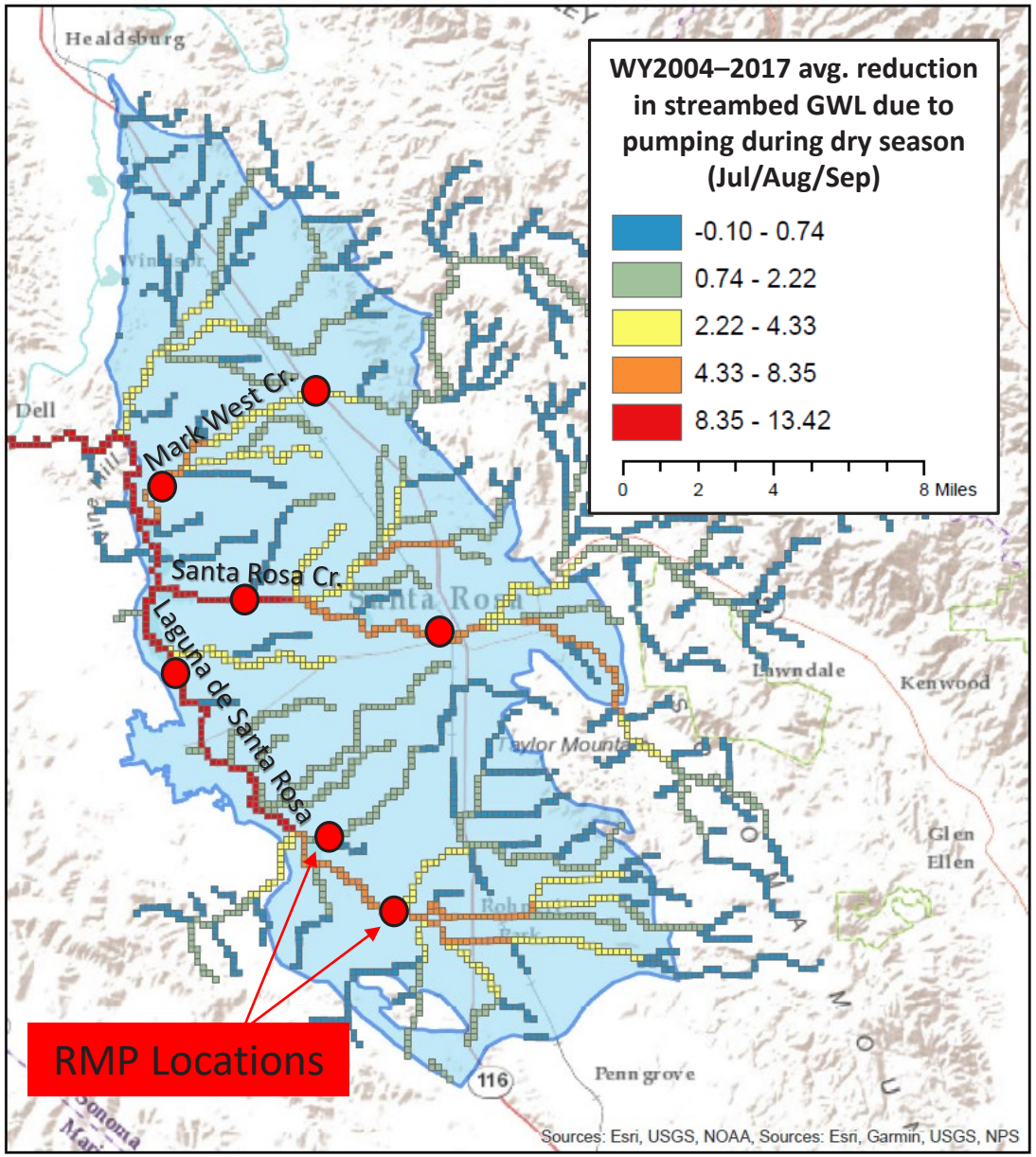
GSFLOW baseline simulation (<u>with</u> pumping)

minus



GSFLOW baseline simulation (<u>no</u> pumping)

Isolate Surface Water Depletion (SWD) from groundwater pumping



Where does pumping have greater potential to impact streamflows?

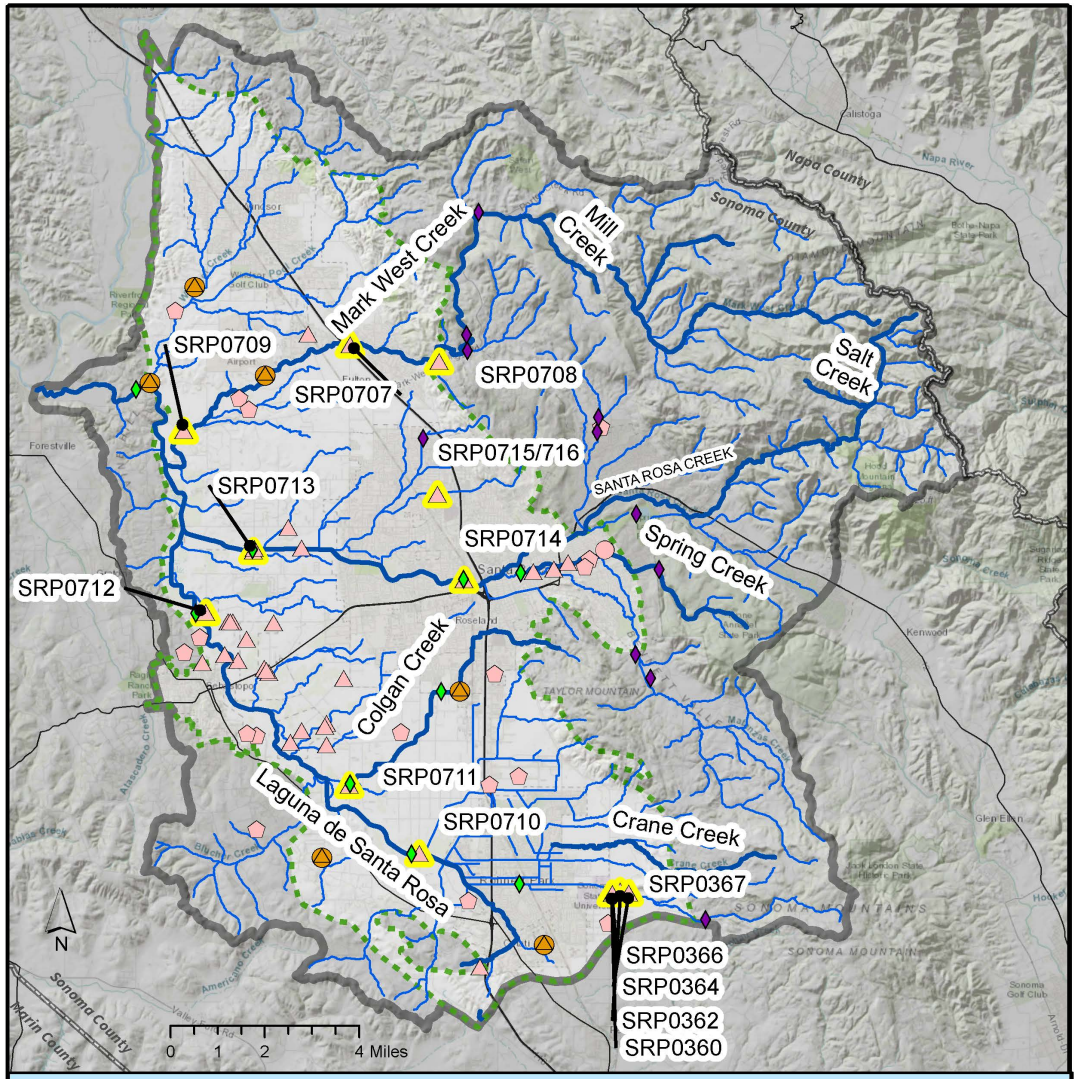
Modeling suggests that pumping has greater potential to impact streamflows on:

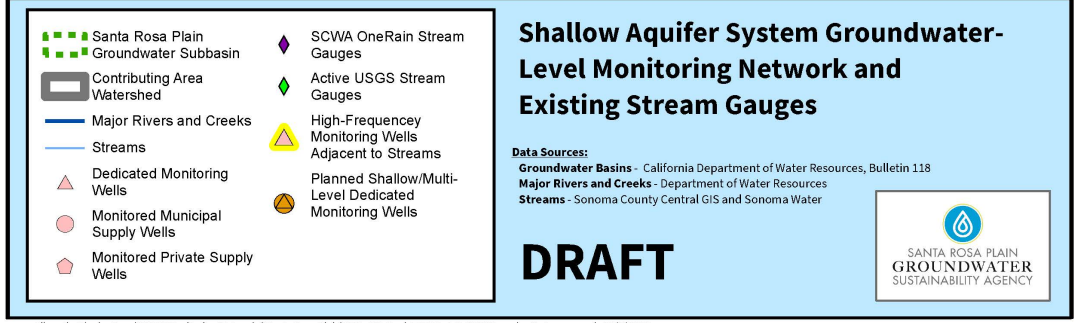
Laguna de Santa Rosa
Santa Rosa Cr.
Mark West Cr.

Actual impacts are very dependent upon:

(1) streambed/shallow aquifer hydraulic conductivity
(2) stream/aquifer configuration

What is the impact of pumping on outflows from the basin?





Shallow Aquifer System Groundwater-Level Monitoring Network and Existing Stream Gauges

Data Sources:
Groundwater Basins - California Department of Water Resources, Bulletin 118
Major Rivers and Creeks - Department of Water Resources
Streams - Sonoma County Central GIS and Sonoma Water

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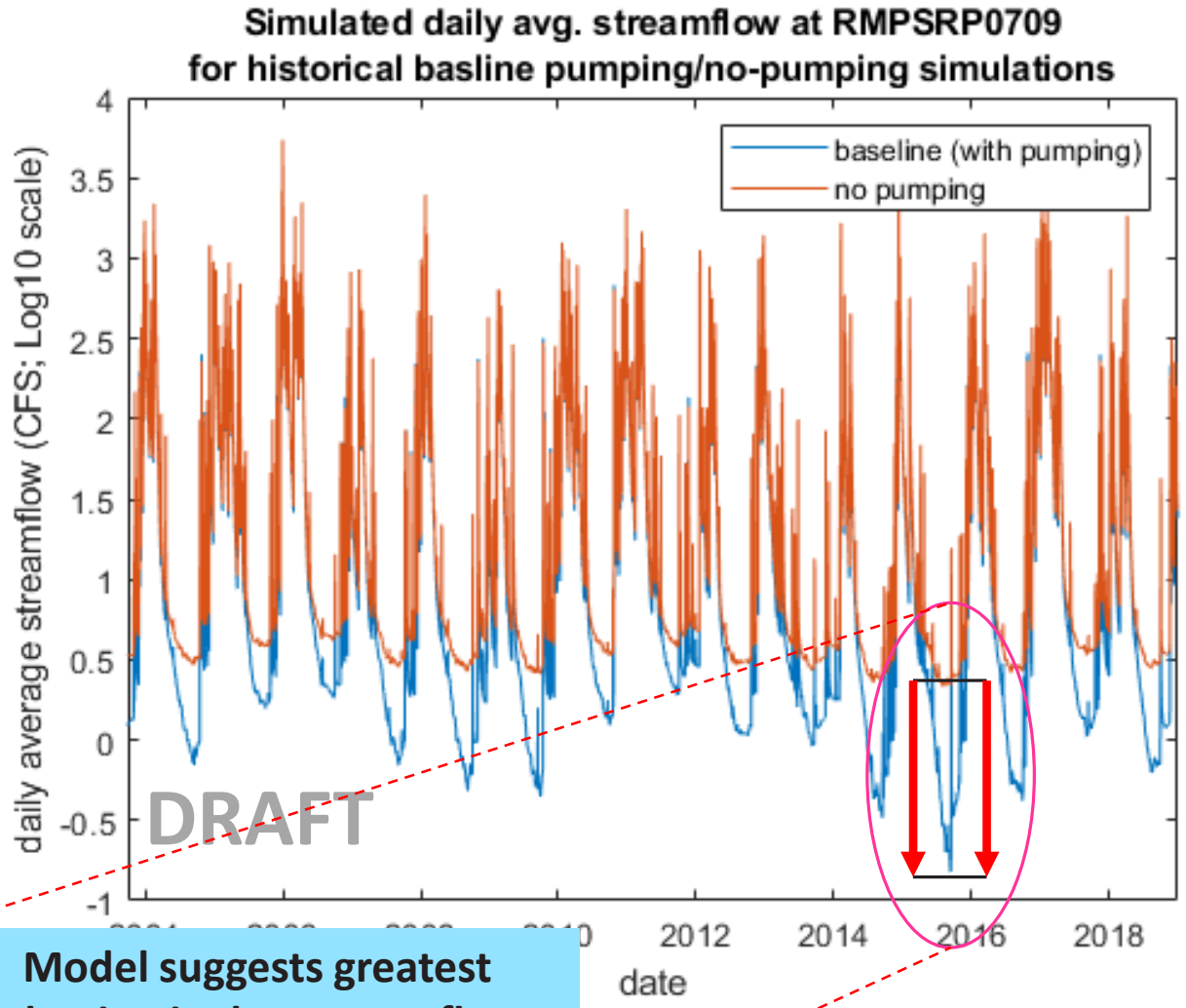
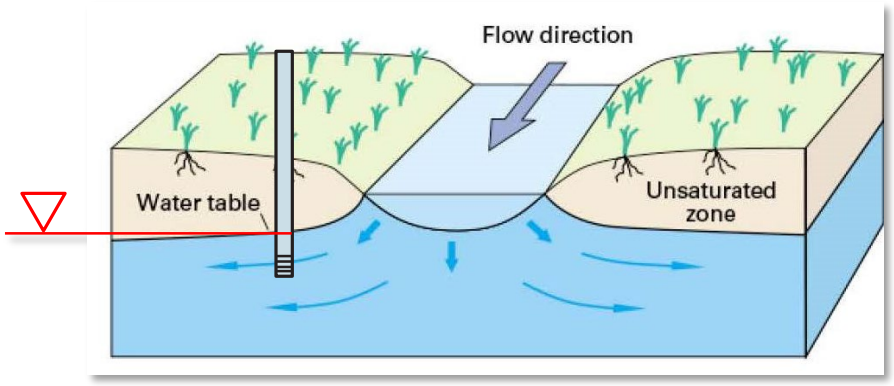
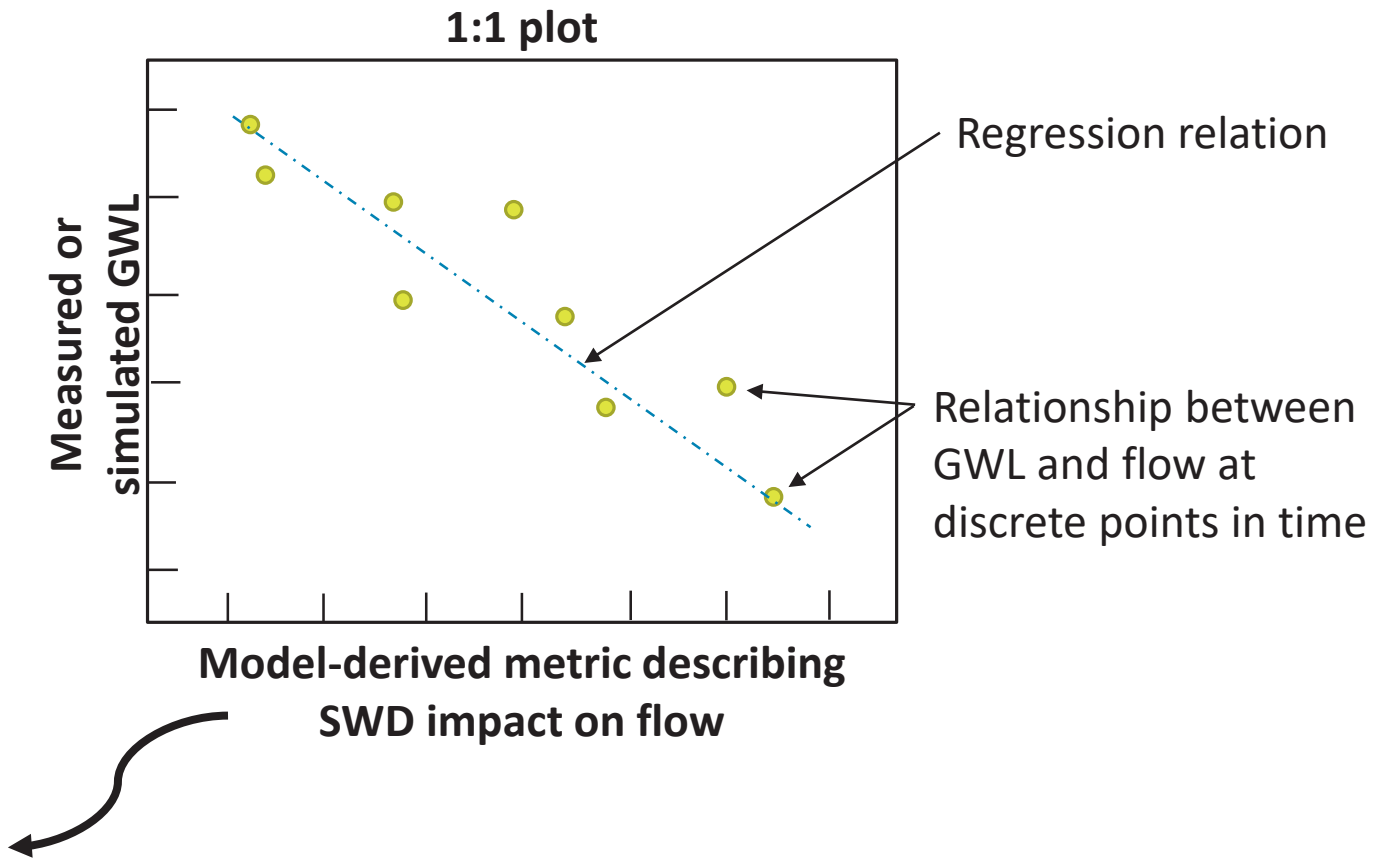


