Q11. Do you have any other suggestions for the GSAs on communication and engagement methods for the SGMA GSP process?

Answered: 73
Skipped: 30

Appendix H. Meeting Feedback Form

Paso Robles Basin Meeting Survey

Name: _____

Contact: _____

Date: _____

Please provide feedback to improve out communication and engagement process.

Survey Questions		Agree	Disagree
1	Information provided was useful and understandable?		
2	Meeting noticing was timely, informative about location and meeting topic(s)?		
3	Opportunity was provided to comment/ask questions?		
4	Can we contact you regarding your survey to follow up?		
5	Other SGMA topics and information of interest to you include: a. _____ b. _____ c. _____ d. _____		
6	Other suggestions on communication and engagement that would be helpful for the SGMA process: _____ _____ _____ _____		

Example Meeting Feedback Form

Appendix I. Letter Distributed to Native American Tribal Governments

[Variable greeting]

We are writing to notify you that a Groundwater Sustainability Plan (GSP) for the Paso Robles Groundwater Basin is under development and we are inviting you to participate in the GSP process.

In 2015, the State legislature approved a new groundwater management law known as the Sustainable Groundwater Management Act (SGMA). SGMA required local agencies to form Groundwater Sustainability Agencies (GSAs) by June 30, 2017 and prepare a GSP. SGMA allows any federally recognized Indian tribe to voluntarily participate in the preparation or administration of a GSP. A federally recognized tribe's actions during participation will be based on the tribe's independent sovereign authority and not the authorities that SGMA provides to local agencies[1]. Regardless of whether a tribe opts to coordinate their groundwater management with SGMA implementation, SGMA requires GSAs to consider the interests of all beneficial uses and users of groundwater, including tribes[2]. For more information on Tribal Government Engagement with GSAs, please see the Discussion Questions[3] paper prepared by the California Department of Water Resources Sustainable Groundwater Management Program Tribal Advisory Group.

We invite you to participate in the Paso Robles Groundwater Basin GSP. If you wish to be included on the list of Interested Parties to receive further information on ways to meaningfully participate in processes related to GSP development in the Paso Robles Basin, please register at the following web address: www.pasogcp.com and feel free to contact our Public Outreach Facilitator, Ellen Cross, with any questions or comments by email at crosse@strategydriver.com or by phone at (510) 316-9657.

Thank you.

The Paso Robles Groundwater Basin Cooperative Committee

- *City of Paso Robles GSA*
- *County of San Luis Obispo GSA*
- *Shandon-San Juan GSA*
- *Heritage Ranch GSA*
- *San Miguel GSA*

[1] Water Code §10720.3(c)
[2] Water Code §10723.2
[3] http://www.water.ca.gov/-/media/DWR-Website/Web-Pages/About/Tribal/Files/Publications/Tribal-Engagement-with-GSA-Discussion-Questions.pdf

[1] Water Code §10720.3(c)
[2] Water Code §10723.2
[3] http://www.water.ca.gov/-/media/DWR-Website/Web-Pages/About/Tribal/Files/Publications/Tribal-Engagement-with-GSA-Discussion-Questions.pdf

Appendix J. Postcard Mailers

JOIN THE DISCUSSION

In accordance with the Sustainable Groundwater Management Act (SGMA), a Groundwater Sustainability Plan (GSP) is being developed for the Paso Robles Groundwater Basin.

The Paso Basin Cooperative Committee invites you to register as an Interested Party to be notified about events concerning GSP preparation and to provide your insights.

For more information and to register as an Interested Party, please visit the website below.

www.pasogcp.com

REGISTER TODAY!

Sent on behalf of the Paso Robles Basin Groundwater Sustainability Agencies:

County of San Luis Obispo GSA
City of Paso Robles GSA
San Miguel Community Services District GSA
Heritage Ranch Community Services District GSA
Shandon San Juan Water District GSA

HYDROMETRICS
PASO BASIN TEAM
1282 PARK STREET, SUITE 2B
PASO ROBLES, CA 93446

Postcard sent to announce the Paso GCP

JOIN THE DISCUSSION

Sustainable Groundwater Management in the
Paso Robles Groundwater Subbasin

JOIN THE DISCUSSION

In accordance with the Sustainable Groundwater Management Act (SGMA), the Paso Robles Groundwater Basin is in the process of preparing a Groundwater Sustainability Plan (GSP).

Interested Parties are encouraged to attend the following workshops to learn more.

Projects and Programs for Groundwater Management Workshop
Monday, May 14, 2018 at 5:30 PM

Summary of the Paso Basin GSP Process Workshop
Monday, May 21, 2018 at 5:30 PM

The workshops above will be held at
Kermit King Elementary
700 Schoolhouse Cir. Paso Robles, CA 93446

For more information, contact the San Miguel CSD offices at (805) 467-3388 or visit www.sanmiguelcsd.org.

After May 15, for all *future* GSP information, register as an Interested Party at **www.pasogcp.com**.

SAN MIGUEL C.S.D.
1150 MISSION ST.
SAN MIGUEL, CA 93451

Postcard sent to invite Interested Parties to attend public workshops

PARTICIPE EN LA DISCUSIÓN

www.pasogcp.com

PARTICIPE EN LA DISCUSIÓN

De acuerdo con la ley de Gestión Sustentable del Agua Subterránea (SGMA), se está desarrollando un Plan de Sustentabilidad de Agua Subterránea para la Cuenca de Paso de Robles (GSP).

El Comité Cooperativo de la Cuenca de Paso de Robles lo invita a registrase como una Parte Interesada para recibir notificaciones sobre eventos acerca de la preparación del GSP y para proporcionar sus ideas.

Para más información y para registrarse como una Parte Interesada, visite el sitio web a continuación.

www.pasogcp.com

¡REGÍSTRESE AHORA!

Enviado en nombre de las Agencias de Sustentabilidad de Agua Subterránea de la Cuenca de Paso de Robles:

GSA del Condado de San Luis Obispo
GSA de la Ciudad de Paso de Robles
GSA del Distrito de Servicios Comunitarios de San Miguel
GSA del Distrito de Servicios Comunitarios de Heritage Ranch
GSA del Distrito de Agua de Shandon-San Juan

HYDROMETRICS
PASO BASIN TEAM
1232 PARK STREET, SUITE 2B
PASO ROBLES, CA 93446

Spanish language postcard for Interested Parties

Appendix N

Public Comments

All comments received through the PasoGCP.com site were automatically recorded with the time and date of the comment as well as the name of the commenter and, if applicable based on the physical address provided, their GSA. The comments were forwarded to the GSAs and the commenter was notified that their comment had been received. The GSAs reviewed each comment received and incorporated the comment into the text as the GSA felt appropriate. Comments received by mail or other means were considered and incorporated in the same manner. The final GSP reflects the responses to comments incorporated by all four GSAs.

Public Comments received through 9/29/2019
to be considered while compiling the Draft GSP for the Paso Basin

Name	Chapter & Section	Comment	GSA	Comment Source	Date/Time	Attachment(s)
Sheila Lyons	**Ch. 1 Introduction to Paso Robles Subbasin Groundwater Sustainability Plan** 1.2 Description of Paso Robles Subbasin	Please read on as this comment does apply to Chapter 1. Chapter 3, Figure 3-14 Indicates current Land Use Planning subareas. There needs to be an additional Figure indicating the PR Groundwater Basin Subareas such the one from Fugro, 2002 Basin Boundary showing subareas of the Basin. This can be found on the front page of the June 10, 2015 report "Achieving Sustainability in the PR Groundwater Basin. If not in this section, the Basin subarea map from Fugro needs to be included in the GSP somewhere....Chapter #1? This is important....land use planning areas are significantly different from basin planning areas. They have different characteristics and land use planning areas would be inappropriate for basin management. Creston participated early on in meetings for setting voluntary Basin Management Objectives and we are clear that the Creston Sub-Area has different management objectives from other parts of the basin due to our location (leading head of much of the recharge water going into the aquifer). We were much more aggressive and conservative about what course of action we think needs to be implemented to obtain basin sustainability. We believe the Creston Sub-area must be considered separate from the El Pomar-Estrella Land Use Planning Area because they are very different from one another and have very different management requirements.	County of San Luis Obispo GSA	pasogcp.com	9/22/2018 2:40:00 PM	
Laurie Gage, District Administrator	**Ch. 1 Introduction to Paso Robles Subbasin Groundwater Sustainability Plan**	The Board of Directors of the Estrella-El Pomar-Creston Water District has reviewed Chapter 1 and concluded that it has no comments on this chapter at this time. Individual Board directors may choose to personally comment on this chapter separately and independently from the Board as a whole.	City of Paso Robles GSA	pasogcp.com	10/11/2018 8:59:00 PM	
Verna Jigour	**Ch. 1 Introduction to Paso Robles Subbasin Groundwater Sustainability Plan** 1.2 Description of Paso Robles Subbasin	I advise expanding the text and figure 1.1 to include the watersheds/catchments feeding the pertinent subbasins. I realize that SGMA does not require planning outside the basins of concern but, especially in the case of the Paso Robles Subbasin, opportunities to augment groundwater recharge and storage will be left out of the equation if planning is confined solely to the basins. GSA stakeholders correctly identified potential watershed approaches at the third GSP informational meeting May 14, 2018, according to the documented results of the Projects and Management Actions Rotating Group Stations. Following are pertinent excerpts: Despite that Station 1 was titled In-Basin Supply Projects some of the documented suggestions do, in fact, consider the broader watershed context, as follows: "Ideas from the small groups related to in-Basin water supply projects: Slow down flows in Salinas River Optimize Salinas River recharge Incentive-based recharge Improve local stream recharge Recharge on floodplains (with environmental benefit) Forest management Recharge above the basin/higher up in basin Station 2 Out of Basin Supply Projects Ideas from the small groups related to out-of-Basin water supply projects: Watershed restoration projects “Management “Restore after fires/reseed with native vegetation Study Salinas Watershed at headwaters for potentialStation 4 Conservation Measures Ideas from the small groups related to conservation measures: Watershed management Forest management Promote healthy soils (pastures, root crops), carbon farming While this especially pertains to CHAPTER 9. Projects and Management Actions, Chapter 1 sets the stage for all subsequent chapters, does it not? If Chapter 1 considers solely the basins, projects and management actions relevant to the watersheds/ catchments will be left out. I consider it a mistaken artifact of reductionism that SGMA dictates apply solely to the (alluvial) groundwater basins [sinks], considering that those basins are actually fed by their respective watersheds/ catchments [source]. Alas, this reductionistic paradigm, one of several documented in the Alternate Paradigms section of my website, has dominated water resources thinking for most of the past century but that was not always the case. Excerpts from the Proceedings of a Conference of Governors in the White House, Washington, D.C., convened by President Theodore Roosevelt in 1908, shared in my third blog post, How Watersheds Relate to Groundwater, demonstrate that livestock managers of that era correctly recognized that the forests and vegetation serve the same purpose as artificial reservoirs, made by dams or otherwise. They were similarly attuned to the minimum flow a.k.a. baseflow as a measure of watershed health. I offer additional details and links in the file attachments to my comments, but suffice it to state here that the approach proposed on my Rainfall to Groundwater website, based on my doctoral dissertation, Watershed Restoration for Baseflow Augmentation [Jigour 2008 (2011)], abstract attached, is literally tailor-made for the Paso Robles Subbasin GSP Chapter 11. Projects and Management. The Paso Robles Subbasin is the poster child for the Rainfall to Groundwater Approach. I only hope the GSAs will avail themselves of this nearly singular opportunity to restore watershed/catchment functions for groundwater sustainability, including restoration of steelhead habitats among other ecological benefits.		pasogcp.com	10/15/2018 9:58:00 PM	Link: 20181015_Jigour
Laurie Gage, District Administrator	**Ch. 2 Agencies' Information**	The Board of Directors of the Estrella-El Pomar-Creston Water District has reviewed Chapter 2 and concluded that it has no comments on this chapter at this time. Individual Board directors may choose to personally comment on this chapter separately and independently from the Board as a whole.	City of Paso Robles GSA	pasogcp.com	10/11/2018 8:59:00 PM	
Verna Jigour	**Ch. 2 Agencies' Information** 2.1 Agencies' Names and Mailing Addresses	Change to include watersheds/ catchments feeding the subbasins as noted for Chapter 1.		pasogcp.com	10/15/2018 9:58:00 PM	Link: 20181015_Jigour
Sheila Lyons	**Ch. 3 Description of Plan Area** 3.4 Land Use	Section 3.4.2 and Figure 3-6, of the same name "Water Use Sectors" show the distribution of sectors but there is no table or text with the actual numbers by acres for each of these sectors, nor is there any estimate of their usage. Perhaps the second part (usage) of this will come in later chapters but the first (acreage) should be shown here.	County of San Luis Obispo GSA	pasogcp.com	9/22/2018 3:40:00 PM	
Sheila Lyons	**Ch. 3 Description of Plan Area** 3.4 Land Use	Table 3-1 Land Use Summary - data from DWR 2014 is obviously out of date. Much has changed since. The SLO Department of Agriculture surely has more recent data (see there annual reports). An update of current info should be done. We believe there are closer to 40,000 or more acres in vineyards today.	County of San Luis Obispo GSA	pasogcp.com	9/22/2018 2:40:00 PM	
Sheila Lyons	**Ch. 3 Description of Plan Area** 3.5 Existing Well Types, Numbers, and Density	Table 3-2 Types of Wells - data appears to be entirely too low. CAB members believe this number should be revisited with numbers acquired from our Public Works department rather than DWR data.. 99 productions wells is way too low. We know there are 200 wineries in North County, admittedly all are not over the PR Basin, but many are. Windfall Farms which is here is Creston has around 6 wells alone that are production wells.	County of San Luis Obispo GSA	pasogcp.com	9/22/2018 2:40:00 PM	
Sheila Lyons	**Ch. 3 Description of Plan Area** 3.6 Existing Monitoring Programs	Section 3.6.4 Climate MonitoringTable 3-4 Average Month Climate Summary Avg of 2010-2017 If this data is to be used for any calculations going forward the more important number would be the slope of the line for the average increase in monthly temperatures over time. Fixed numbers are not really useful for predicting future events. Or, at a minimum if this is a "for information only" section, the rate of temperature increases should be calculated and included as part of this section.	County of San Luis Obispo GSA	pasogcp.com	9/22/2018 2:40:00 PM	

Public Comments received through 9/29/2019
to be considered while compiling the Draft GSP for the Paso Basin

Name	Chapter & Section	Comment	GSA	Comment Source	Date/Time	Attachment(s)
Sheila Lyons	**Ch. 3 Description of Plan Area** 3.10 Land Use Plans	Figure 3-14 Indicates current Land Use Planning subareas. There needs to be an additional Figure indicating the PR Groundwater Basin Subareas such the one from Fugro, 2002 Basin Boundary showing subareas of the Basin. This can be found on the front page of the June 10, 2015 report "Achieving Sustainability in the PR Groundwater Basin. If not in this section, the Basin subarea map from Fugro needs to be included in the GSP somewhere....Chapter #1? This is important....land use planning areas are significantly different from basin planning areas. They have different characteristics and land use planning areas would be inappropriate for basin management. Creston participated early on in meetings for setting voluntary Basin Management Objectives and we are clear that the Creston Sub-Area has different management objectives from other parts of the basin due to our location (leading head of much of the recharge water going into the aquifer).We were much more aggressive and conservative about what course of action we think needs to be implemented to obtain basin sustainability. We believe the Creston Sub-area must be considered separate from the El Pomar-Estrella Land Use Planning Area because they are very different from one another and have very different management requirements.	County of San Luis Obispo GSA	pasogcp.com	9/22/2018 2:40:00 PM	
Sheila Lyons	**Ch. 3 Description of Plan Area** 3.5 Existing Well Types, Numbers, and Density	CAB recently submitted a comment regarding Table 3-2 Wells over the Basin stating that we didn't believe the numbers shown in this table. We have since located an Excel file provided to CAB from the SLO PW Dept in recent months showing that there are 3945 production wells over the PR Basin. This indicates that there are many many more wells than the Table 3-2 of the Chapter 3 draft of the GSP would suggest. See attached file.	County of San Luis Obispo GSA	pasogcp.com	9/30/2018 8:51:00 AM	Link: 20180930_Lyons
Dennis Loucks	**Ch. 3 Description of Plan Area** 3.4 Land Use	See attachment regarding Chapter 3.4 Land Use -- specifically Table 3-1, Land Use Summary.Notes:Comment uploaded by consultant via scanned hard copy. Because physical address is required to submit form, address for Dennis Loucks was found online posted in the SAN LUIS OBISPO LOCAL AGENCY FORMATION COMMISSION MEETING MINUTES FOR THURSDAY September 17, 2015. Therefore, address may be dated or incorrect. Because comment was uploaded by consultant, and the interested party's email address was not known to the consultant, the email address provided with this form belongs to uploading party.	County of San Luis Obispo GSA	pasogcp.com	9/30/2018 4:30:00 PM	Link: 20180725_Loucks
Laurie Gage, District Administrator	**Ch. 3 Description of Plan Area**	The Board of Directors of the Estrella-El Pomar-Creston Water District has reviewed Chapter 3 and concluded that it has no comments on this chapter at this time. Individual Board directors may choose to personally comment on this chapter separately and independently from the Board as a whole.	City of Paso Robles GSA	pasogcp.com	10/11/2018 8:59:00 PM	
Verna Jigour	**Ch. 3 Description of Plan Area** 3.1 Paso Robles Subbasin Introduction	This GSP covers the entire Paso Robles Subbasin.This GSP covers the entire watershed/ catchment area feeding the Paso Robles Subbasin.Figure 3-1: Area Covered by GSP:Change to include watershed/ catchment area.		pasogcp.com	10/15/2018 9:58:00 PM	Link: 20181015_Jigour
Verna Jigour	**Ch. 3 Description of Plan Area** 3.4 Land Use	3.4.2 WATER USE SECTORS Please correct the following patently incorrect statement: Native vegetation. This is the largest water use sector in the Subbasin by land area.This sector includes rural residential areas. Again, this largest water use sector is dominated by nonnative annual grasslands., as stated above. Figure 3-6: Water Use SectorsPlease correct the erroneous label stating Native Vegetation		pasogcp.com	10/15/2018 9:58:00 PM	Link: 20181015_Jigour
Verna Jigour	**Ch. 3 Description of Plan Area** 3.4 Land Use	The following statement is flat-out incorrect: The balance of the approximately 438,000 acres in the GSP Plan Area is largely native vegetation and could include dry farmed land. Surely the County of San Luis Obispo has its own Geographic Information System (GIS) it can use to test the veracity of the above claim. The GSP should not rely on erroneous information, even if it comes from DWR. My own past GIS work with landcover layers derived from the California Gap Analysis (explained in greater detail in my accompanying file attachment) showed me that a vast proportion of what I then referred to as upper Salinas River watershed is clothed with nonnative annual grasslands. While DWR may have referred to these lands as native vegetation they certainly not known for their discernment of vegetation types.The Land Use section should include at least a summary of historical and prehistorical (Native American) land use to fully establish the environmental setting of human cause changes in vegetative land cover. For example, the charcoal industry is known to have thrived later in SLO County than in many other regions of California. Historical removal of native oaks used in the charcoal should ideally be mapped to correlate historical changes to watershed land cover. The spatial locations of other documented impacts on native vegetation (and its watershed/ catchment functions), such as those mid- 20th Century state-sanctioned projects aimed at removing woody vegetation for rangeland improvement summarized in my blog post, Ball and Chain & Other Links, should be mapped. Historical impacts for which spatial documentation may not be forthcoming should at least be considered as part of the planning process.		pasogcp.com	10/15/2018 9:58:00 PM	Link: 20181015_Jigour
Sheila Lyons	**Ch. 3 Description of Plan Area** 3.1 Paso Robles Subbasin Introduction	CAB voted at our Oct 17th meeting to echo the sentiments of the public present at the Oct. 8, 2018 Workshop held in Creston, that Creston is unique and should not be lumped in with El Pomar, Estrella, or any other part of the PR Basin, but should be considered a sub-area unto itself. Our hydrology is different and our view on basin management is more conservative than other areas of the basin.	County of San Luis Obispo GSA	pasogcp.com	10/20/2018 9:27:00 AM	
Dick McKinley	**Ch. 4 Hydrogeologic Conceptual Model** 4.3 Regional Geology	Explain transmissivity. Is 400ft fast or slow?	City of Paso Robles GSA	pasogcp.com	10/5/2018 1:06:00 PM	
Dick McKinley	**Ch. 4 Hydrogeologic Conceptual Model** 4.7 Groundwater Recharge and Discharge Areas	We may need to date this page at a later date because it is an amended page.	City of Paso Robles GSA	pasogcp.com	10/5/2018 1:06:00 PM	
Dana Merrill	**Ch. 4 Hydrogeologic Conceptual Model** 4.9 Data Gaps in the Hydrogeologic Conceptual Model	In my opinion options for cutbacks that won't cause major reverse economic impacts across our presently robust local economy are very limited, I am most interested In Supply and Recharge options. The upper range of the PR (below the Alluvial) has experience the most decline. It is where the majority of domestic and smaller capacity agricultural wells are located, mostly drilled 20+ years ago. A major effort to recharge that zone would accomplish a great deal and should be an area of major focus immediately. What's needed to focus on this aspect? Vertical zone basin studies for one. There are a good many wells in this range and some could be converted to recharge wells since they don't pump water anymore. Figure a way to comply with regulations on recharge. If the upper range could be restored and regularly recharged it helps rural landowners, agriculture and really everyone.Let's get to meaningful work ASAP. Background efforts I realize are required in the process but the challenges are pretty obvious after decades of study and recent history of wells going dry.	County of San Luis Obispo GSA	pasogcp.com	11/12/2018 7:15:00 AM	
John Thompson	**Ch. 4 Hydrogeologic Conceptual Model** 4.9 Data Gaps in the Hydrogeologic Conceptual Model	Since well logs are readily available, it would seem a model could be made (realizing that someone has to gather the data and create the map and probably would not do it for free). I have noticed that well drillers do not always describe formations the same. But if you took a driller of 40 years who has drilled all over the basin and mapped using his/her logs you could have a GOOD map. You could go onsite with said driller and see what they call cemented gravel and everyone could be on the same page.		pasogcp.com	12/6/2018 1:00:00 PM	
John Thompson	**Ch. 4 Hydrogeologic Conceptual Model** 4.1 Subbasin Topography and Boundaries	Bottom of Page 4. "...very little well data in this portion of the subbasin." Is the lack of data something that is looking to be corrected? It would seem that a local well drilling company could be a huge source of data and information. I do not know the legalities of such things, just an idea.		pasogcp.com	12/6/2018 1:00:00 PM	
Patricia Wilmore	**Ch. 4 Hydrogeologic Conceptual Model** 4.5 Primary Users of Groundwater	Municipal use, when addressed in future chapters, should indicate, outline and encourage opportunities where in the City of Paso Robles can utilize other sources besides groundwater. This should be one of the highest priority means of balancing the basin.	County of San Luis Obispo GSA	pasogcp.com	12/9/2018 3:16:00 PM	

Public Comments received through 9/29/2019
to be considered while compiling the Draft GSP for the Paso Basin

Name	Chapter & Section	Comment	GSA	Comment Source	Date/Time	Attachment(s)
Patricia Wilmore	**Ch. 4 Hydrogeologic Conceptual Model** 4.7 Groundwater Recharge and Discharge Areas	Figure 4-16 provides an excellent basis for bringing additional water into the basin via recharge.	County of San Luis Obispo GSA	pasogcp.com	12/9/2018 3:16:00 PM	
Verna Jigour	**Ch. 4 Hydrogeologic Conceptual Model** 4.7 Groundwater Recharge and Discharge Areas	Re: the last sentence of 4.7.1: "this map provides good guidance on where natural recharge likely occurs" it actually offers only a partial picture considering solely recharge occurring from strictly vertical infiltration/percolation from surfaces directly above the identified recharge areas. It fails to consider *interflow* from natural infiltration/percolation on uplands draining to those apparently optimal areas. See the catchment model on my web page, Stream Networks vs Watersheds/ Catchments: https://rainfalltogroundwater.net/stream-networks-vs-catchments/		pasogcp.com	12/10/2018 5:48:00 PM	
Verna Jigour	**Ch. 4 Hydrogeologic Conceptual Model** 4.9 Data Gaps in the Hydrogeologic Conceptual Model	Another method for ascertaining aquifer continuity and/or fault influence on groundwater flow is isotope analysis, e.g., see the following: Zdon, A., M. L. Davisson, and A. H. Love. 2018. Understanding the source of water for selected springs within Mojave Trails National Monument, California. Environmental Forensics 19:99-111 https://doi.org/10.1080/15275922.2018.1448909		pasogcp.com	12/10/2018 5:48:00 PM	
Verna Jigour	**Ch. 4 Hydrogeologic Conceptual Model** 4.2 Soils Infiltration Potential	The first sentence, Saturated hydraulic conductivity of surficial soils is a good indicator of the soils infiltration potential may have been assumed true by many in the early 20th century, but by mid-century empirical observations began to show that woody plant roots and their decay products strongly influence both infiltration and percolation. Furthermore, soil structure mediated by especially woody plant roots, along with their soil ecosystems, also influences infiltration and percolation rates. Ecohydrology emerged around the turn of this current century/ millennium and it's past time to be integrating it into such public planning processes as this. Remember, infiltration and percolation begin in the unsaturated a.k.a vadose zone (not the saturated zone) and the properties of the vadose zone are highly influenced by the vegetation there. While inferences based on the purely physical property of saturated hydraulic conductivity offer some insight, they tell far from the whole story. Infiltration and percolation may be greatly enhanced by restoring native woody plants to historically degraded watersheds the case for most in this subbasin, as per my comments on earlier chapters. If this GSP overlooks that it will be overlooking important opportunities to enhance sustainability. For some pertinent insights, please see the following pages on my website: Plants in an Ecohydrology Context: https://rainfalltogroundwater.net/plants-in-an-ecohydrology-context/ and Surface-Groundwater Systems in a Holistic Water Cycle: https://rainfalltogroundwater.net/surface-groundwater-systems/		pasogcp.com	12/10/2018 5:48:00 PM	
Dennis Loucks, Fred Hoey & Greg Grewal	**Ch. 5 Groundwater Conditions** 5.4 Subsidence	(See attachments)		Other	10/17/2018	Link: 20181017_LouGreHoe Link: 20181017_USGS
Todd Beights	**Ch. 5 Groundwater Conditions** 5.2 Change in Groundwater Storage	A neighbor nearby has recently installed 30,000 gallons of water storage tanks with another 10,000 gallons of storage about to be installed. Our water wells are only a few hundred feet apart and they have to run their well around the clock to continually fill these storage tanks that are used for agricultural benefits. I am nervous that over drafting is occurring and potentially jeopardizing the future of our domestic well use. Is unlimited storage and well pumping a sound practice that you endorse or do you view it some other way that might warrant addressing the issue?		pasogcp.com	11/26/2018 3:00:00 PM	
Todd Beights	**Ch. 5 Groundwater Conditions** 5.2 Change in Groundwater Storage	A neighbor nearby has recently installed 30,000 gallons of water storage tanks with another 10,000 gallons of storage about to be installed. Our water wells are only a few hundred feet apart and they have to run their well around the clock to continually fill these storage tanks that are used for agricultural benefits. I am nervous that over drafting is occurring and potentially jeopardizing the future of our domestic well use. Is unlimited storage and well pumping a sound practice that you endorse or do you view it some other way that might warrant addressing the issue?		pasogcp.com	11/26/2018 3:00:00 PM	
Kevin Peck	**Ch. 5 Groundwater Conditions** 5.1 Groundwater Elevations	Paragraph 1 of 5.1.2.2 explains that there is a lack of publicly available ground water data. Has there been an effort during this GSP process, to contact basin landowners to access their wells for acquiring additional water levels data?	Shandon San Juan GSA	pasogcp.com	11/26/2018 3:59:00 PM	
Molly Scott	**Ch. 5 Groundwater Conditions** 5.2 Change in Groundwater Storage	Good morning, With mutual respect for the effort that has been put into writing these chapters, it would be my recommendation to ensure there is a glossary defining critical terms such as: Alluvial Aquifer, Groundwater Storage, Groundwater pumping, etc. Having a specific outlined definition for terms such as these would be beneficial for all parties and allow for greater consistency when discussing and ready future chapters. Thank you, Molly Scott, Grower Relations Manager JUSTIN Vineyards & Winery	County of San Luis Obispo GSA	pasogcp.com	12/6/2018 11:44:00 AM	
John Thompson	**Ch. 5 Groundwater Conditions** 5.2 Change in Groundwater Storage	From page 5-23, "This suggests that the loss in groundwater storage is not due to increased pumping, but is more likely a result of lock of recharge during low precipitation years." Figures 5-14 and 5-15 are supposed to visually describe this, but I think they do not help with comprehending the above statement. It seems obvious in figure 5-14 but is unclear in 5-15. I think the visual of the chart/graph can be better represented or the statement should be modified.		pasogcp.com	12/6/2018 1:28:00 PM	
John Thompson	**Ch. 5 Groundwater Conditions** 5.2 Change in Groundwater Storage	Is there such a thing as groundwater storage potential? Does this change? Is this where subsidence comes into play?		pasogcp.com	12/6/2018 1:28:00 PM	
John Thompson	**Ch. 5 Groundwater Conditions** 5.1 Groundwater Elevations	Some items that could use another paragraph to put more in layman's terms: Standardized precipitation Index Vertical Groundwater Gradients		pasogcp.com	12/6/2018 1:28:00 PM	
John Thompson	**Ch. 5 Groundwater Conditions** 5.1 Groundwater Elevations	The map of monitoring wells seem to be lacking some of the most critical areas such as Jardine, Ground Squirrel Hollow, and Independence Ranch. IDEA: Waive water offset fee/tax for continued monitoring allowance.		pasogcp.com	12/6/2018 1:00:00 PM	
John Thompson	**Ch. 5 Groundwater Conditions** 5.1 Groundwater Elevations	Is there a better map available to see where the monitoring wells are or does that violate certain rights?		pasogcp.com	12/6/2018 1:00:00 PM	
John Thompson	**Ch. 5 Groundwater Conditions** 5.1 Groundwater Elevations	Overlay figures 5-7 & 5-1 to really see where data is lacking and where it is really needed.		pasogcp.com	12/6/2018 1:00:00 PM	
John Thompson	**Ch. 5 Groundwater Conditions** 5.1 Groundwater Elevations	Regarding Hydrographs, I have noticed that everyone wants to think of water levels in terms of feet below ground surface instead of feet above sea level. I think both could be represented on the graph so all could see the correlation. For instance, feet above sea level could stay on the left hand vertical axis and the right hand vertical axis could be stated in feet below ground surface.		pasogcp.com	12/6/2018 1:00:00 PM	
John Thompson	**Ch. 5 Groundwater Conditions** 5.3 Seawater Intrusion	Regarding subsidence. On the surface it seems a trite item if we can stabilize groundwater levels. However, if it persists, are we harming how much water our aquifer can potentially hold? If so, maybe our minimal threshold should be geared more towards this type of data. Is there any plans to measure this? Is there a way to differentiate between natural and pumping causes?		pasogcp.com	12/6/2018 1:28:00 PM	
John Thompson	**Ch. 5 Groundwater Conditions** 5.6 Groundwater Quality Distribution and Trends	Last paragraph. Is there any examples of this happening? Is this a legitimate concern?		pasogcp.com	12/6/2018 1:28:00 PM	