Model suggests greatest reduction in dry-season flows due to pumping during 2015

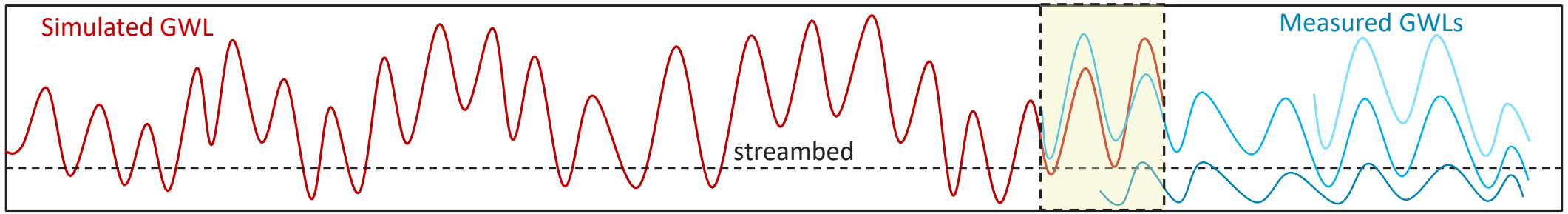
How can GWL be used as a proxy for surface water depletion?



1. **Percent reduction in streamflow due to pumping (over entire WY)**
2. **Percent reduction in streamflow due to pumping (during low-flow periods)**
3. **Number of days that SWD exceeds threshold value**



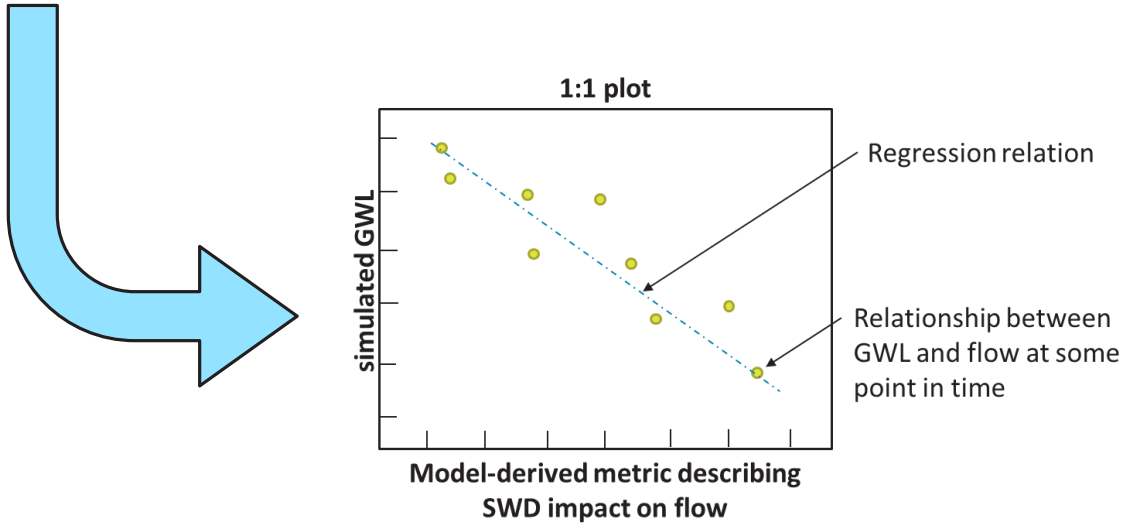
How can GWL – SWD relationship be used to inform SMC choice?