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Name	Chapter & Section	Comment	GSA	Comment Source	Date/Time	Attachment(s)
John Thompson	**Ch. 5 Groundwater Conditions** 5.6 Groundwater Quality Distribution and Trends	Of your groundwater constituents, it is not clear why each of them is being considered as a constituent. For example, "elevated chloride concentrations in groundwater can damage crops and affect plant growth," is strait forward and I could see why you would measure it. However, TDS, sulfate, and gross alpha radiation are not adequately explained as to their usefulness as groundwater quality constituents. And gross alpha radiation is not adequately defined so that I would even know what it is.		pasogcp.com	12/6/2018 1:28:00 PM	
Patricia Wilmore	**Ch. 5 Groundwater Conditions** 5.2 Change in Groundwater Storage	5.21. Alluvial Aquifer Notes that Figure 5-14 "suggests that the loss in groundwater during low precipitation years is not due to increased pumping but is more likely a result of lack of recharge during low precipitation years" is a key point for future planning.	County of San Luis Obispo GSA	pasogcp.com	12/9/2018 3:16:00 PM	
Patricia Wilmore	**Ch. 5 Groundwater Conditions** 5.1 Groundwater Elevations	Significant data gaps are indicated due to lack of publicly available groundwater level data. How can this be remedied? Since confidentiality appears to be important, pursue getting additional agreements.	County of San Luis Obispo GSA	pasogcp.com	12/9/2018 3:16:00 PM	
John Onderdonk	**Ch. 5 Groundwater Conditions** 5.1 Groundwater Elevations	The last sentence of the first paragraph of Section 5.1.2.2 states: The lack of publicly available groundwater level data for the Paso Robles Formation Aquifer is a significant data gap. This data gap combined with uncertainty with regard to aquifer continuity within the Subbasin (Section 4.9) and continuity with neighboring Subbasins, particularly given the Northern boundary of the Subbasinis defined by the county line not by a physical barrier to groundwater flow (Section 4.1), highlights the limited understanding of aquifer attributes and current conditions. The GSP must establish a clear protocol for how this uncertaintywill be addressed. According to Section 5.1.2.1, the lack of data will be partially addressed through a recommended expansion of the Subbasin monitoring network which will be detailed in Chapter 8. It would be beneficial if the GSP explicitly states a timeline for this monitoring expansion and provided specific guidance on whether or not the additional monitoring and data collection will be done before or after the adoption of the GSP and how new monitoring data will be incorporated during GSP implementation. Specific procedures for how the GSP can be refined, modified and challenged as new data is presented should be clearly defined in advance. While the collection of additional data will improve the development and implementation of the GSP, uncertainly will still remain. Given that fact, the GSP should clearly define where the burden of proof for compliance/non-compliance lies (with the landowneror GSA). Additionally, clear procedures for demonstrating compliance in light of limited data and uncertainty should be defined.	County of San Luis Obispo GSA	pasogcp.com	12/10/2018 8:59:00 AM	
Timothy Cleath	**Ch. 5 Groundwater Conditions** 5.1 Groundwater Elevations	Fig 5-2: as shown should not be included in the alluvial aquifer map as these areas are typically on elevated terraces and are not saturated. Paso Robles Formation aquifer infers that there is only one aquifer. In fact, within the Paso Robles Formation there are many aquifers. Modify the title to say Aquifers. Fig 5-3, -4, -5 and -6 contours extend considerably beyond where well water level information occurs (Fig. 5-1) northeast of Whitley Gardens and east of the San Juan River. Either show the basis for these contours (on Figure 5-1) or remove or dash the contours in these areas on Fig 5-3. Showing the "inferred groundwater flow direction" can be misleading (the gradient of the interpreted contours may be due to various factors and is not always the direction of flow) and should be removed. Fig 5-6 and 5-7 similarly include areas where the contours have extended beyond the water level information. The depression west of Creston is based on one data point and may not be representative of other wells in this area (the basin is shallower in this area and may show significant variability in water levels from one well to another). This should be noted in the text. The water level rise along the western edge of the basin near Paso Robles is acknowledged to be a result of limited data and it is best to not try to guess why in the text (delete last sentence on para. 1 of page 5-13). 5.1.2.2 Identify where the 18 monitored wells are located. In light of the potential need for "key wells" as a basis for groundwater management, further discussions should be included regarding available publicly reviewable groundwater level hydrographs. With respect to the hydrographs, Fig 5-11 shows the water level at nearly the bottom of the well. This well, in the Creston area, would not be good for a future water level monitoring well. The well water level for the Shandon area shows stability during the recent dry period, while the other two hydrographs (Creston and Estrella subareas) show a 40- to 50-foot decline. Please consider including some comment on this in the text. 5.1.3 Historically an upward vertical gradient in the Estrella River valley near Shandon has been indicated by flowing wells in this area. As groundwater levels decline in the lower aquifers, the vertical gradient will change. Similarly, wells in the Creston area have flowed during wet periods.		pasogcp.com	12/10/2018 11:29:00 AM	
Verna Jigour	**Ch. 5 Groundwater Conditions** 5.2 Change in Groundwater Storage	5.2.1 ALLUVIAL AQUIFER, 3rd paragraph: Some text seems to be missing here: As indicated on _____ presumably Figure 5-14?		pasogcp.com	12/10/2018 5:48:00 PM	
Jerry Reaugh	**Ch. 5 Groundwater Conditions** 5.2 Change in Groundwater Storage	Comments Pertaining to Chapter 5 of the Paso Robles Subbasin Groundwater Sustainability Plan	County of San Luis Obispo GSA	pasogcp.com	12/10/2018 12:49:00 PM	
Jerry Reaugh	**Ch. 5 Groundwater Conditions** 5.2 Change in Groundwater Storage	This comment should be referred to the SLO County Paso Basin GSA. The EPC WD is in the County GSA but the way you do the addresses prevents this comment from being assigned to the proper GSA. Jerry Reaugh	County of San Luis Obispo GSA	pasogcp.com	12/10/2018 12:31:00 PM	
Herb Rowland	**Ch. 5 Groundwater Conditions** 5.2 Change in Groundwater Storage	In regards to Figures 5-14 and 5-15, how is the annual groundwater pumping determined? How was this measured historically and how will it be estimated going forward? If wells are not metered, and even the ones that are metered aren't being reported, how is that number established? It is a very crucial number to determine the water budget for the basin and will affect a large number of people and businesses if it is incorrect. There needs to be a high level of confidence and consensus in this number, throughout the basin, if the overall plan is to succeed. This number is too important to just make generalizations and the assumptions that whatever model you use takes, must be vetted under a very high level of scrutiny.	County of San Luis Obispo GSA	pasogcp.com	12/10/2018 11:50:00 AM	
Timothy Cleath	**Ch. 5 Groundwater Conditions** 5.2 Change in Groundwater Storage	For comparison purposes, use the same scales for the alluvial aquifer and Paso Robles Formation plots. The net change in storage in the alluvial aquifer is highly dependent on inflows from rainfall runoff, releases from reservoirs and wastewater discharges. This should be noted. The lack of alluvial aquifer water level data in the various stream valleys limits the verification of the modeled change in storage. This should be noted. fourth para p. 5-23: "As indicated on" ?? what? Total groundwater in alluvial aquifer storage should be stated to understand the impact of the "cumulative change in storage". This would also be appropriate for the Paso Robles Formation aquifers. page 5-25 first sentence: Fig 5-15 shows climate periods not precipitation data.		pasogcp.com	12/10/2018 11:29:00 AM	
Timothy Cleath	**Ch. 5 Groundwater Conditions** 5.4 Subsidence	Comment on whether subsidence is significant for groundwater management of this basin. What is the level at which it is significant? Has there been any impacts to date?		pasogcp.com	12/10/2018 11:29:00 AM	

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Timothy Cleath	**Ch. 5 Groundwater Conditions** 5.5 Interconnected Surface Water	Why wouldn't groundwater elevations in the alluvial wells at or above the stream channel at any time suggest interconnectivity between the surface water and the groundwater? Paso Robles Formation wells would not necessarily indicate interconnectivity based on water levels. Water levels for model simulation time step durations are not be the best indicator of connectivity. Are the surface water areas and the alluvial aquifers not interconnected if they are not shown in red on Fig. 5-17? The depletion of interconnected surface water across the basin is much more complex than is depicted in this section. A discussion of the factors and their significance in different areas of the basin would be a good start toward a more thorough analysis of this interconnectivity.		pasogcp.com	12/10/2018 11:29:00 AM	
Verna Jigour	**Ch. 5 Groundwater Conditions** 5.6 Groundwater Quality Distribution and Trends	5.6.1 GROUNDWATER QUALITY SUITABILITY FOR DRINKING WATER, last sentence: Please explain the likely source for exceedance of mercury in 1990 and whether/why it may no longer be an issue (?)		pasogcp.com	12/10/2018 5:48:00 PM	
Timothy Cleath	**Ch. 5 Groundwater Conditions** 5.6 Groundwater Quality Distribution and Trends	Since the 2002 report, changes to MCLs and additional water quality data has occurred. Arsenic has been found at levels above the MCL. More information about boron is available in the western portion of the basin between San Miguel and Paso Robles. These should be discussed and possible recommendations made to further delineate areas/aquifers where these occur. The quality of wastewater discharges has changed but current discharges can be a significant source of salt to the groundwater recharge. This should be discussed and potential management measures to evaluate and reduce this source of salt contribution to the basin. TDS and Chloride concentrations are shown to be high on Figs 5-20 and -21 in the area near Paso Robles. Groundwater recharge is also high in this area. Sustainability projects and management actions could result in improvements to this condition. Average Boron Concentration as noted in table 5-6 is probably not correct for most of the Estrella subarea (high boron does occur in the underlying formations beneath the Paso Robles Formation and in the area west of Highway 101).		pasogcp.com	12/10/2018 11:29:00 AM	
Patricia Wilmore	**Ch. 6 Water Budgets** 6.5 Future Water Budget	General Comment: Future Water Budgets should use well data, gathered from more wells than 12 (as noted in Chapter 7) rather than a GSP model. The monitoring network, to produce valid information on which to base actions, should be at least 50 wells. 6.5.1. States that "a portion of the City's future groundwater demand will be offset by Nacimiento water." The beneficial use of Naci water is a key point of this entire GSP. There needs to be a more serious effort/plan to either have the City use more of the 6,500 AFY entitlement, either via a greater treatment capacity than it has now and/ or additional supplies into the Salinas to be recovered by recovery well(s) and/or a viable plan to deliver and sell the water to agriculture. In other words, the difference between what the city is entitled to and what it currently uses needs to be accounted and planned for in the GSP. The GSP should and the County should actively support and promote the Basin's access to Nacimiento water.	County of San Luis Obispo GSA	pasogcp.com	4/15/2019 10:42:00 AM	
TImothy Cleath	**Ch. 6 Water Budgets** 6.3 Historical Water Budget	Table 6-3 and ensuing tables: Wastewater pond "leakage" should be better referred to as "percolation". Leakage sounds like it is unintentional. Table 6-3 (and ensuing tables): Rather than not having the numbers add up and saying some difference relates to water year/calendar year values, it would be better to make some adjustments to the numbers and not have this discrepancy. 6.3.2.2Table 6-4: Shouldn't riparian ET have some variation (max/min), even if it is not much? Some of the hydrologic budget components have appreciable increases over the historic period. Therefore, a discussion of the trends would be useful in determining if the "average" values should be used to compare historic and recent uses. 6.3.2.3 Figure 6-4: 1986 does not have a value- I'd assume that is because it is "0" but perhaps some way of showing that on the graph would be good. 6.3.2.4 The report should identify a "balanced" hydrologic period during which sustainable yield should be determined in addition to using the full base period. This is important since the time interval for appreciable recharge (10-12 years) is longer than in many other basins.		pasogcp.com	4/15/2019 12:21:00 PM	
TImothy Cleath	**Ch. 6 Water Budgets** 6.4 Current Water Budget	6.4.1.1 Imported Nacimiento water should be aggregated into the surface water budget in light of the fact that this source will be increasingly used to the benefit of the basin. 6.4.1.2 Are the Salinas River releases based on flow at the Niblick bridge or are they releases from the dam? In light of the extractions between the dam and the down flow stream gage, value may be appreciably different. Tables 6-6 and 6-7 Groundwater discharge to the river is more than the percolation of surface water to groundwater during this drought period. It would seem to me that the opposite should be true. 6.4.1.4 Figure 6-5 should have the same vertical scale as Figure 6-4 6.4.2.3 Comparing historic average to current average would be better if it considered the trends of water use over the historic time period (particularly for rural domestic). Figure 6-7 could be better presented as a bar graph considering the limited number of datapoints and the fact that they represent the entire year.		pasogcp.com	4/15/2019 12:21:00 PM	
Sandi Matsumoto	**Ch. 6 Water Budgets** 6.4 Current Water Budget	Please clarify what assumptions and data were used to calculate Riparian Evapotranspiration. Why was evapotranspiration only calculated for riparian vegetation? In Chapter 3.4.2 ofthe Draft GSP, native vegetation was identified as the largest water use sectorin the subbasin by land area. Please estimate evapotranspiration for allnative vegetation in the subbasin for the water budget.		pasogcp.com	4/15/2019 1:20:00 PM	Link: 20190415_Matsumoto
Stephen Sinton	**Ch. 6 Water Budgets** 6.5 Future Water Budget	A groundwater basin which is at or beyond its safe yield is allocated according to water rights with the priority given to domestic and agricultural uses overlying the basin. Projections for the City's future groundwater demand must be limited to any prescriptive rights determined to be held by it, but may not be expanded. Therefore, under current water law, the City and SMCSD's future water demands are limited in the basin and will need to be satisfied by other sources. Because we don't know what a judge might do with regard to the City's and SMCSD's rights, this section should be removed.	Shandon San Juan GSA	pasogcp.com	4/15/2019 12:00:00 AM	
Verna Jigour	**Ch. 6 Water Budgets** 6.1 Overview of Water Budget Development	1st paragraph: This chapter includes one appendix Please state specifically which appendix here (presumably D?). Figure 6-1. Hydrologic Cycle:The labels for Infiltration are incorrect. The associated arrows in the diagram depict *Interflow*, rather than infiltration. *Infiltration* should be shown at watershed surfaces. *Percolation* follows infiltration through the vadose and saturated zones.		pasogcp.com	4/15/2019 9:48:00 PM	
Verna Jigour	**Ch. 6 Water Budgets** 6.3 Historical Water Budget	The largest groundwater inflow component is streamflow percolation, which accounts for approximately 38% of the total average inflow. Especially since surface-groundwater interflows operate in both directions, how were the figures for Streamflow Percolation derived? Perhaps this is revealed in one of the earlier models but it is not apparent in Chapter 6 nor in Appendix D. Does that high percentage of inflows attributed to streamflow percolation apply primarily on certain streams or is it consistent throughout the watershed? Given that the combined substrate area of all streams comprises a fraction of the area of watershed uplands, this predominance of Streamflow Percolation over Deep Percolation of Direct Precipitation and Subsurface Inflow contributions seems to suggest a fairly high rate of runoff. That supports the historical degradation of the watersheds Iv'e pointed to in previous comments.That is, the detention (infiltration and percolation) storage capacity of regional watersheds has become degraded through historical human impacts on land cover (vegetation) such that runoff became enhanced. This comment is intended to connect with my previous and current input that watershed restoration could serve some of the purpose intended by flood water capture.		pasogcp.com	4/15/2019 9:48:00 PM	

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Name	Chapter & Section	Comment	GSA	Comment Source	Date/Time	Attachment(s)
National Marine Fisheries Service - Rick Rogers	**Ch. 6 Water Budgets**	Section 6.2.1 (Model Assumptions and Uncertainty) stated: “Results of the previous calibration process demonstrated that the model-simulated groundwater and surface water flow conditions were similar to observed conditions. After updating for the GSP, the calibration of the GSP model was reviewed. Results of the review indicated that the GSP model was sufficiently calibrated for use in the GSP.” Since the evaluation of interconnected surface water are based on the results of simulated streamflow and groundwater levels from the GSP model, we would like to obtain a detailed information about the results of the calibration process and the differences between observed and simulated streamflow and groundwater levels. In this way, we will have a better understanding of the uncertainty in the interconnected surface water results associated with the GSP model results.		email		
Patricia Wilmore	**Ch. 7 Monitoring Networks** 7.2 Groundwater Level Monitoring Network	12 wells in the monitoring network is woefully insufficient data on which to base decisions. Significant and dedicated outreach needs to be done to get this number up to about 50. The GSP should have a section detailing how this will be achieved. As for the percentage of monitoring wells that will trigger action, the current draft uses 15%; we recommend 25%.	County of San Luis Obispo GSA	pasogcp.com	4/15/2019 10:42:00 AM	
TImothy Cleath	**Ch. 7 Monitoring Networks** 7.2 Groundwater Level Monitoring Network	7.2 Available alluvial aquifer groundwater level monitoring data should be obtained for the wastewater discharge monitoring sites. This provides good information on alluvial aquifer groundwater levels- particularly for City of Paso Robles, San Miguel CSD and Camp Roberts. This information is publicly released and can be used without a confidentiality agreement. This information can also be used in evaluating surface water/groundwater flow conditions. The bmp criteria for monitoring well networks and the data gaps in Table 7-2 might be better connected with Figure 7-3 if specific data gap locations are related to specific bmp criteria (e.g., well data density for storage calculations, wells located to address alluvial aquifer/surface water interconnectivity, wells used to monitor groundwater recharge activities, wells to monitor conditions along the borders with other subbasins).The Camp Roberts wells tapping the Paso Robles Formation can serve to address some of the data gap issues on the northern boundary of the basin as discussed in the data gaps on Table 7-2. This information was used in defining the basin structure in the 2002 basin study. City of Paso Robles has formed a GSA and will need to provide groundwater level data for their GSP. This data should be considered as available. The City has wells in the alluvial deposits and the Paso Robles Formation that are monitored. Table 7-2 states that in the future "only publicly available data will be used to develop contour maps". This will severely limit the accuracy of the contour maps. Other basin management agencies have used data in-house to develop contour maps without releasing the specific well water level data. This section refers to "confidential" wells. It is important to use appropriate terminology. The wells themselves are not confidential.Â The water level data collected is considered "confidential" where no release has been given to share the data to the public. It may also be good to define the term "confidential".Table 7-2 The last item says that the "network will be expanded". Say the "network will need to be expanded"7.4 If not reviewed already, the 2015 CCGWC Groundwater Quality Characterization report should be reviewed to identify areas of known high nitrate concentrations and verify that groundwater quality monitoring is sufficient to address the impact of the sources of nitrate on the basin groundwater. Recent water quality investigations have noted arsenic concentrations exceeding the current MCL at quite a few wells in the basin. These were not identified in the 2002 basin study because there was a higher MCL at the time. Groundwater quality monitoring in the future should better define the extent of this natural constituent.7.5 While no documented subsidence has been found, the existing monitoring network for subsidence is insufficient to evaluate subsidence due to groundwater pumping in the basin. Three sites are along the northern border of the subbasin where little pumping is occurring and there are only two others in the remainder of the basin area: one south of Whitley Gardens and the other in Camatta Canyon. Only the Whitley Gardens site is in the main area of pumping. The long term monitoring of these locations should be verified as some subsidence monitoring is tied to research activities that do not have long term funding.7.6 As a professional hydrogeologist working in this area for 35 years, I am not part of the consensus that there is "no interconnection between surface water and groundwater in the Subbasin". Since the GSP is saying that further evaluation of interconnectivity will need to be performed, the monitoring program should be developed if further evaluation establishes interconnectivity. As I mentioned earlier on data collection, there are existing monitoring wells in the "datagap" areas that have been monitored for many years and whose data is publicly available.Streamflow data is typically less abundant but some may be available from the City of Paso Robles near the wastewater treatment plant. Inquiry with the City should be done to see if they have this information.		pasogcp.com	4/15/2019 12:21:00 PM	
Sandi Matsumoto	**Ch. 7 Monitoring Networks** 7.2 Groundwater Level Monitoring Network	Data must be able to characterize conditions and monitor adverse impacts to beneficial uses andusers identified within the basin. Aside from GDEs mapped in the basin (Figure 4-18), environmental surfacewater users have not been identified in the GSP thus far. SGMA requires that potential effects on GDEs andenvironmental surface water users be described when defining undesirableresults. In addition to identifying GDEs inthe basin, The Nature Conservancy recommends identifying beneficial users ofsurface water, which include environmental users. This is a critical step, asit is impossible to define significant and unreasonable adverse impacts without knowing what is being impacted, nor is possible to monitor ISWs in a way that can identify adverse impacts on beneficial uses ofsurface water[23 CCR, §354.34(c)(6)(D)]. For your convenience, we've provided a list of freshwater species within the boundary of the Paso Robles basin in Attachment C of our letter. Our hope is that this information will help your GSA better evaluate and monitor the impacts of groundwater management on environmental beneficial users ofsurface water. We recommend that after identifying whichfreshwater species exist in your basin, especially federal and state listed species, that you contact staff at the Department of Fish and Wildlife (DFW), United States Fish and Wildlife Service (USFWS) and/or National Marine Fisheries Services (NMFS) to obtain their input on thegroundwater and surface water needs of the organisms on the freshwater specieslist, and how best to monitor them. Because effects to plants and animalsare difficult and sometimes impossible to reverse, we recommend erring on theside of caution to preserve sufficient groundwater conditions to sustain GDEs and ISWs. Please identify appropriate biological indicators that can be used to monitor potential impacts to environmental beneficial users as a current data gap, and make plans to reconcile these in Chapter 10 (Plan Implementation).		pasogcp.com	4/15/2019 1:20:00 PM	Link: 20190415_Matsumoto
Sandi Matsumoto	**Ch. 7 Monitoring Networks** 7.6 Interconnected Surface Water Monitoring Network	The first sentence in this section is contradictory to the ISW mapping conducted in Chapter 5 do exist in the Paso Robles Subbasin (Figure 5-17). Depletions of surface water were also estimatedin Section 5.5.1, and the statement that there is no need for a monitoring network that quantifies surface water depletion from is false and goes against SGMA requirements. SGMA requires tha twhen monitoring depletions of interconnected surface water that spatial and temporal exchanges between surface water and groundwater are necessary to calculate depletions of surface water caused by groundwater extraction [23CCR §354.34(c)(6)] and that the monitoring network shall be designed to ensure adequate coverage of sustainability indicators [23CCR,§ 354.34(d)]. Where minimum thresholds for ISWs are to be quantified by the location, quantity, and timing of depletions of interconnected surface water [23 CCR, §354.28(c)(6)(A)]. Thus, there is a need for a monitoring network that quantifies surface water depletion from interconnected surface waters. In addition to the need for additional shallow monitoring wells in the Alluvial aquifer to map ISWs, there is also a need to enhancing monitoring of stream flow and vertical groundwater gradients by installing more stream gauges and clustered/nested wells near streams, rivers or wetlands. Ideally, co-locating stream gauges with clustered wells that can monitor groundwater levels in both the Alluvial and Paso Robles Formation aquifers would enhance understanding about where ISWs exist in the basin and whether pumping is causing depletions of surface water or impacts on beneficial users of surfacewater and groundwater.There is a need to integrate biological indicators that can monitor adverse impacts to beneficial uses of surface water and groundwater within ISWs.		pasogcp.com	4/15/2019 1:20:00 PM	Link: 20190415_Matsumoto

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National Marine Fisheries Service - Rick Rogers	**Ch. 7 Monitoring Networks**	Section 7.6 (Interconnected Surface Water Monitoring Network) stated: “As discussed in Chapter 5, the consensus among local groundwater experts is that there is no interconnection between surface water and groundwater in the Subbasin. Therefore, there is no need for a monitoring network that quantifies surface water depletion from interconnected surface waters. However, there is a need to verify whether or not there are interconnected surface waters in the Subbasin. The assessment of whether or not there are interconnected surface waters will be evaluated by monitoring surface water and groundwater in areas where interconnected surface water conditions may exist.” We have reviewed Chapter 5 and have not found any statement or references regarding the consensus among local groundwater experts (which are not identified) indicated in the previous paragraph. Chapter 5 stated: “Limited and ephemeral surface water flows in the Subbasin over the last 40 years make it difficult to study the interconnectivity of surface water and groundwater and to quantify the degree to which surface water depletion has occurred. The spatial extent of interconnected surface water was evaluated based on results from the basin-wide groundwater flow model of the Paso Robles Subbasin.” Also, Chapter 6 (Section 6.2.1) stated: “During early implementation of the GSP, additional data will be collected to refine Subbasin understanding and recalibrate the GSP model. New hydrologic data and the recalibrated model will be used to adaptively implement sustainability management actions and projects to ensure that progress toward sustainability goals is being achieved.” Therefore, the first statement in Section 7.6 (regarding non-interconnected surface waters) is not properly justified and should not be mentioned at this time. More definitive conclusions should be provided after the GSP model is refined and recalibrate.				
Andrew Christie	**Ch. 8 Sustainable Management Criteria** 8.9 Depletion of Interconnected Surface Water SMC	As set forth below, Chapter 8 claims that that the proposed minimum thresholds would not impact interconnected surface waters because, Chapter 8 claims, there are no interconnected surface waters. Depletion of interconnected surface waters. The assessment of local groundwater experts is that there are not interconnected surface waters in the Subbasin. Therefore, there are no current minimum thresholds or undesirable results that could be affected by the groundwater elevation minimum thresholds. Changes in groundwater elevations, however, could reconnect surface waters. If this occurs, minimum thresholds will be established for depletion of interconnected surface waters and the relationship between those new minimum thresholds and all other sustainability indicators will be reassessed. Chapter 5, however, shows that the basin does include areas of surface water connection. See Figure 5-17, at 5-29. Accordingly, Chapter 8 must analyze the relationship between the proposed minimum thresholds and surface water connections. Chapter 8 claims, Groundwater elevation minimum thresholds effectively protect the groundwater resource including those existing ecological habitats that rely upon it. As noted above, groundwater level minimum thresholds may limit both agricultural and rural residential growth. Ecological land uses and users may benefit by this reduction in agricultural and rural residential growth. The claim that the thresholds effectively protect ecological habitats, however, is not supported by any analysis of data. As such, Chapter 8 must be revised to include analysis of the relationship between the groundwater levels and ecological habitats and discuss whether and the extent to which the proposed minimum thresholds affect ecological habitats.		pasogcp.com	4/1/2019 3:46:00 PM	
Patricia Wilmore	**Ch. 8 Sustainable Management Criteria** 8.4 Chronic Lowering of Groundwater Levels Sustainable Management Criteria	8.3 relies on a survey (also referred to in other parts of the document) that represents a small sample and asks for opinions on matters for which there was no accompanying data on which to base an opinion. Therefore, its analysis and conclusions should not be used to set standards which by their nature require study and expertise, including knowledge of the consequences of each decision. 8.4.2. Minimum Thresholds. These need to be reset at a reasonable level that doesn't put us behind at the outset. They should protect the resource while also giving the GSA's time to collect and analyze data, allow for public input on specific actions under consideration and create specific funding mechanisms. 8.4.2.7. Effects on Beneficial Users and Land Uses. As noted, "many parts of the local economy rely on a vibrant agricultural industry and they too will be hurt proportional to the losses imparted to agricultural businesses." Indeed! The entire GSP needs a more thorough economic analysis of its proposals. Our most recent study, done by the UC Davis Agricultural Issues Center, indicated in 2016 a total of $1.65 Billion economic impact for the Paso AVA. Of that, in 2015 the year on which the study was based, property tax assessments to vineyards and wineries represented 28% of the total in SLO County and the sales tax revenue collected from those same entities was 10% of the SLO County total. It would be well worth it to factor in the proportional benefits to increasing supply with realistic projects based on clear defensible data. There are challenges ahead and concerned citizens, landowners and interested parties need to be part of the process to make it successful.	County of San Luis Obispo GSA	pasogcp.com	4/15/2019 10:42:00 AM	
Patricia Noel	**Ch. 8 Sustainable Management Criteria** 8.3 General Process for Establishing Sustainable Management Criteria	Please allow the enforcing agencies to have adequate time (at least five years) to start implementation and observe the results before more drastic measures are commenced.Water levels should be given adequate time to stabilize after the historic drought.Any undesirable results should be addressed locally, not throughout the basin. Bottom line: I support the Shandon-San Juan Water District's comments on the Basin Plan as posted on its website.	Shandon San Juan GSA	pasogcp.com	4/15/2019 12:53:00 PM	
Sandi Matsumoto	**Ch. 8 Sustainable Management Criteria** 8.3 General Process for Establishing Sustainable Management Criteria	Stakeholder involvement is crucial whenestablishing sustainable management criteria. The role of the GSA is to represent and balance the needs of all groundwater beneficial uses and users in the basin, which has been expressed in the Sustainability goal in Section 8.2. According to p.6, only rural residents, farmers, and local cities were surveyed to gather input on sustainable management criteria. Please specify what information or efforts have been used/made to protect the interests of environmental users and disadvantaged community members. SGMA requires that sustainable management criteria are consistent with other state, federal or local regulatory standards [23 CCR, §354.28(b)(5)]. Please describe what process was used to identify other regulatory standards that need consideration when establishing minimum thresholds for sustainability criteria.		pasogcp.com	4/15/2019 1:20:00 PM	Link: 20190415_Matsumoto

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Name	Chapter & Section	Comment	GSA	Comment Source	Date/Time	Attachment(s)
Sandi Matsumoto	**Ch. 8 Sustainable Management Criteria** 8.4 Chronic Lowering of Groundwater Levels Sustainable Management Criteria	[8.4.1] The definition of significant and unreasonable is a qualitative statement that is used to describe when undesirable results would occur in the basin, such that a minimum threshold can be quantified. Potential effects on all beneficial users of groundwater in the basin need to be taken into consideration. According to the California Constitution Article X, water resources in California must be put to beneficial use to the fullest extent of which they are capable. Please modify the local definition for significant and unreasonable (provided on p. 6), so that it also specifies potential effects on environmental beneficial users of groundwater in the basin, and addresses how water rights amongst beneficial users will be prioritized when establishing thresholds. [8.4.2.1] The use of 2017 groundwater elevations to establish minimum thresholds for the Paso Robles Formation Aquifer is inadequate, since the SGMA benchmark date is January 1, 2015. Also, no scientific rationale was explained for using 2007 groundwater elevation data to establish initial minimum thresholds for the Alluvial Aquifer. SGMA is based on the use of best available science, and selecting minimum thresholds solely on public opinion from a select group of stakeholders (e.g., domestic well users, irrigators, municipalities) in the basin, is not a scientifically-based approach nor does it consider potential effects on environmental beneficial users of groundwater. A better approach is to use 10-year baseline period of groundwater elevation data (2005-2015) to establish how groundwater conditions during that time period affect different water users across the basin. Please document the consideration of the following when establishing minimum thresholds for chronic lowering of groundwater levels:- Are groundwater elevations between 2005-2015 above the max screen depth for domestic, agriculture, municipal wells?- Are the proposed minimum thresholds preserving water rights? [Water Code ,§10720.5(b)]- Are the proposed minimum thresholds consistent with other state, federal or local regulatory standards? [23 CCR, §354.28(b)(5)]- Are there environmental beneficial groundwater users that need consideration, particularly those that are legally protected under the United States Endangered Species Act or California Endangered Species Act? (See Attachment C in the attached letter for a list of freshwater species located in the Paso Robles Subbasin).- Is the equity being applied across different beneficial user groups (e.g., domestic, agriculture, municipal, environmental) when establishing minimum thresholds? [8.4.2.1] Please provide a description for how the initial minimum threshold groundwater elevations for the Alluvial Aquifer (Figure 8-3) may impact environmental beneficial users of groundwater (e.g., GDEs) in the basin. When converting groundwater elevations to depth to groundwater contours, please use the USGS digital elevation model (see Attachment D in the letter). [8.4.2.1] Please make a back-up plan in the Monitoring network chapter on how the GSA will install shallow monitoring wells in the Alluvial Aquifer if confidentially agreements still prevent existing wells from being used as representative monitoring wells for the Chronic Lowering of Groundwater sustainability indicator. [8.4.2.5] Depletions of interconnected surface waters do exist in the Paso Robles Subbasin (Figure 5-17). Depletions of surface water were also estimated in Section 5.5.1, and the statement that there are no current minimum thresholds or undesirable results for interconnected surface water is inadequate and goes against SGMA requirements. Thus, there is a need to establish sustainable management criteria for interconnected surface waters in the basin. (See further comments in attached letter regarding Interconnected Surface Waters)..		pasogcp.com	4/15/2019 1:20:00 PM	Link: 20190415_Matsumoto
		[8.4.2.7] The description of how the groundwater elevation minimum thresholds affect ecological land uses and users (Section 8.4.2.7 p.17) is inadequate for the following reasons:- The draft GSP has failed to describe current and historical groundwater conditions with GDE areas. Thus, it is impossible to assess how the proposed minimum thresholds relate to historical groundwater conditions in the GDE and whether potential adverse effects could occur to the GDEs as a result of groundwater conditions. - Legally protected species located with GDEs have not been identified. Thus, it is impossible to evaluate whether federal, state, or local standards exist for groundwater elevations needed to protect these listed species (see Section 8.4.2.8). [8.4.3.1] Under SGMA, Measurable Objectives are to be established to achieve the sustainability goal of the basin within 20 years of Plan implementation [23 CCR ,§ 354.30 (a)]. Please modify the methodology for setting measurable objectives for groundwater levels (p.18-19) so that it helps attain the sustainability goal defined on p. 4 (Section 8.2): sustainably manage the groundwater resources of the Paso Robles Subbasin for long-term community, financial, and environmental benefit of residents and business in the Subbasin. This GSP outlines the approach to achieve a sustainable groundwater resource free of undesirable results within 20 years, while maintaining the unique cultural, community, and business aspects of the Subbasin. In adopting this GSP, it is the express goal of the GSAs to balance the needs of all groundwater users in the Subbasin, within the sustainable limits of the Subbasins resources. [8.4.4.1] Please elaborate how the 15% exceedance criteria balances the interests of environmental beneficial users in comparison with other groundwater users in the basin				
Sandi Matsumoto	**Ch. 8 Sustainable Management Criteria** 8.9 Depletion of Interconnected Surface Water SMC	According to Chapter 5, interconnected surface waters exist in the Paso Robles Subbasin (Figure 5-17). Depletions of surface water were also estimated in Section 5.5.1. While there is certainly data gaps and a need for additional shallow monitoring wells inthe Alluvial aquifer to map ISWs, there is also a need to enhancing monitoring of stream flow and vertical groundwater gradients by installing morestream. SGMA is based on best available science and adaptive management, thusthere should be an attempt to identify some minimum thresholds for ISWs, which are to be quantified by The location, quantity, and timing of depletions of interconnected surface water [23 CCR, §354.28(c)(6)(A)]. [8.9.2] There is a need to evaluate potential effects on beneficial uses of surface and groundwater. Please refer to Attachment C (in the attached letter) for a list of freshwater species in Paso Robles Subbasin that may be existwithin ISWs. We recommend that after identifying which freshwater species exist in your basin, especially federal and state listed species, that you contact staff at the Department of Fish and Wildlife (DFW), United States Fish and Wildlife Service (USFWS) and/or National Marine Fisheries Services (NMFS) to obtain their input on the groundwater and surface water needs of the organisms on the freshwater species list. Because effects to plants and animals are difficult and sometimes impossible to reverse, we recommend erring on the side of caution to preserve sufficient groundwater conditions to sustain GDEs and ISWs.		pasogcp.com	4/15/2019 1:20:00 PM	Link: 20190415_Matsumoto
Martha Noel	**Ch. 8 Sustainable Management Criteria** 8.3 General Process for Establishing Sustainable Management Criteria	I want the Basin Plan to provide for the following: 1. That the agencies that have to enforce the plan have adequate time (at least five years) to start implementation and observe the results before more drastic measures are commenced. 2. That water levels be given adequate time to stabilize after the historic drought. 3. That "undesirable results" not include shallow wells going dry. 4. That any undesirable results be addressed locally, not throughout the basin. I am in support the Shandon-San Juan Water District's comments on the Basin Plan as posted on its website.	Shandon San Juan GSA	pasogcp.com	4/15/2019 1:49:00 PM	
William Noel	**Ch. 8 Sustainable Management Criteria** 8.1 Definitions	Here are my requests about definitions. Thank you. Will 1. That water levels be given adequate time to stabilize after the historic drought. 3. That "undesirable results" not include shallow wells going dry. 4. That any undesirable results be addressed locally, not throughout the basin. I support the Shandon-San Juan Water District's comments on the Basin Plan as posted on its website. All my best. Will	Shandon “San Juan GSA	pasogcp.com	4/15/2019 2:12:00 PM	