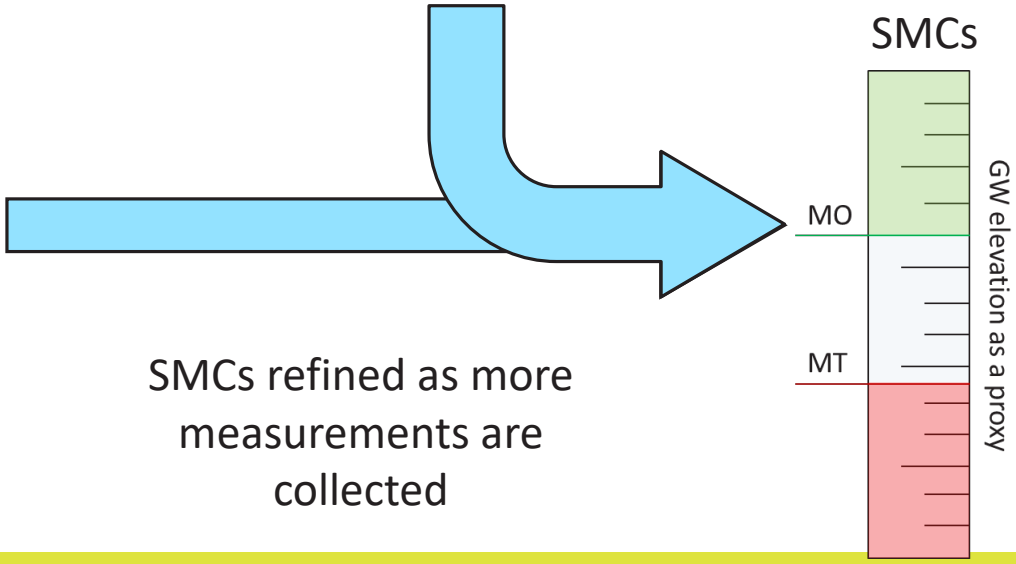
Simulation Period (1974–2018)

Little or no temporal overlap

Measurement Period (recent past-present)



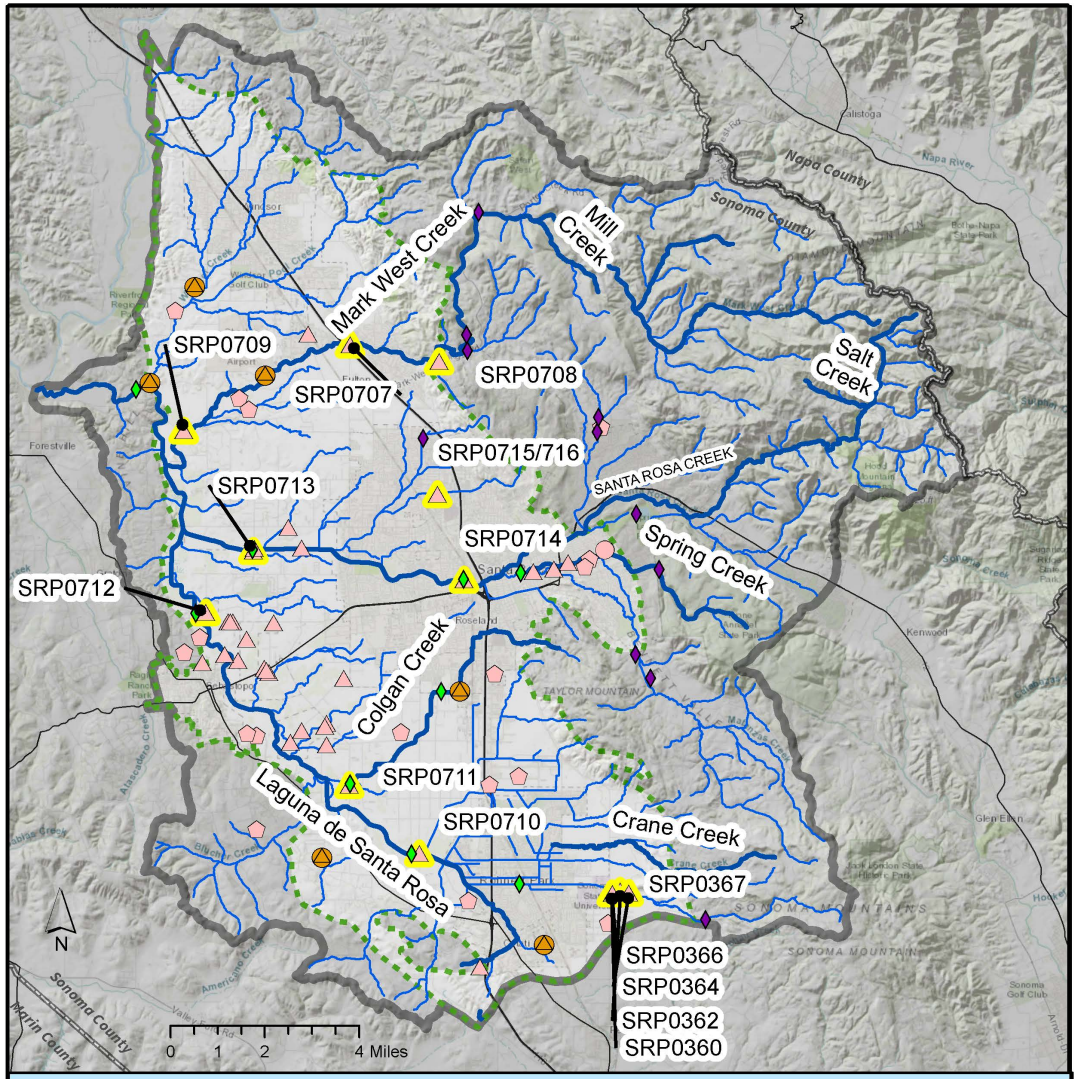
SMC choices informed by modeled SWD

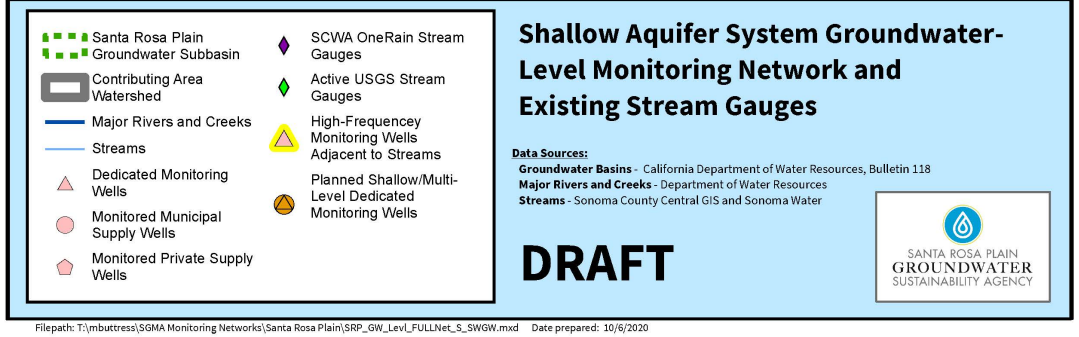


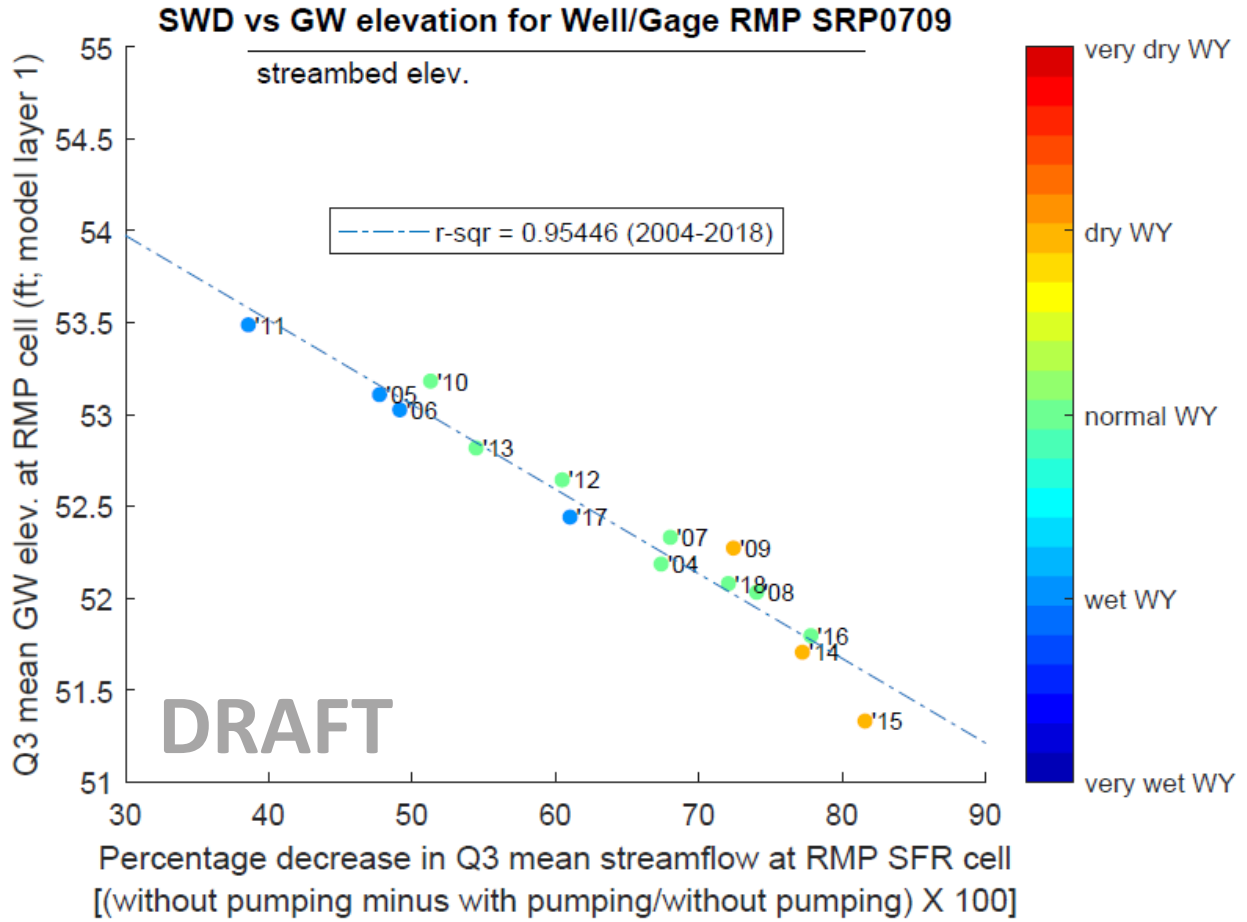
SMCs refined as more measurements are collected

Can we use GW levels as a proxy for SWD?

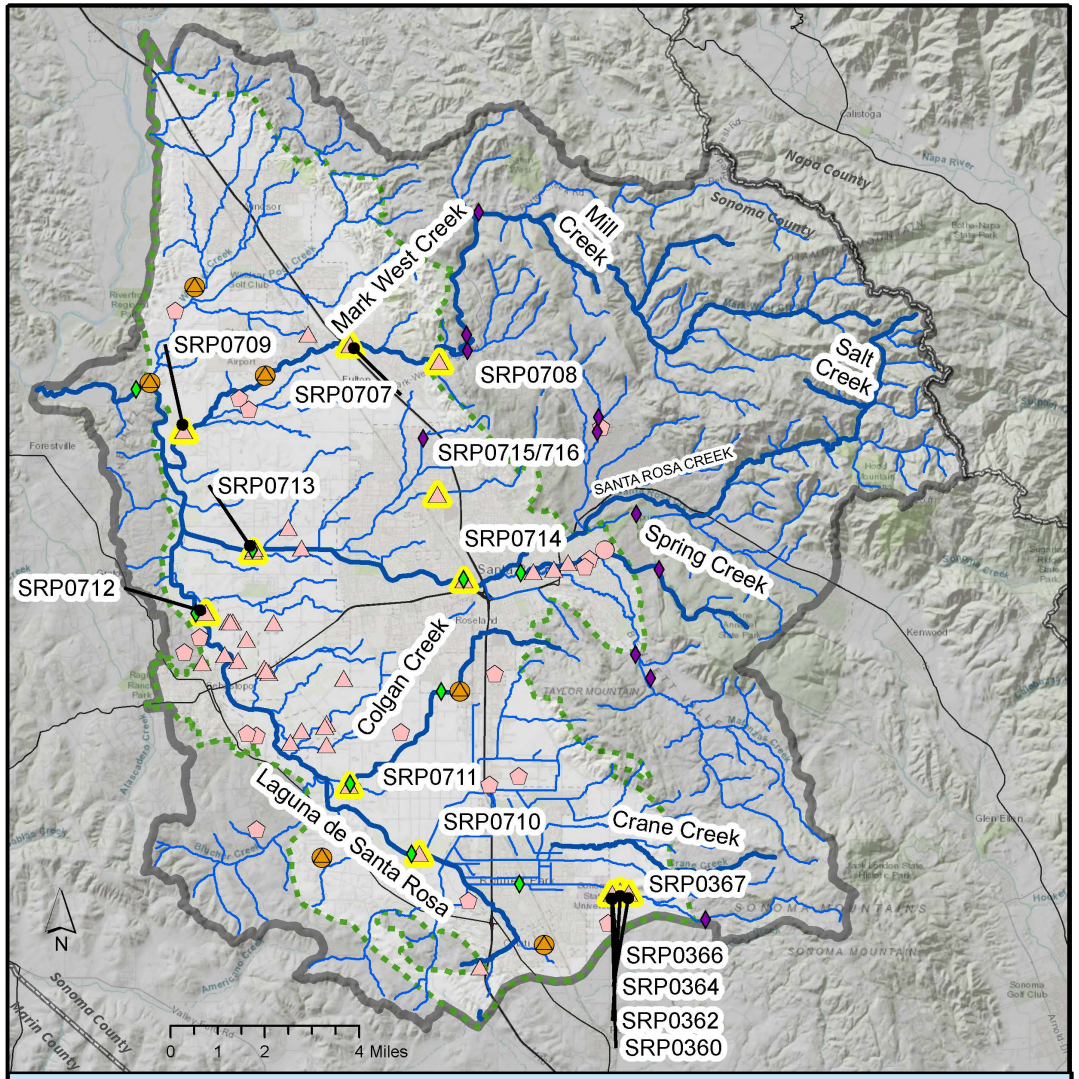
Good correlation … for simulated GW levels and SWD at some RMPs