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Julie Pruniski	**Ch. 8 Sustainable Management Criteria** 8.3 General Process for Establishing Sustainable Management Criteria	Overall, I support the Shandon-San Juan Water District's comments on the Basin Plan as posted on its website. Specifically, the Basin Plan should 1) provide the agencies that have to enforce the plan with adequate time (at least five years) to start implementation and observe the results before more drastic measures are commenced; 2) that water levels be given adequate time to stabilize after the historic drought; 3) that "undesirable results" not include shallow wells going dry, and 4) that any undesirable results be addressed locally, not throughout the basin.	Shandon San Juan GSA	pasogcp.com	4/15/2019 2:18:00 PM	
Laurie Gage	**Ch. 8 Sustainable Management Criteria** 8.1 Definitions	Multiple sections addressed in attached document	County of San Luis Obispo GSA	pasogcp.com	4/15/2019 4:51:00 PM	Link: 20190415_Gage
Timothy Cleath	**Ch. 8 Sustainable Management Criteria** 8.7 Degraded Water Quality Sustainable Management Criteria	8.7.2 Water Quality: Arsenic is a naturally occurring constituent that should be monitored. 8.7.2 Previous statement that there are no mapped plumes is repeated here. The treated wastewater effluent discharges introduce higher NO3 water to the groundwater. There is also a nitrate high concentration near Creston. These have been documented in the 2015 CCGWC report prepared for the irrigated lands program monitoring.		pasogcp.com	4/15/2019 4:53:00 PM	
Timothy Cleath	**Ch. 8 Sustainable Management Criteria** 8.9 Depletion of Interconnected Surface Water SMC	8.9.1 I believe there is some interconnectivity.8.9.4 Impacts can occur based on interconnectivity.		pasogcp.com	4/15/2019 4:53:00 PM	
Timothy Cleath	**Ch. 8 Sustainable Management Criteria** 8.10 Management Areas	Groundwater management for specific management areas within the Subbasin is highly recommended to address impacts more appropriately.		pasogcp.com	4/15/2019 4:53:00 PM	
Timothy Cleath	**Ch. 8 Sustainable Management Criteria** 8.4 Chronic Lowering of Groundwater Levels Sustainable Management Criteria	8.4.2.1 Water level in the alluvium is very sensitive to time of year. State specific time of year when water level data is to be used for threshold. The water level should be specific to the monitored well-simulated information is not accurate enough. 8.4.2.4 I question the accuracy of the water levels in OSWCR wells with the minimum thresholds because often these wells do not have accurate ground surface elevations. 8.4.2.5 Water Quality Degradation: It is possible (and likely) that some upflow may already be occurring from the poor quality water at depth in some locations due to low water levels. 8.4.2.5 Subsidence: It is not reasonable to establish a zero subsidence threshold because some subsidence is possible without causing an unacceptable impact. Subsidence is very site specific, so if subsidence is to be a criteria for management, the location of monitoring sites is critical and the amount of subsidence causing an unacceptable impact should be applied to that location based on impact to local structures.		pasogcp.com	4/15/2019 4:53:00 PM	
Stephen Sinton	**Ch. 8 Sustainable Management Criteria** 8.1 Definitions	Minimum thresholds as used are a problem because they put us in violation the moment they are adopted. GSA's need time to implement measures to arrest groundwater level declines and even after 5 years, may need additional leeway in setting minimum thresholds to allow time for the design, permitting and construction of water supply enhancement projects. Appropriate Minimum thresholds are at best a guess at this point. The historic excess pumping (as calculated by the Model) are very small amounts compared to the total amount of water in storage in the basin. I don't think that point is well described, but should be in order for interested and concerned citizens to understand the situation. I suspect that hydrographs that don't show the depth to the bottom of the groundwater formation give a false sense of urgency. We definitely need to stop the downward trend, but the real question is how much time do we have before we risk undesirable results.	Shandon San Juan GSA	pasogcp.com	4/15/2019 5:38:00 PM	
Stephen Sinton	**Ch. 8 Sustainable Management Criteria** 8.2 Sustainability Goal	Public surveys in the absence of facts about costs and other impacts have limited value and shouldn't be relied upon as the primary basis for setting standards. The outreach for this GSP was valuable, but reached a relatively small sample of the total basin groundwater users. The comments received are valuable, but scientific information should be the real basis for decisions made. I think the projects and management actions should be stated as options, not requirements. I think the Figure 8-2 map is wrong and troublesome and should be deleted. We might want to show measureable objectives, but I'm not even sure about the value of doing that.	Shandon San Juan GSA	pasogcp.com	4/15/2019 5:38:00 PM	
Stephen Sinton	**Ch. 8 Sustainable Management Criteria** 8.1 Definitions	It would help if the acronyms used were defined, either in the definitions sectionÂ or when they first appear in the text. I would think this would be a good practice at the beginning of each chapter.	Shandon San Juan GSA	pasogcp.com	4/15/2019 5:38:00 PM	
Stephen Sinton	**Ch. 8 Sustainable Management Criteria** 8.4 Chronic Lowering of Groundwater Levels Sustainable Management Criteria	8.4.2.6 Third paragraph refers to "two" GSAs, but there are four of us and one more in Monterey County. The language about minimum thresholds should be replaced with measureable objectives.Going back to minimum thresholds, I think they are essential for preventing undesirable results, but since we don't know where orÂ at what water levels that is going to occur, I think it's essential that the GSP be clear that minimum thresholds are an estimate and shouldn't be considered as fixed or absolute.	Shandon San Juan GSA	pasogcp.com	4/15/2019 5:38:00 PM	
Stephen Sinton	**Ch. 8 Sustainable Management Criteria** 8.5 Reduction in Groundwater Storage Sustainable Management Criteria	There are two itemized points under 8.5.1 and #2 says that pumping should be reduced in dry years is a highly ranked concession. The fact is that pumping should be reduced in wet years, when less "added" water from irrigation is required. In dry years farmers have to use more water to make up for the lack of rain. 8.5.2.4 I couldn't understand the opening sentence. Same with 8.5.4.3.	Shandon San Juan GSA	pasogcp.com	4/15/2019 5:38:00 PM	
Stephen Sinton	**Ch. 8 Sustainable Management Criteria** 8.7 Degraded Water Quality Sustainable Management Criteria	8.7.2.1 & .2 If a new monitoring well is added to the system and it has water quality that exceeds the established limits, does that constitute an exceedance?	Shandon San Juan GSA	pasogcp.com	4/15/2019 5:38:00 PM	
John Onderdonk	**Ch. 8 Sustainable Management Criteria** 8.4 Chronic Lowering of Groundwater Levels Sustainable Management Criteria	This theme is reiterated in Chapters 7 and 8. Given that uncertainty, it seems reasonable to expect that management thresholds be set conservatively. The proposed decision to base individual well minimum thresholdson single points in time (2007 or 2017) based on survey responses doesn't seem to reflect appropriately conservative decision making in the face ofuncertainty. A more prudent approach would be to set minimum thresholds more conservatively (lower elevation) than suggested in the GSP and adjust those minimum thresholds, to become more stringent (higher elevation) as additional data dictates. Perhaps an appropriate methodology for this would be to add trend lines to the hydrographs in Appendix G, extend that trend out five years and set theminimum threshold at that point. Another concern is the reliance on 12 wells to be representative of the entire Subbasin. Here again, choosing 15% (two wells) as the limit on minimum threshold exceedance in the chronic lowering of groundwater level is overly aggressive and presumptuous. A more reasoned decision would acknowledge the small sample size and increase the percentage appropriately. It seems a 33% (four wells) threshold would be significantly more representative of the entire Subbasin. Alternatively, the threshold could be set at a lower percentage, say 25% (three wells), if management action were triggered only in the event those wells were each in a geographically distinct area of the Subasin. Of course these numbers may not be nor are they based on rigorous mathematics, but they do allow for the early adoption of management criteria, collection of additional data to further inform decision making and time for regulated entities to participate and adapt to the GSP management actions. Importantly, this processof continued refinement and data informed regulation is consistent with the intention of SGMA and US environmental case law.	County of San Luis Obispo GSA	pasogcp.com	4/15/2019 8:50:00 PM	

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Name	Chapter & Section	Comment	GSA	Comment Source	Date/Time	Attachment(s)
National Marine Fisheries Service - Rick Rogers	**Ch. 8 Sustainable Management Criteria**	Page 48 states “As described in Chapter 4, Hydrogeologic Conceptual Model and Chapter 5, Groundwater Conditions, the prevailing belief of local residents and experts in the Subbasin based on observation and some hydrologic data, is that interconnected surface water and groundwater does not currently exist in the Subbasin.” This conclusion is not supported by Chapter 5, which clearly shows interconnected surface water in Figure 5-17. In fact, the process used in Chapter 5 to identify groundwater/surface water interconnection likely underestimates the extent and distribution of this connection – “If model simulated groundwater elevations in any aquifer were above the bottom of the stream or river for at least half of the time between 2010 and 2016, then the surface water was considered interconnected with the groundwater.” First, no explanation is given as to why modeled groundwater elevations must be above the streambed elevation for “at least half of the time” for streamflow depletion to be realized. Without further explanation, this assumption is not scientifically appropriate or justified. Also, why was the time period of 2010-2016 (a historic drought) chosen as the period of analysis? Given the likely depressed groundwater elevation expected during a drought and the resultant underestimation of groundwater/surface water connectivity, using this time period is inappropriate. In Chapter 6 the draft GSP acknowledges as much, stating that using the period 2012-2016 for the current water budget “represents a more extreme condition in the basin and is not appropriate for sustainability planning in the Subbasin.” Thus, the Paso GSP should begin developing a threshold and measureable objective for streamflow depletion at this time, in addition to planning for further data analysis in the future that will help refine those values.		pasogcp.com	4/15/2019 12:00:00 AM	
Daniel Sinton	**Ch. 8 Sustainable Management Criteria** 8.3 General Process for Establishing Sustainable Management Criteria	1. That the agencies that have to enforce the plan haveadequate time (at least five years) to start implementation and observe the results before more drastic measures are commenced.2. That water levels be given adequate time to stabilizeafter the historic drought. 3. That "undesirable results" not include shallow wells going dry. 4. That any undesirable results be addressed locally, notthroughout the basin. I support the Shandon-San Juan Water District's comments on the Basin Plan as posted on its website.	Shandon San Juan GSA	pasogcp.com	4/16/2019 7:18:00 AM	
Laurie Gage	**Ch. 9 Projects and Management Actions** (Revised May 2019) 9.4 Level 2 Management Actions	Section 9.4.2.3 references "Re-locating pumping allowances provides pumpers with flexibility and maintains consistency with San Luis Obispo County's current Agriculture Offset Program." I fully agree that there needs to be a program that allows transition from the current offset ordinance to something that provides equal or better protection in terms of total water use. But the fly in the ointment is that the ordinance must have an extension in order to remain in effect, or there will be a gap between the sunset date of the ordinance (upon adoption of the GSP by the last GSA), and the time that any GSP-defined replacement could take place. We have seen a rush to plant in the past when a gap opportunity presented itself and at that time, it was on the order of months, and not a few years. BUT MORE IMPORTANTLY, allowing the ordinance to sunset presents another more immediately critical issue: the deed restrictions in place on properties which provided the offset credit fall away as of the sunset date. Which means that if the current sunset date is not extended, then EVERY FALLOWED ACRE COULD IMMEDIATE COME BACK ON LINE FOR IRRIGATION. The total number of acre-feet used for agricultural irrigation offset credits (according to County GSA staff) is approximately 12,000 acre-feet. That is the amount that could feasibly come back on line into irrigation the day after the GSP is adopted. With a projected annual deficit of 13,000 acre-feet, we are looking at DOUBLING the deficit if those acre-feet are reclaimed for use upon the sunset date of the offset ordinance. As an even nastier side effect of not extending the ordinance and having fallowed acreage come back online, that acreage could be used AGAIN for a future offset credit under the relocation and transfer or pumping allowances program outlined in this section. At the very minimum, GSP staff should be aware of the potential 12,000 acre-feet that could come back online after the sunset date without extension of the offset ordinance, and to utilize that figure in all projections of annual use in calculations for the GSP. Please consider the extreme degree to which the choice not to extend the sunset date of the offset ordinance could potentially impact the annual deficit.	County of San Luis Obispo GSA	pasogcp.com	5/26/2019 1:24:00 PM	
Stephen Sinton	**Ch.9 Projects and Management Actions** (Revised May 2019) 9.4 Level 2 Management Actions	In 9.4.2, carryover pumping credits, recharge credits and transfer allowances must always be limited in location to the area within the basin that is impacted. One approach might be to have a general rule that transfers can only be used within a stated distance from a well, but allow a pumper to appeal that rule if the facts support allowing a more distant transfer. 9.4.2.1: I don't support stating that a GSA "will" or "would" do something. That isn't appropriate to the plan in my opinion. The plan should say "may" or "could". That shows up in the first sentence of 9.4.2.1 and the first & third sentences of the third paragraph. 9.4.2.3 I want to reiterate that moving pumping allowances must be limited first to the basin and second, to a location close to the sending source. 9.4.3: I have a HUGE problem with this section. While the proposal may be good for water conservation, it is a disaster for the land, our communities, open space, wildlife, water and air quality, sedimentation, percolation and a whole range of social and environmental issues. This is a policy matter that is regularly before the County and our cities, but converting agriculture to rural residential use - rural sprawl - damages everything noted above as well as our food supply. In addition, if we suppress agriculture, but foster residential growth, we will see our water use grow and our sustainability decline. This is a terrible idea.	Shandon San Juan GSA	pasogcp.com	6/19/2019 4:15:00 PM	
Stephen Sinton	**Ch. 9 Projects and Management Actions** (Revised May 2019) 9.2 Implementation Approach and Criteria for Management Actions and Projects	These comments are my own, as I have not had an opportunity to discuss them with the Board of the Shandon-San Juan Water District. One of the mechanisms that may help not only with the implementation of best management practices, but also with funding for projects is to look for ways to both incentivize pumpers and penalize them for failure to measure water use. If the basic fee for pumping an acre foot is X, then those who don't measure could be charged the assumed consumption rate for the crops grown plus 50% (or some other %). On the other hand, GSAs could seek grants to help pumpers pay for and install meters, provide training and even maintenance. 9.2 talks about GSAs implementing management practices as soon as possible, which is fine to a point, but my view is that we will need time to improve monitoring and reporting (and while that is going on, refine our evaluation of projects) before we know clearly what it is that must be done. So I don't support the the statement that management actions will be implemented before projects. Some projects may get started (planning, CEQA, engineering, budgeting) very quickly. Also, the above referenced statement doesn't make clear whether you project Level 1 or Level 2 management to precede project work. I have a similar reaction to the statement that Level 2 management will begin soon after GSP adoption. We need time to refine our assessment of the magnitude of the problem and vastly improve our monitoring so we can more accurately measure our progress, or even our lack of progress. We also need to understand where Level 2 actions will be effective and where they will not. To me, Level 2 addresses the situation after we know more.	Shandon San Juan GSA	pasogcp.com	6/19/2019 4:15:00 PM	