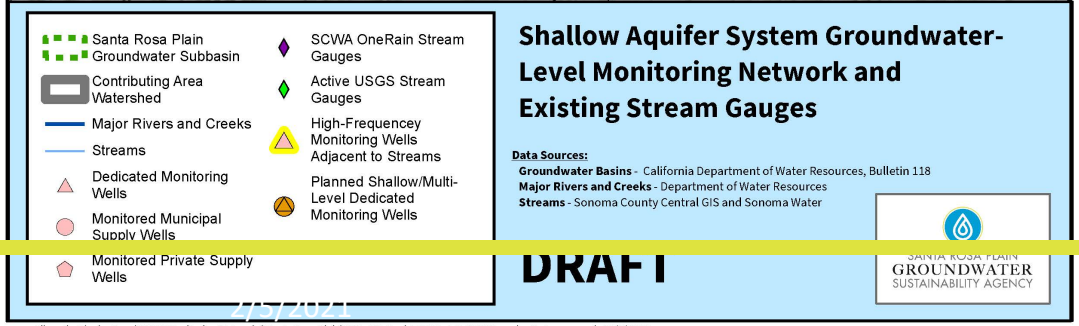


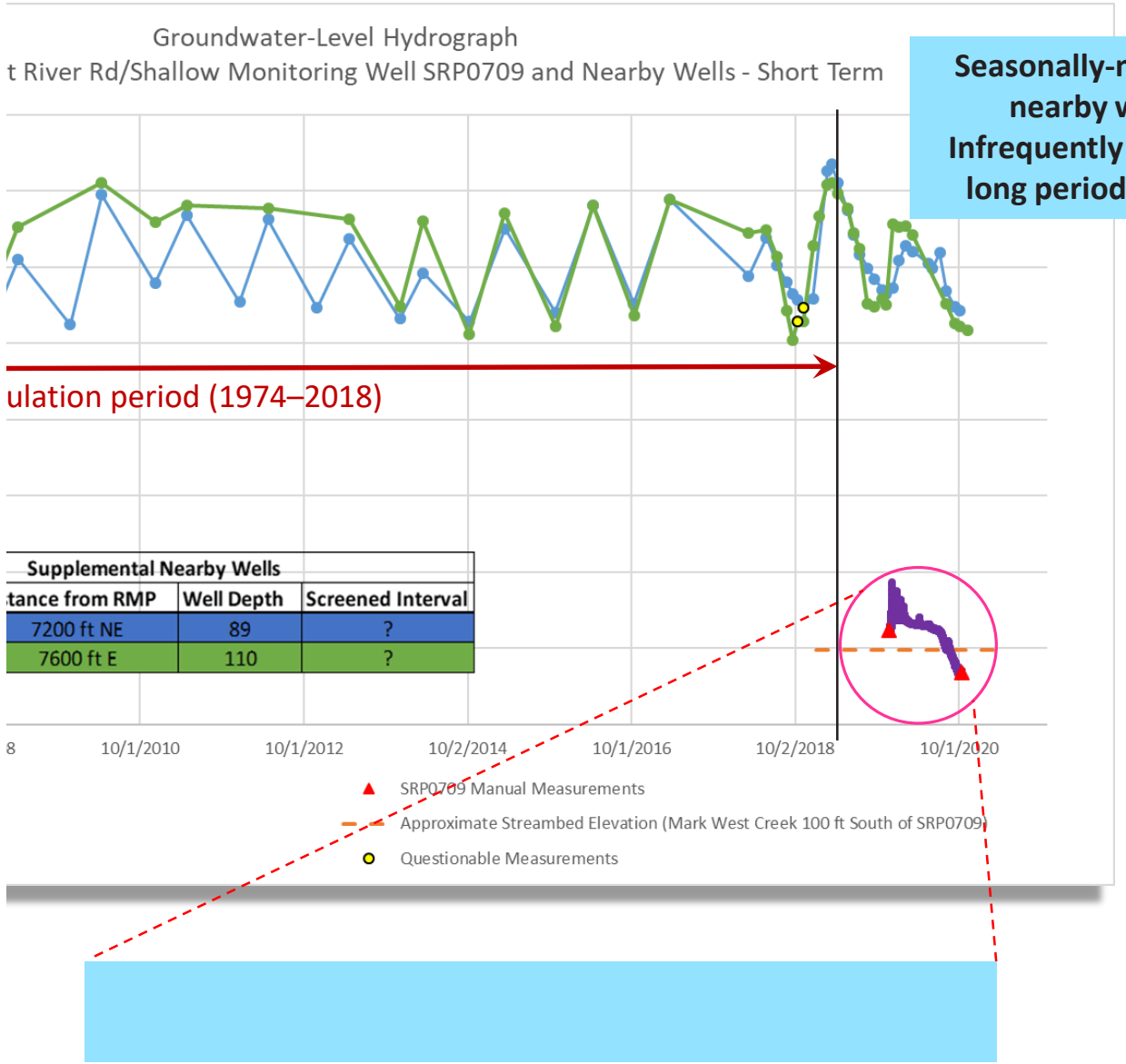




What GWL measurements do we have at RMPs?

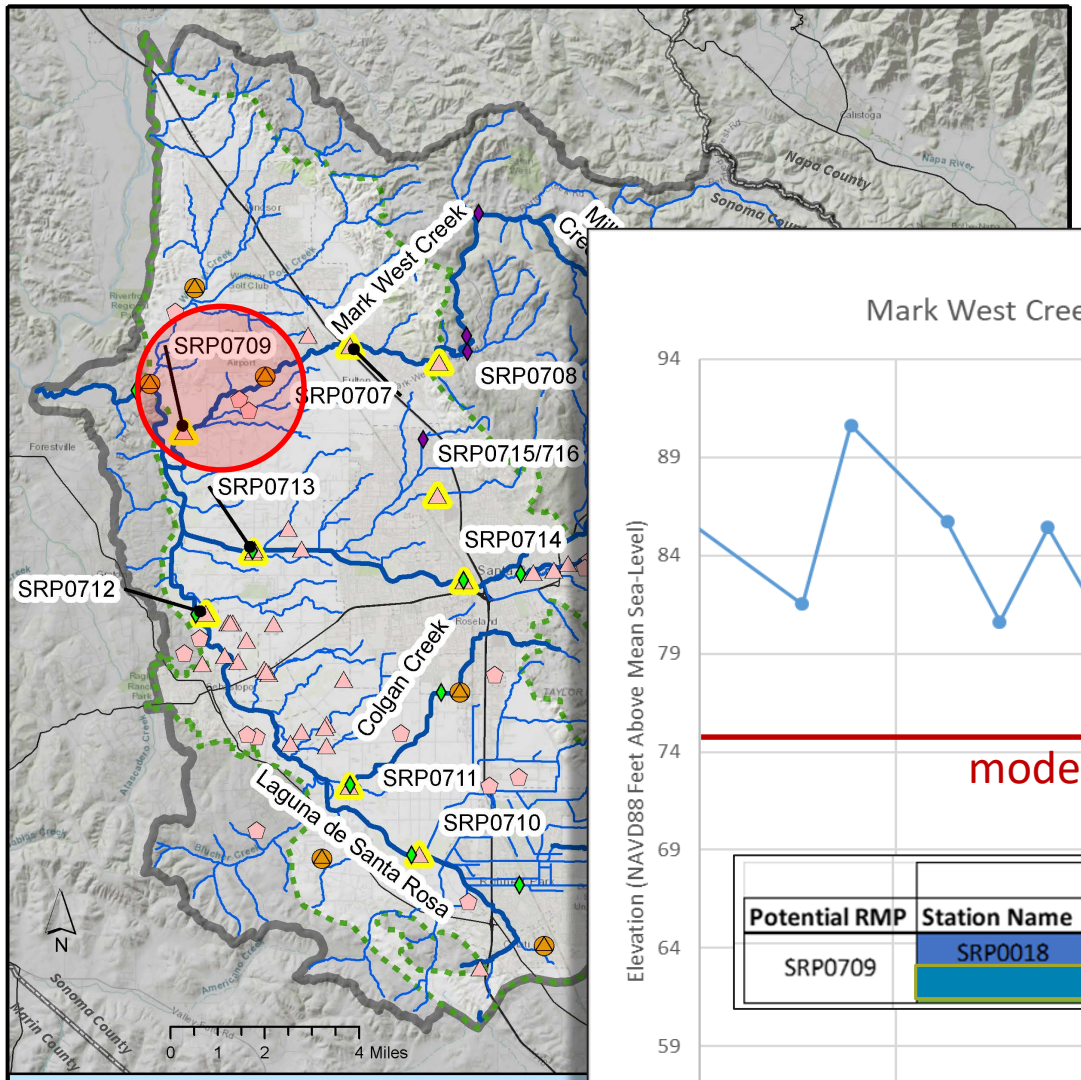


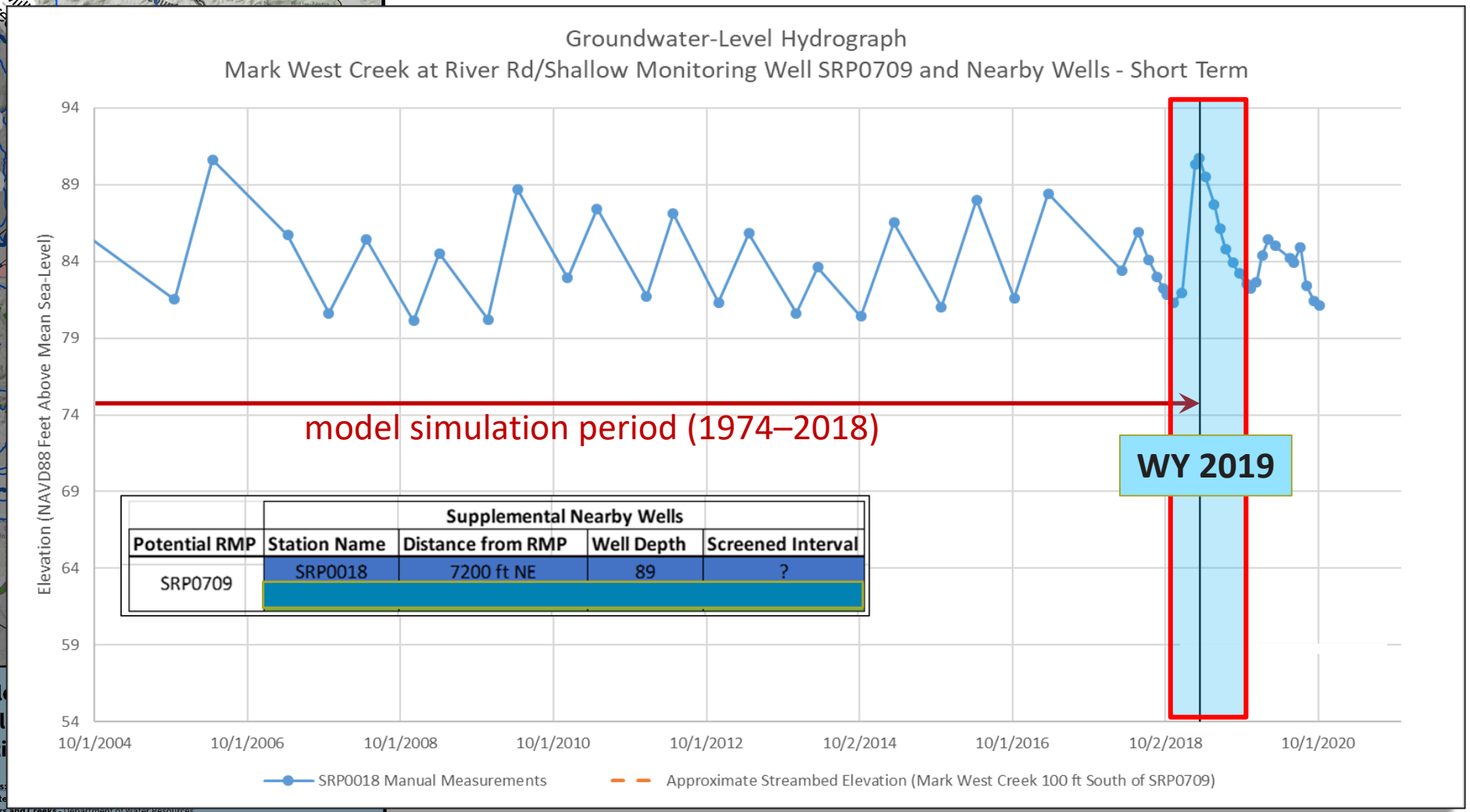




Seasonally-monitored, nearby wells …
Infrequently measured, long period of record

How do we use model results to characterize SWD from measurements? Example: WY 2019





Potential RMP	Supplemental Nearby Wells			
	Station Name	Distance from RMP	Well Depth	Screened Interval
SRP0709	SRP0018	7200 ft NE	89	?

Santa Rosa Plain Groundwater Subbasin
Contributing Area Watershed
Major Rivers and Creeks
Streams
Dedicated Monitoring Wells
Monitored Municipal Supply Wells
Monitored Private Supply Wells
SCWA OneRain Stream Gauges
Active USGS Stream Gauges
High-Frequency Monitoring Wells Adjacent to Streams
Planned Shallow/Multi-Level Dedicated Monitoring Wells