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Stephen Sinton	**Ch. 9 Projects and Management Actions** (Revised May 2019) 9.5 Projects	I think the list of projects is very good, but I strongly disagree (and I believe the Shandon-San Juan Water District will too) that capturing flood flows is a "lower priority". In fact, I believe it may be the lowest hanging fruit and with willing landowners and some cooperation from regulatory authorities, could be implemented relatively soon. So whatever bias there is against capturing and percolating flood flows, it should not be in the GSP. This entire section, showing the expected costs of every new acre foot of water, shows that there really isn't any such thing as de minimis use. 9.5.1.2: Speaking with some confidence that I am not alone in this, the current assumption is that any project using direct recharge will NOT be initiated and or owned by the County GSA. The County has never supported agriculture in this way and the primary reason for the existence of two new water districts in the County is not to become GSAs, but to do projects because we farmers and ranchers have been repeatedly ignored when it comes to water projects. Those projects go to urban voters, not we who provide the food and jobs. 9.5.2.2: In the same line of thought, I believe the projects will not be led by the Cooperative Committee. The cities probably won't need these projects, so it won't be the Cooperative Committee that leads it. The Water Districts are more likely to assume leadership with projects, since that is what they were created to do. 9.5.3.5 There are several references to Figures that seem to be the wrong ones. 9.5.4: The name "Substitute Projects" implies less valuable concepts. Substitute for what? All projects are valuable when we need water - and should be preferred only based on price, water availability and feasibility. 9.5.4.2: Why does this project assume the use of treated water from the SWP? That makes no sense to me. One possible recharge project would be to divert the water just before the treatment facility, pipe it to the nearest available recharge point on Cholame Creek or the Estrella River and discharge for percolation. Treated water is more expensive and without apparent added value.	Shandon San Juan GSA	pasogcp.com	6/19/2019 4:15:00 PM	
Stephen Sinton	**Ch. 9 Projects and Management Actions** (Revised May 2019) 9.3 Level 1 Management Actions	In encouraging BMPs, we need to engage with entities that aren't currently part of this process, such as NRCS, RCDs and the UC Cooperative Extension. In 9.3.2 Well Interference Mitigation, I wish it were so, but doubt that alternating pumping days will save water. It may avoid well interference, but I expect that farmers would end up using the same amount of water during the growing season. 9.3.4: I support the voluntary fallowing program, but have always felt that we might have to pay for some fallowing. In fact, paying someone to fallow ground that is growing a high water use crop may be by the far the least expensive way to reach sustainability. GSAs will need to plan for buying irrigation rights. Having said that, it is critical that any purchase of irrigation rights not be transferable. They need to be retired. The same applies to the Conservation Program in 9.4.2.	Shandon San Juan GSA	pasogcp.com	6/19/2019 4:15:00 PM	
Lee Nesbit	**Ch. 9 Projects and Management Actions** (Revised May 2019)	(See attachment)	County of San Luis Obispo GSA	pasogcp.com	6/20/2019 4:04:00 PM	Link: 20190621_Nesbitt
James Anderson	**Ch. 9 Projects and Management Actions** (Revised May 2019)	Chapter 9 of the draft GSP provides that land is not under irrigation when the GSP is adopted may not be provided an initial pumping allowance if a Groundwater Conservation Program is established because the GSP assumes that there will be no increase in demand on the Subbasin. Chapter 9 goes on to provide that, if owners of such non-irrigated land wish to begin pumping in the future consistent with their overlying rights, they must either (i) acquire pumping allowance from willing sellers subject to GSA approval, (ii) but into a project that delivers surface water to the same area of the Subbasin, and/or (iii) pay surcharges associated with pumping above their pumping allowance. William & Doris Land & Energy Co., LLC is the owner of approximately 2,440 acres of open land in San Luis Obispo County identified as Assessor's Parcel Nos. 037-321-016 and 037-331-014. That land is flat and farmable, and we intend to farm it in the immediate future. Indeed, we have engaged a hydrologist to locate the best locations for new wells. However, while the property has been irrigated with groundwater in the past, there has been no recent irrigation of the property. It could therefore be considered "non-irrigated" for purposes of Chapter 9 of the Draft GSP. That would result in an inequitable and illegal impact on our land. As drafted, Chapter 9 fails to recognize our overlying groundwater rights or our right to pump groundwater in the future and instead imposes a penalty on us simply because we have not yet commenced our planned extractions. Effectively precluding the exercise of our overlying rights simply because they have not recently been exercised would amount to an unconstitutional taking of those rights that could result in an enormous reduction in our land value. Should that occur, we would have no alternative but to bring an action for inverse condemnation and other claims to recover that lost value. We want to avoid that outcome. We therefore urge you to recognize the rights of our property and similarly situated lands to pump groundwater regardless of whether those rights have been recently exercised, and to not adopt and GSP that interferes with those rights or discriminates between currently irrigated land and land that has not recently been irrigated.		pasogcp.com	6/26/2019 12:52:00 PM	
Estrella Dosrios	**Ch. 9 Projects and Management Actions** (Revised May 2019)	(See attachment)		email / pasogcp.com	6/27/2019 0:00	Link: 20190427_Dosrios
Patricia Wilmore	**Ch. 9 Projects and Management Actions** (Revised May 2019) 9.3 Level 1 Management Actions	9.3.2 in the first version of Chapter 9 was called Groundwater Management Program. This has now changed to Interference Mitigation Program which is not as clear as the original. This is an example of what we perceive to be unnecessary changes from the original draft, which the consultant and his team say it took 3 months to write, to a revised version prepared in just a few weeks. This change in process has made stakeholders uneasy and has left our constituents questioning the transparency of the process. We continue to support a reasonable plan which allows for a collaborative approach to prevent negative effects on the Basin in a way that benefits all users.	County of San Luis Obispo GSA	pasogcp.com	6/28/2019 8:36:00 AM	
Patricia Wilmore	**Ch. 9 Projects and Management Actions** (Revised May 2019) 9.2 Implementation Approach and Criteria for Management Actions and Projects	9.3.2.4. Public noticing. It is stated here that the Interference Mitigation Program (please change back to Groundwater Management Program) "will be developed in an open and transparent process...to include interested stakeholders." We have many members who farm over the Basin and they would like to have a session with the consultant and our County GSA representative. So far, meetings with specific outreach to agriculturists have not occurred and this is the most effected group of stakeholders. Is this up to us to arrange or could County staff do so?	County of San Luis Obispo GSA	pasogcp.com	6/28/2019 8:36:00 AM	

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Name	Chapter & Section	Comment	GSA	Comment Source	Date/Time	Attachment(s)
Patricia Wilmore	**Ch. 9 Projects and Management Actions** (Revised May 2019) 9.4 Level 2 Management Actions	It is critical that during the Level 1 phase, which we understand to be five years, we also explore projects to bring water to the Basin. Without this effort, the potential reductions outlined in Level 2 may be onerous to the point of destroying a very viable and significant part of our economy. Again, agriculturists need to be involved in getting a clear understanding of the effects of mandatory pumping reductions. A portion of the Groundwater pumping fees from Level 1 should be earmarked for working on new supplies and not just a time to figure out how the pumping reductions would work.	County of San Luis Obispo GSA	pasogcp.com	6/28/2019 8:36:00 AM	
Patricia Wilmore	**Ch. 9 Projects and Management Actions** (Revised May 2019) 9.5 Projects	9.5.3 changes the term "Priority Projects" to "Conceptual Projects." This change of terminology dilutes the very real need to be serious about bringing new supplies to the Basin. There seems to be a lack of understanding that most of our grower members are not "big guys." During the first five years of the plan, we need to expend time and money looking at the opportunities for additional water and prioritize the most doable.	County of San Luis Obispo GSA	pasogcp.com	6/28/2019 8:36:00 AM	
Patricia Wilmore	**Ch. 9 Projects and Management Actions** (Revised May 2019) 9.6 Other Groundwater Management Activities	9.6.1. When new supplies are identified and prioritized, rural residents should share in the cost since they will also share in the benefits.	County of San Luis Obispo GSA	pasogcp.com	6/28/2019 8:36:00 AM	
Patricia Wilmore	**Ch. 9 Projects and Management Actions** (Revised May 2019) 9.7 Demonstrated Ability to Attain Sustainability	Bottom line, for us, is that the plan is feasible and meets State requirements. Since we are a High Priority Basin, our plan will certainly be scrutinized. It is essential that the consultant and his team, hired as the experts, have a say in every step of the process. It is also important that specific groups of stakeholders are able to have input in a focused stakeholder meeting. Additionally, a more thorough study of the economic effects of the GSP needs to be done.	County of San Luis Obispo GSA	pasogcp.com	6/28/2019 8:36:00 AM	
Patricia Wilmore	**Ch. 9 Projects and Management Actions** (Revised May 2019) 9.8 Management of Groundwater Extractions and Recharge and Mitigation of Overdraft	Please note that although the PRWCA offices are in the City of Paso Robles, our constituents are primarily in the County.	County of San Luis Obispo GSA	pasogcp.com	6/28/2019 8:36:00 AM	
Jerry Lohr	**Ch. 9 Projects and Management Actions** (Revised May 2019) 9.5 Projects	I would like to submit the attached PDF file as my comments on Chapter 9. Regards, Jerry Lohr	County of San Luis Obispo GSA	pasogcp.com	6/28/2019 2:07:00 PM	Link: 20190628_Lohr
Craig Finster	**Ch. 9 Projects and Management Actions** (Revised May 2019) 9.1 Introduction	Please see attached comment.		pasogcp.com	6/29/2019 10:02:00 AM	Link: 20190629_Finster
Jerry Reaugh	**Ch. 9 Projects and Management Actions** (Revised May 2019) 9.2 Implementation Approach and Criteria for Management Actions and Projects	Thank you for this opportunity to submit these comments. Regards, Jerry Reaugh	County of San Luis Obispo GSA	pasogcp.com	6/30/2019 4:16:00 PM	Link: 20190630_Reaugh
Sandi Matsumoto	**Ch. 9 Projects and Management Actions** (Revised May 2019) 9.3 Level 1 Management Actions	This attachment summarizes our comments on Chapters 9-11 of the Paso Robles Subbasin Draft GSP. In this section, we refer to our previous comments, dated 15 April 2019, on Chapters 4-8 and Appendix B of the Draft GSP. Chapter 9 Management Actions and Projects [Checklist Items #50-51]: Since these conceptual projects are location-specific, please highlight the benefits of these conceptual projects on specific mapped GDEs and ISWs. For more case studies on how to incorporate environmental benefits into groundwater projects, please visit our website: https://groundwaterresourcehub.org/case-studies/recharge-case-studies/		pasogcp.com	7/1/2019 12:21:00 PM	Link: 20190701_Matsumoto
Sandi Matsumoto	**Ch. 9 Projects and Management Actions** (Revised May 2019) 9.4 Level 2 Management Actions	This attachment summarizes our comments on Chapters 9-11 of the Paso Robles Subbasin Draft GSP. In this section, we refer to our previous comments, dated 15 April 2019, on Chapters 4-8 and Appendix B of the Draft GSP. Chapter 9 Management Actions and Projects [ChecklistItems #50-51]: Since these conceptual projects are location-specific, please highlight the benefits of these conceptual projects on specific mapped GDEs and ISWs. For more case studies on how to incorporate environmental benefits into groundwater projects, please visit our website: https://groundwaterresourcehub.org/case-studies/recharge-case-studies/		pasogcp.com	7/1/2019 12:38:00 PM	Link: 20190701_Matsumoto
Sandi Matsumoto	**Ch. 9 Projects and Management Actions** (Revised May 2019) 9.5 Projects	This attachment summarizes our comments on Chapters 9-11 of the Paso Robles Subbasin Draft GSP. In this section, we refer to our previous comments, dated 15 April 2019, on Chapters 4-8 and Appendix B of the Draft GSP. Chapter 9 Management Actions and Projects [ChecklistItems #50-51]: Since these conceptual projects are location-specific, please highlight the benefits of these conceptual projects on specific mapped GDEs and ISWs. For more case studies on how to incorporate environmental benefits into groundwater projects, please visit our website: https://groundwaterresourcehub.org/case-studies/recharge-case-studies/		pasogcp.com	7/1/2019 12:40:00 PM	Link: 20190701_Matsumoto
Sandi Matsumoto	(Submitted with comments on Chapter 9-12)	Lands that are protected as open space reserves, habitat reserves, wildlife refuges, etc. or other lands protected inperpetuity and supported by groundwater or ISWs should be identified and acknowledged.		pasogcp.com	7/1/2019 12:43:00 PM	Link: 20190701_Matsumoto
Molly Saso	**Ch. 9 Projects and Management Actions** (Revised May 2019) 9.4 Level 2 Management Actions	HFS supports the development of carryover pumping allowances to provide flexibility in meeting hydrologic conditions. Â Maximum flexibility in the management and transfer of pumping allowances, subject to the avoidance of undesirable results as defined by SGMA, will provide opportunity to manage and address needs within the Basin.		pasogcp.com	7/1/2019 1:56:00 PM	
Molly Saso	**Ch. 9 Projects and Management Actions** (Revised May 2019) 9.4 Level 2 Management Actions	Implementation of pumping rampdown should be initiated only upon assessment of groundwater level trend and pumping data, and then limited to specific areas where the contribution of pumping reductions to Basin sustainability objectives can be quantified through modeling and other analysis.		pasogcp.com	7/1/2019 1:56:00 PM	
Molly Saso	**Ch. 9 Projects and Management Actions** (Revised May 2019) 9.4 Level 2 Management Actions	Fees developed within the proposed Tiered Pumping Fee structure must be developed based on legal principles of equity, economic impacts, cost of replenishment water, demand reduction and other quantifiable components.		pasogcp.com	7/1/2019 1:56:00 PM	