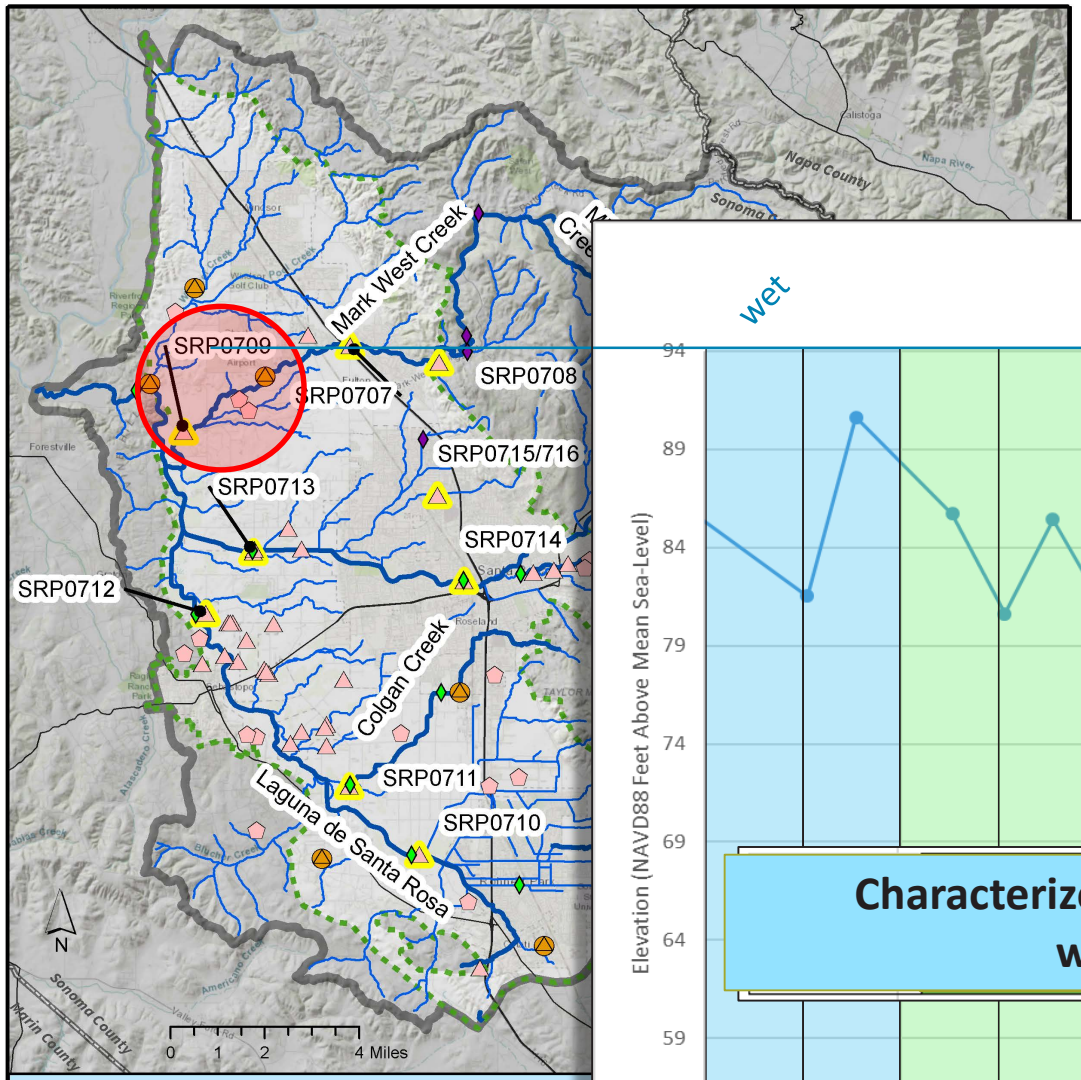
Data Sources:
Groundwate
Major Rivers and Creeks - Department of Water Resources
Streams - Sonoma County Central GIS and Sonoma Water

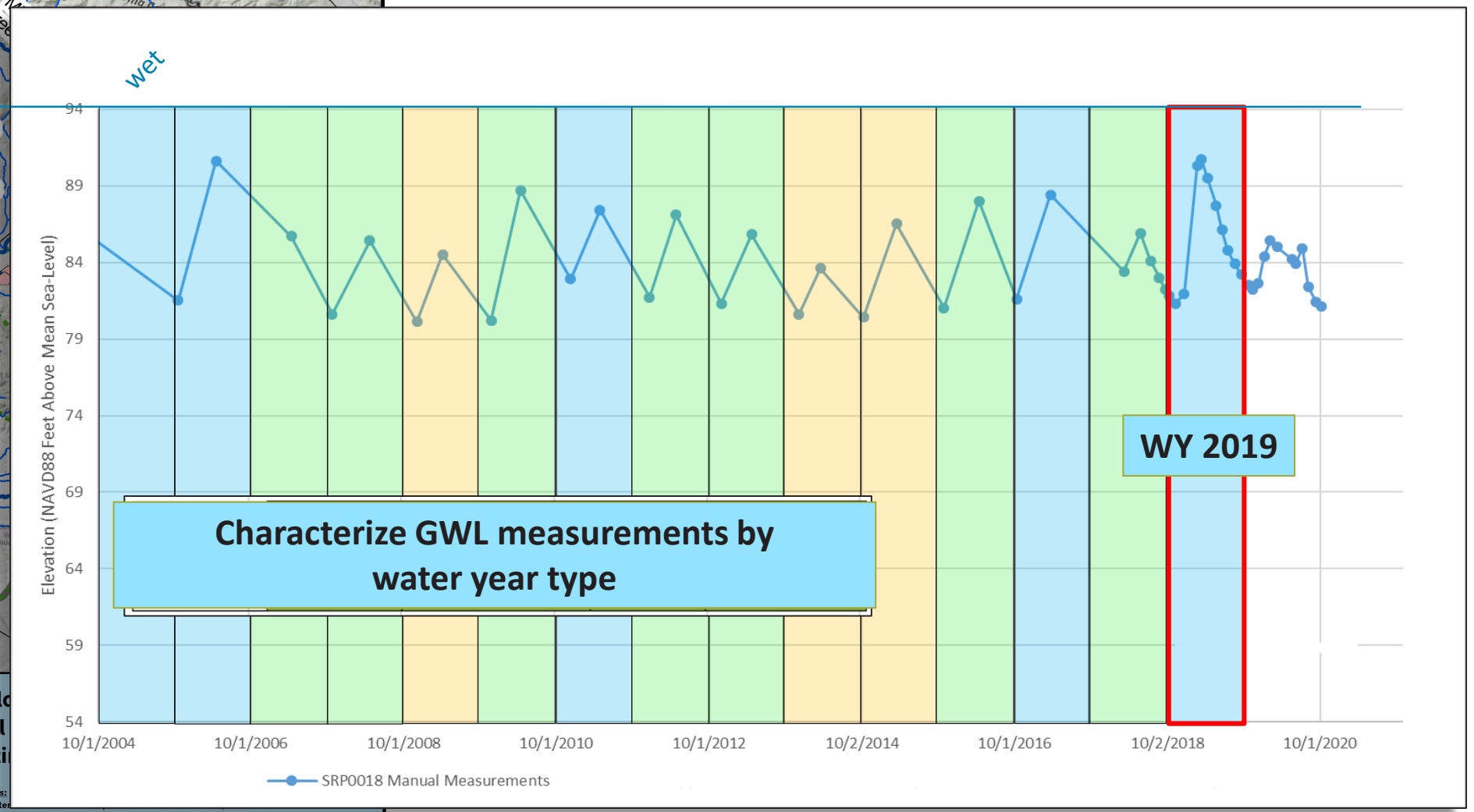
DRAFT

SANTA ROSA PLAIN GROUNDWATER SUSTAINABILITY AGENCY

Filepath: T:\mbuttress\SGMA Monitoring Networks\Santa Rosa Plain\SRP_GW_Levl_FULLNet_S_SWGW.mxd Date prepared: 10/6/2020

How do we use model results to characterize SWD from measurements? — Example: WY 2019





How do we use model results to characterize SWD from measurements? — Example: WY 2019