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Molly Saso	**Ch. 9 Projects and Management Actions** (Revised May 2019) 9.4 Level 2 Management Actions	HFS supports continuation of the current Agriculture Offset Program. This Program is understood and provides a solid mechanism for establishing pumping allowances under the GSP, as well as conditions for use and transfer of those allowances.		pasogcp.com	7/1/2019 1:56:00 PM	
Molly Saso	**Ch.9 Projects and Management Actions** (Revised May 2019) 9.3 Level 1 Management Actions	The proposed implementation of Level 1 and Level 2 Management Actions is reasonable given the limited amount of data and understanding of Basin Conditions as discussed in the Chapter 6 draft. Additional monitoring data must be developed and is required to support Level 2 Actions. The GSP should consider financial and other incentives to promote and maximize the sustainability benefits of Level 1 Management Actions.		pasogcp.com	7/1/2019 1:56:00 PM	
Molly Saso	**Ch. 9 Projects and Management Actions** (Revised May 2019) 9.1 Introduction	The impact of de minimis groundwater users is defined as significant, yet the draft GSP proposes that they should not be regulated. SGMA defines a de minimis extractor as once who extracts, for domestic purposes, two acre-feet or less per year. [WC 10721(e)]. De minimis extractors are not exempt from the full provisions of SGMA, rather they are provided limited protections relative to metering and reporting and the imposition of regulatory fees. Careful consideration and evaluation should be given to the impact of de minimis extractors on the Paso Basin sustainability objectives and various financial and demand reduction alternatives that are available to mitigate those impacts.		pasogcp.com	7/1/2019 1:56:00 PM	
Molly Saso	**Ch. 9 Projects and Management Actions** (Revised May 2019) 9.7 Demonstrated Ability to Attain Sustainability	The ability to attain sustainability has been modeled using all of the conceptual projects and management actions set forth in Chapter 9 and pumping reductions to meet measurable objectives by 2040. Further analysis on the economic benefit and viability of these projects is needed to support inclusion in that modeling. It is highly probable that some projects will not meet basic economic targets, thus impacting the timing and amounts of future pumping reductions. The GSP should include a discussion of various alternatives and project/pumping mixes to show a range of possibilities that would result in sustainable groundwater management.		pasogcp.com	7/1/2019 1:56:00 PM	
Molly Saso	**Ch. 9 Projects and Management Actions** (Revised May 2019) 9.5 Projects	HFS appreciates the analysis of Project alternatives in Section 9.5. HFS supports strategic investment at the GSA and individual level to expand the Water Budget for the Basin by constructing economically viable projects.		pasogcp.com	7/1/2019 1:56:00 PM	
John Onderdonk	**Ch. 9 Projects and Management Actions** (Revised May 2019) 9.4 Level 2 Management Actions	While Chapter 9 does not mandate specific management actions and projects nor does it define all aspects of those management actions or projects, it will form the basis for future implementation. Because of that fact, Section 9.4 Level 2 Management Actions should either explicitly state that the order management actions are listed does not imply a prioritization of those actions or Section 9.4 should be reorganized to more accurately reflect implementation priority. It seems reasonable to assume that mandatory pumping reductions would be the last management action to be implemented after all other actions have failed to achieve desired results. A reasonable reorganization of Section 9.4 would be groundwater conservation program (9.4.2) followed by agricultural land and pumping allowance retirement (9.4.3) followed by mandatory pumping reductions (9.4.1).The discussion in Section 9.4.2.4 of how non-irrigated land will be treated should a Groundwater Conservation Program be implemented is concerning in that it suggests initial pumping allowance will be denied thereby unfairly penalizing non-irrigated landowners by curtailing their future rights to pump groundwater. This could create a perverse incentive for non-irrigated landowners to immediately installirrigation to maintain their future rights. The three options listed for ways non-irrigated landowners can acquire pumpingallowances are in effect the same: purchase those allowances at marke tvalue. These again could potentially create perverse incentives where by early actors are reward with lower market prices. Because section 9.4.2.4 will establish a basis for how non-irrigated landowners are treated under a Groundwater Conservation Plan, the section should explicitly state there may be other reasonable ways to fairly allocate initial pumping allowances and the list provided is meant to be illustrative not complete. For example, consideration should be given to an opt-in option for non-irrigated landowners to voluntarily opt-in to the groundwater conservation program to attain and secure initial pumping allowances. Alternatively, non-irrigated landowners could be given credit for positive contributions to the health of the groundwater basin (groundwater recharge, monitoring well installation, watershed and riparian protection/management, etc.) any of which could be used to satisfy future pumping allowance. The main point is that all the details of specific management actions should be thoroughly discussed at a point in time when those actions are warranted, and action planning is required. Chapter 9 must not curtail or preemptively define the scope or parameters of the future development of those actions.	County of San Luis Obispo GSA	pasogcp.com	7/1/2019 4:06:00 PM	
John Onderdonk	**Ch. 9 Projects and Management Actions** (Revised May 2019) 9.3 Level 1 Management Actions	Section 9.3.3 highlights the importance of on-farm recharge of local water as a beneficial action landowners could take to meet the goals of the GSP. A primary means for achieving groundwater recharge is through the construction and use of stock ponds and other surface impoundments. However,given SB 88 and portions of the California Water Code, there seems to be significant confusion among landowners with regards to their rights to construct and use stock ponds and surface impoundments. It would be beneficial if this section provided more guidance on stormwater capture best practices (surface impoundment and other methods) to help landowners balance local GSP goals with State regulations.	County of San Luis Obispo GSA	pasogcp.com	7/1/2019 4:06:00 PM	
Sheila Lyons	**Ch. 9 Projects and Management Actions** (Revised May 2019) 9.3 Level 1 Management Actions	There needs to be more emphasis on water conservation and living within our means. Suggesting that historical usage be a justification for future allowances is nonsensical. Here in Creston, we have seen many properties significantly over pumping (sprinklers when it is raining, overflow onto the roads, major pipe leaks, continuing to plant more and more lush landscaping around wineries, etc.) to establish their usage numbers. Whereas other folks, particularly those with shallow wells or wells slow to recharge have made significant efforts to conserve...allowing landscaping to die, etc. Those who have conserved in an attempt to protect us all are not all de minimus users. Many folks chose not to plant knowing full well where we were headed. They should not be penalized. The proposal set forth rewards those who have over-pumped by allocating to them larger claims to water up front. Any mandatory cut backs will not begin to have any immediate impact to them because they have built in a cushion. Meanwhile their over-pumping continues to harm their immediate neighbors. Also, they have set up high usage numbers which they can then decide to "sell off, move to other properties, or trade". There should be no selling off or trading. Crop duty factors must enter into the equation to restrict the folks who have been over-pumping throughout our rising crisis of a declining basin. Whereas, folks who have been conserving all along will feel the immediate effect IF mandatory cut backs are implemented. Additionally, no one with a parcel of land should be water starved. The obstacles for building a family home on a blank parcel are already tremendous. Property owners should not have to "buy" water for a de minimus use. Having to do so has a significant impact on property values. All existing legal parcels should have access to de minimus levels of water usage. For many people their blank parcel was an investment for their futures, either an eventual family home or a retirement property. They should not bear the financial burden of those who have continuously over-pumped the Basin.	County of San Luis Obispo GSA	pasogcp.com	7/2/2019 15:43	

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Name	Chapter & Section	Comment	GSA	Comment Source	Date/Time	Attachment(s)
Sandi Matsumoto	**Ch. 10 Plan Implementation** 10.2 Monitoring Networks	Section 10.2.5 Evaluating Interconnected Surface Water (p. 14-15) [Checklist Item #48]: sustainable management criteria and an associated monitoring network for interconnected surface water and groundwater do need to be developed in the GSP, as stated in our comments on Chapter 9 above, and depletion of ISWs should be monitored. The Draft GSP states that an initial hydrogeologic investigation will be conducted. Please provide sufficient detail for the investigation and monitoring program including stream gauges, screened intervals and aquifers of the shallow wells and frequency of monitoring, in order to describe monitoring of both the extent of ISWs and the quantity of surface water depletions from ISWs. As stated in TNCs previous comments in our previous letter on Chapter 7, the Nature Conservancy recommends identifying beneficial users of surface water, which include environmental users. This is a critical step, as it is impossible to define significant and unreasonable adverse impacts without knowing what is being impacted, nor is possible to monitor ISWs in a way that can identify adverse impacts on beneficial uses of surface water. For your convenience, we've provided a list of freshwater species within the boundary of the Paso Robles basin in Attachment C. Please identify appropriate biological indicators that can be used to monitor potential impacts to environmental beneficial users as a current data gap and explain how this data gap will be filled.		pasogcp.com	7/1/2019 12:41:00 PM	Link: 20190701_Matsumoto
Laurie Gage, District Administrator	**Ch. 11 Notice and Communications**	The Board of Directors of the Estrella-El Pomar-Creston Water District has reviewed Chapter 11 and concluded that it has no comments on this chapter at this time. Individual Board directors may choose to personally comment on this chapter separately and independently from the Board as a whole.	City of Paso Robles GSA	pasogcp.com	10/11/2018 8:59:00 PM	
Dan Penkauskas	**Ch. 11 Notice and Communications** 11.1 Communications and Engagement Plan	Hi All. We're in the Creston area and have a single domestic well for our drinking water. We vote for maintaining levels as they are today. Also, please sign us up to monitor our well. Thank you, Dan	County of San Luis Obispo GSA	pasogcp.com	10/12/2018 6:41:00 AM	
Sheila Lyons	**Ch. 11 Notice and Communications** 11.1 Communications and Engagement Plan	Anywhere in the GSP where there is a reference to interested parties, including the Appendix D of Chapter 11, all Citizen Advisory Groups over the Paso Basin should be listed. CAB is writing to ask specifically that we be added throughout, including Appendix D of this chapter.	County of San Luis Obispo GSA	pasogcp.com	10/20/2018 9:26:00 AM	
Joe Plummer	**Draft GSP** Executive Summary	We have significant concerns about the proposed document and how it was prepared. The document, as written, is vague with respect to impacts and timing of same on irrigated agriculture. This is not surprising, as the Water District representing irrigated agriculture was prohibited from direct participation in the preparation and drafting of the document. In place of direct participation in the process, our "elected officials" chose to insert themselves, having the "County" represent our interests. In fact, the "County" has never, to my knowledge, held any input sessions or requested any input, including from the PRWCA or IGGA (representatives of our industry) from our industry. As a result, the presented draft document does not adequately represent the interests of irrigated ag and, in fact, goes a long ways towards decimating our industry. I believe this document should not be finalized and submitted until a broad representation of the ag community have had an opportunity to provide, in an open forum, their input.	County of San Luis Obispo GSA	pasogcp.com	9/25/2019 2:10:00 PM	
Stuart Suplick	**Draft GSP** Executive Summary	***ES 4.4 Interconnected Surface Water and Groundwater*** There are no available data that establish whether or not the groundwater and surface water are connected through a continuous saturated zone in any aquifer. The potential for interconnected surface water and groundwater in the Subbasin will be assessed during GSP implementation. COMMENT: The GDE determination methods from Rohde et al., 2018 do not indicate these interconnections? Or only to too limited a capacity, e.g. alluvial aquifers? Apologies if I misunderstood/did not read in detail enough Appendix C in this regard.		pasogcp.com	9/24/2019 8:52:00 PM	
Donald Morris	**Draft GSP** Executive Summary	The objectives of the approach to achieving sustainability should state that all property water rights should be equally respected, regardless of the current usage. Allotment of the quotas should be done by acreage and the free market would allow leasing/sellilng of usage rights between those wishing to use higher amounts and those using below their quota. To do otherwise would be outright confiscation of deeded water rights without compensation and a public gift to other/adjacent properties. This could be phased in over a period of years(suggest 5 or less) in which at the end of the time those not using their quota could be leasing their quota or just adding to the amount not being pumped. This guidance/goal may be applicable to other sections in the documents provided for review.	County of San Luis Obispo GSA	pasogcp.com	9/26/2019 10:58:00 AM	
Carter Collins	**Draft GSP** Executive Summary	1. As a whole, the GSP is unclear as to what exactly the GSAs will tangibly do to ensure the elimination of the current overdraft in the Paso Robles Basin. This not only risks the health of the basin, but it increases the chances that the California Department of Water Resources will not approve the GSP. The GSP needs to clearly state what and how the GSAs will act. 2. A hallmark of SGMA is the call for including all stakeholders in the decision-making process. The County GSA, however, did not hold any outreach meetings with the Ag Community. Since the EPC WD represents 44% of the agriculture based pumped water, there should be more active involvement in developing the GSP. Successfully reducing the Ag pumping to benefit the groundwater basin will have to include the understanding and support of the Ag Community. 3. Groundwater pumping allocations, monitoring, and enforcement need to be clearly planned out. The implementation process will be doomed to failure if those who must sacrifice are not included in the decision to cutback pumping. Water use should be measured by meters to ensure accuracy. Violations must be enforced through both civil orders and penalties. 4. Most of the projects listed in the current GSP are purely conceptual. Moving forward, the GSP needs to explain how it will ensure and promote the construction of projects generating significant new useable water. 5. The risk of growth in de minimis groundwater users needs to be fully addressed. The GSP notes that the current number of de minimis users is significant and that their growth could warrant regulation in the future, but it does not say how it will ensure that the growth will not eat into the rights of other existing users. Perhaps a cap should be placed on the total number of de minimis users, requiring that any growth is acquired voluntarily from others.	County of San Luis Obispo GSA	pasogcp.com	9/26/2019 13:52	20190926_Collins

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Anthony Riboli	**Draft GSP** Executive Summary	Please see attached letter.	County of San Luis Obispo GSA	pasogcp.com	9/26/2019 5:48:00 PM	Link: 20190926_Riboli
James Green	**Draft GSP** Executive Summary	Please see the attached letter.		pasogcp.com	9/27/2019 10:58:00 AM	Link: 20190927_Green
Hilary Graves	**Draft GSP** Executive Summary	My comments pertain to the entire GSP document and the process that agricultural overliers have endured to arrive at the current version available to the public. As an agriculturist, I have not felt well represented by the County of SLO as my GSA. In addition, the County has, in my opinion, failed to satisfy the SGMA requirement of outreach and education. The County as my GSA has not held a stakeholder meeting soliciting input from agriculture or sharing their vision for supporting our industry through the SGMA implementation process. Three minutes of one-directional public comment at the Board of Supervisors and/or the Paso Basin Cooperative Committee meetings is not sufficient to serve as outreach and education. This process is important enough to all overliers that it requires the opportunity for outreach and education in the form of back-and-forth dialogue with the option of asking questions and robust debate when warranted. One only has to read the comments from other commenters to see that the County has failed in its role as educator to overlying property owners. The confusion and misinformation being shared without correction is disappointing, to say the least. The County's lack of commitment in the GSP to a multi-faceted and truly sustainable approach to solutions, including options such as groundwater recharge, water conservation, increased surface storage, increased use of recycled water, capture and reuse of stormwater, and better implementation and integration of regional projects, further complicates our situation and highlights the County's lack of ambition and ability to think proactively about the health of our groundwater basin. For example, if the County is unable to receive and distribute our State Water Project allocation due to lack of forethought and planning, at least sell the water to other users and use the money to pay for projects that benefit our Basins in SLO County. Even that suggestion is met with a list of reasons why it cannot be done instead of a list of ways that we might be able to make it happen. Agriculture is not only the primary driver of the economy in SLO County, but an important part of our Countys heritage. Farmers in California are leaders in implementing some of the most efficient irrigation methods in the world. The broad consensus in our state, and in our county as well, is that our water management system is unprepared to meet the needs of agriculture, industry, the environment, and our growing population. I am committed to collaborating and contributing to a solution for the long term health of our basin. There is no easy fix and it is going to be expensive, but sustainability means that we must all work together to come up with solutions that support a stable economy, protect the environment, and provide for public health and safety.	County of San Luis Obispo GSA	pasogcp.com	9/28/2019 10:50:00 AM	
Ralph J. Herman Sr.	**Draft GSP - Volume 1** Chapter 1	In reviewing the material on the GSP Volume 1, I did not find any mention or any indication that there are double Faults running parallel, East and West, from approximately Hog Canyon, Westerly to apparently San Miguel. The Faults are therefore just South of the end of Ranchita Canyon. As a result, we believe that is the main reason that at least the area of Ranchita Canyon, North to and beyond the SLO County line, has generally maintained adequate ground water for the wells over the yeas, including the past dry seasons. Further, it has been more recently recognized by the Superior Court, that the single Fault separating the Paso Robles Basin from the Atascadero Basin, is a physical barrier between the two Basins. As a result of this legal determination, why has the Paso Robles Basin, annexed all lands to the North County Line into the Paso Robles Basin when there is a double Fault Block? In addition, the only brief mention of any Faults in the material that I could locate, was in Volume 1, 4.9.2 Fault Influence on Groundwater. In addition to the above, I have a suggestion for you. It would be easier reading the material presented when in Draft form, that the word DRAFT that appears on every page, be reduced from Black to maybe a light gray, or simply an outline of the letters so that the underlying material is not blocked out. Thank you.	County of San Luis Obispo GSA	pasogcp.com	9/28/2019 11:29:00 PM	
Sheila Lyons	**Draft GSP - Volume 1** Chapter 3	The math doesn't seem to bear out on page 3-34 top paragraph. If build out 75% of all RR parcels results in pumping of 37,000 AFY, then 100% would be 49,300 AFY. Final paragraph says that 16,504 AFY would be 44% of ultimate build out, but doing the math it only comes out to be 33%.	County of San Luis Obispo GSA	pasogcp.com	9/3/2019 11:10:00 AM	
Sue Harvey	**Draft GSP - Volume 1** Chapter 4	Re 4.9 Data Gaps in the Hydrogeological Conceptual Model: We are assuming that the underlying data supporting the inflow and outflows are accurately interpreted within the limitations of the data gaps that are laid out in the Plan. Once the GSP is adopted the first project to be undertaken must be in-fill of data for monitoring wells to collect the information necessary to plug the data gaps.		pasogcp.com	9/27/2019 2:52:00 PM	
Stuart Suplick	**Draft GSP - Volume 1** Chapter 4	Section 4.7.1 Groundwater Recharge Areas Inside the Subbasin "Figure 4-16 is a map that ranks soil suitability to accommodate groundwater recharge based on five major factors that affect recharge potential, including: deep percolation, root zone residence time, topography, chemical limitations, and soil surface condition. The map was developed by the California Soil Resource Lab at UC Davis and the University of California Agricultural and Natural Resources Department." COMMENT: Consider pairing with information provided in the Cal Poly Senior Project https://digitalcommons.calpoly.edu/nrmsp/57/ to identify areas where, especially during droughts, promoting beaver damming with beaver dam analogs or local resident educational efforts can help with at least alluvial aquifer recharge. Or where runoff or deliberately added water can create additional "reservoirs" or "recharge ponds" that are seasonal, relatively cheap, and (besides the need to monitor for/control invasives) provide a boon for birds and local endangered species.		pasogcp.com		
Sue Harvey	**Draft GSP - Volume 2** Chapter 8	The Plan relies on identifying exceedances of minimum thresholds (groundwater levels or water quality) for purposes of triggering pumping cutbacks. How will exceedances be addressed while an ordinance is being enacted? Violations of exceedances will be meaningless and cannot be remedied without an intermediate plan. Ground water levels will continue to decline.		pasogcp.com	9/27/2019 2:52:00 PM	

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Name	Chapter & Section	Comment	GSA	Comment Source	Date/Time	Attachment(s)
Sue Harvey	**Draft GSP - Volume 2** Chapter 9	The Plan estimates that it will take five years to enact a pumping reduction ordinance. Five years is too long to wait to start to reverse over-pumping. The Plan correctly emphasizes that pumping cutbacks are necessary as extensive over-pumping is already occurring.There must be some intermediate plan of action identified to mitigate current over-pumping during the period before an ordinance is adopted. As listed in 9.5, the Projects, while possible and of benefit, are too far distant to be viable management options for addressing the immediate problem of reversing depletion of the basin. Chapter 9 offers little realistic planning, cost, or engineering information. Projects 2, 3, 4, and 5 dangerously offers overproduction surcharges as a reliable funding mechanism for the projects. Over-pumping (overproduction) cant be managed through a system of surcharges because entities will merely treat this as a cost of doing business and make no effort to change their business model, while "overproduction surcharges will end up becoming a necessary component of the financial survival of the agency leveling the surcharge. Hence there will be little incentive on anyones part to come into compliance. The history of Fox Canyon Water District should provide ample caution in this regard. Chapter 9 should be relegated to the Appendix.		pasogcp.com	9/27/2019 2:52:00 PM	
Stuart Suplick	**Draft GSP - Volume 2** Chapter 9	Concerned that the Northern Chumash and Salinan tribes will not be encouraged sufficiently (or their relationship with the GSAs/County is not being prioritized or invested in) to collaborate in the process for promoting voluntary fallowing with farmers, environmental users, County government. Or other recharge/demand reduction methods. Section 3.3.2 Tribal Jurisdiction states "These two tribes do not have any recognized tribal land in the Subbasin" seeming to imply that they are a low-impact or low-priority stakeholder - but this does not account for the lands they occupied prior to any state- or federal-specific recognitions of governance. Appendix I also does not describe the degree to which tribes were notified and followed-up upon (unless I missed this elsewhere). Perhaps the members really aren't interested, but given that they managed this land historically/prehistorically, it seems an insult to not prioritize their incorporation or give them a bigger platform for sharing and integrating and respecting any traditional ecological knowledge they may have, on their terms as much as possible. I also have reservations about the lack of information at the moment on how the meetings and community consultations for voluntary fallowing/mandatory supply cuts will be directed or run to best encourage cooperation on what can become a highly political and emotion-filled topic very fast. At least some solid research should go into providing a lower-level picture of how these sessions could be run on a human-dimensions level. Especially if none of the GSA/GSP consultant staff come from a agricultural background. For instance, in terms of voluntary fallowing, thinking more holistically https://esajournals.onlinelibrary.wiley.com/doi/full/10.1002/ecs2.2367 could be key if combined with the recognition that a good number of farmers would not want to fallow their land for more than economic reasons - e.g. a rewarding sense of stewardship, for instance. In this sense, finding ways to accompany fallowing with restoration/riparian buffer expansion/environmental and traditional indigenous knowledge education of kids and the community could be one idea for farmers to maintain their sense of identity during seasons or the long-term when they fallow.		pasogcp.com	9/24/2019 8:52:00 PM	
Ruthie Redmond	Draft GSP **Volumes 1 & 2** **Executive Summary**	(See attached letter for specific comments on each section)		pasogcp.com	9/27/2019 12:27:00 PM	Link: 20190927_Redmond
Robert Woodland	**Draft GSP - Appendices**	Please see attachment	City of Paso Robles GSA	pasogcp.com	9/27/2019 2:10:00 PM	Link: 20190927_Woodland
Mackenna Buchholz	Additional Comments	(See attachment)		Other	5/3/2018	Link: 20180503_Buchholz
Greg Grewal	Additional Comments	(See attachment)		Other	5/14/2018	Link: 20180514_Grewal
Donald Morris	Additional Comments	(See attachment)		Other	5/21/2018	Link: 20180521_Morris
Sheila Lyons	Additional Comments	Please find enclosed below a letter and an attachment with input from the Creston Advisory Body representing the Creston Community and Rural Residents across the Basin. The vote of endorsement for the contents of this letter by the CAB member at last night's CAB meeting was unanimous. We hope you will find this information helpful when making decisions on Basin management. Thank you for your attention to our input. Sheila Lyons CAB Chairperson		Other	7/19/2018	Link: 20180719_Lyons
William Enholm	Additional Comments	(See attachment)		Other	7/25/2018	Link: 20180725_Elholm
Tommy & Kathy Carter	Additional Comments	(See attachment)		Other	7/26/2018	Link: 20180727_Carter
Dianne Jackson	Additional Comments	Supervisors Peschong & Arnold, and Chairperson Hamon, I am in complete agreement and support the comments CAB submitted to the Paso Basin Cooperative Committee. CAB has been working on this topic for over a decade and has tried to include the many comments that they have received from the public, over the years. The new groundwater sustainability plans require each basin to reverse groundwater overdraft. There is only one way to get that accomplished, stop over pumping. Hoping you will take into serious consideration every point that was addressed. Grace and Peace, Dianne Jackson		Other	7/26/2018	

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Carol & Harold Rowland	Additional Comments	(See attachment)		Other	7/26/2018	Link: 20180726_Rowland
Sheila Lyons	Additional Comments	In reading the notes from various PR Basin Cooperative Committee meetings we don't see anywhere that the local Citizen's Advisory Councils are included for receiving notices or communications. Additionally in those lists we have seen all entities listed have specific addresses by which the organizations or agencies may be noticed, however, Rural Residents are simply called out as Rural Residents. It seems greatly amiss to us that Rural Residents who are the great majority of the people living over the Paso Basin and who will be impacted the very most are not being communicated with directly. At the very least all Citizen Advisory Councils over the Basin should be noticed. Please add the Creston Advisory Body (CAB) to your contact lists. All notices may be sent directly to our chairperson, Sheila Lyons, (removed)	County of San Luis Obispo GSA	pasogcp.com	9/22/2018 2:47:00 PM	
Leslie Jordan	Additional Comments	(See attachment)		Other	9/25/2018	Link: 20180925_Jordan
Melenie Ristow	Additional Comments	Hello, I'm on vacation & won't be able to attend the water meeting in Creston. I wanted you to know I'm extremely worried about what will happen to my residential water well for my home & 20 acres. I've lived on Huer Huero rd for 38+ yrs with a mix of drought, normal & wet years & so far never run out of water, but I'm a lucky one. We've always known water is life out here & we have chosen a variety of ways to be responsible & conserve our water to be able to live here. I too worry about my investment in my property & realize my investment will be compromised if my well runs dry. Not being a big or corporate water user I have very few alternatives or be financially able to truck water to my home. And thus count on my representatives to protect my water interests. I implore you to do just that. Please protect mine & the thousands of residential water user wells in our Creston area. Thank You, Melenie Ristow		Other	10/1/2018	
Sheila Lyons	Additional Comments	Hello Supervisor Arnold, I submitted the following Excel file, that CAB received from the Public Works Dept back in the spring, to the Paso Basin Groundwater Sustainability Cooperative Committee through the GCP Portal. You may recall that CAB questioned the table in Chapter 3 of the GSP (Table 3-2, page 22) because it didn't appear to be up to date. In fact Table 3-2 of Chapter 3 showed only about 1/3 of the total wells that the SLO PW Dept indicated as being in production over the PR Basin, as given to CAB earlier this year. Sheila Lyons CAB Chairperson (See attachment)		Other	10/2/2018	Link: 20181002_Lyons
Dick McKinley	Additional Comments	Figures 4.6-4.10 have print that is too small to read.	City of Paso Robles GSA	pasogcp.com	10/5/2018 1:06:00 PM	
Frederick Hoey	Additional Comments	These comments relate to Figure 3-14: North County Planning Subareas: I object to the El Pomar-Estrella-Sub Area as defined. Interestingly, this Sub Area is startlingly similar to the boundaries of the "area of influence" of the Estrella-El Pomar-Creston Water District as defined by SLO-LAFCO. I expect this harmony is deliberate. The Creston area is distinctly different from both the El Pomar and Estrella area; accordingly, actions that are appropriate and necessary for the El Pomar and Estrella areas will not be appropriate for Creston. For instance within the Estrella areas a significant "cone of depression" has been created by the egregious groundwater pumping by the City of Paso Robles, which has been compounded by the local concentrations of large vineyard operations. Many Creston landowners have long been concerned that Creston groundwater would ultimately be utilized to remedy the damage that has been done to the Estrella groundwater levels. By combining three geographic areas, each with their own unique issues, into a Planning Sub Area, the authors of Chapter 3 wrongly assumed that the citizens of Creston would not rise up in strong opposition to such blatant, potential piracy of our water resources to cover the sins of the City of Paso Robles through the exploitation of the Estrella area. I strongly urge that the Creston area be identified as a separate Planning Sub Area, a view shared by all of my Creston friends and connections.	County of San Luis Obispo GSA	pasogcp.com	10/6/2018 4:03:00 PM	
James Green	Additional Comments	Good afternoon, Micki: Please distribute the attached letter regarding County Groundwater Sustainability Agency (GSA) Meetings to the Supervisors, all districts. Thank you. Warm Regards, James Green Government Affairs Specialist		Other	10/8/2018	Link: 20181008_Green
Dennis Loucks	Additional Comments	Dear Mr Peschong, Attached are my comments pertaining to the GSP plan to date. Please refer them to your Cooperative Committee. (See attachment)		Other	10/8/2018	Link: 20181008_Loucks
Frederick Hoey	Additional Comments	(See attachment)		Other	10/12/2018	Link: 20181012_Hoey

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Dennis Loucks	Additional Comments	(See attachment)		Other	10/15/2018	Link: 20181017_USGS
Stephen Sinton	Additional Comments	Figure 4-12 makes zones look simple and continuous when they are probably more complicated and multi-layered with impervious and semi-impervious layers scattered both vertically and horizontally. I believe our newest well on Shell Creek was 592' with almost continuous sandfrom surface to the bottom of the formation. It test pumped more like 1500 gpm, although we don't use it at thatlevel. The transmissivity information could be very significant. Is there a source for where this came from? Artesian wells existed within the boundaries of Shandon itself. Overall Much of the information available for this GSP is uncertain, but we will know a lot more as we begin implementation. The risk, therefore, is that facts will become immovable and immutable if we don't repeatedly state our uncertainties and the need forrefinement. The Plan needs to be clear that our understanding of the basin is likely to change over time, numbers will have to be changed, basin limits will undoubtedly be revised and many other aspects will be altered by new information. So we need to be unambiguous that each "fact" may potentially require updating and decisions and actions based on those facts may need to bealtered.	County of San Luis Obispo GSA	pasogcp.com	10/15/2018 8:01:00 AM	
Verna Jigour	Additional Comments	This is just to note my apologies if you received two copies of my comment addendum file. My comment on this web input function is that I could not tell how many files I had attached the screen only shows the most recent attachment. I intended/ attempted to attach two files 1. my comments addendum and 2. my doctoral dissertation abstract. If you did not receive both files, please advise me and I will provide them again. Thanks for the opportunity to comment! Verna Jigour, PhD Rainfall to Groundwater		pasogcp.com	10/15/2018 9:58:00 PM	Link: 20181015_Jigour
Dana Merrill	Additional Comments	RE Survey While the comments are interesting to read and seem to suggest in general experience with falling water levels and concern for more to follow, they have several shortcomings in my opinion. 1. Done in a vacuum as no mention of cost or who would pay renders them useless without follow up 2. Sample size is likely too small and cannot be verified as to authenticity 3. Time and cost hopefully was minimal as time is passing while the drought continues and meaningful measures and strategies are urgently needed for individuals and businesses to plan and budget for the future. 4. More critical work is needed, asking whether Utopia is desired is of minimal interest without quoting a cost Sorry but that's my feeling on the Survey. Maybe a well intentioned legislative mandate that it be included but we need to get on to the real issues and strategies. Every stakeholder, landowner, and even cities will feel the impact of severe pumping cutbacks in the Paso Basin as economic multipliers in reverse mean higher taxes, less jobs, tourism and lower property values. The Urgency Ordinace is an example of how land values plummet if water is restricted. Let's get going on solutions and figure out whether we can find a way to pay for them!	County of San Luis Obispo GSA	pasogcp.com	11/12/2018 7:56:00 AM	
John Thompson	Additional Comments	This probably seems tedious, but when reviewing the draft, the dark "DRAFT" across the page is distracting. Possibly lighten the text across the page or put "DRAFT" as a header.		pasogcp.com	12/6/2018 1:00:00 PM	
John Thompson	Additional Comments	In general, when a source is referred to in the text, it would be nice if it were properly cited. I do not know that we need a literature cited at the end of each section, but one online literature sited page would suffice. For instance, on page 5-38 the map is cited as RMC, 2015, but that resource is hard to find without a proper literature cited appendix or reference. Better yet, a website that could digitally link you to all cited works.		pasogcp.com	12/6/2018 1:00:00 PM	
Steve Sinton	Additional Comments	Can the chapter draw any conclusions as to what would happen to groundwater levels if we had a period of above normal rainfall years? 2. Can you further clarify the different aquifers? Most readers are familiar with the deep sulfur water and the aquifer above it, but Chapter 5 seems to further divide the upper aquifer in a way that isn't perfectly clear. 3. Figure 5-8 does not reflect the groundwater elevation conditions I experience on Shell Creek. Perhaps the extrapolation used in the figure covers too wide an area. 4. In 5.1.3 there is discussion of upward vertical groundwater flow. What is this based on and what does it mean to the management of the basin? 5. It may just be me, but I find Figures 5-15 and 5-16 very confusing. 5-15 makes it look like water use (the black lines coming down) is declining, but the text says the opposite. 6. Section 5.5 talks about gaining streams, but other than a few places where underflow is forced to the surface, I don't know of anything that is a gaining stream. The same applies to 5.5.1 where the chapter talks about groundwater discharge to surface water. I don't know of any place where it exists. The conclusion that the mean annual surface water depletion was about 8500 af/year seems impossible. If that statement (and Figure 5-18) is based solely on the model, that only makes the model seem less valid.	Shandon San Juan GSA	pasogcp.com	12/9/2018 9:55:00 PM	

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Name	Chapter & Section	Comment	GSA	Comment Source	Date/Time	Attachment(s)
Timothy Cleath	Additional Comments	Specific Edits: P. 7 Para 4: Delete sentences 5 and 6 (King City fault?). Fig 4-6: Geologic Map does not agree with portions of this cross section. P. 17 Delete last sentence of first paragraph: not necessary and not significant. P. 17 para 2: Identify arsenic as a constituent of concern. P. 19 para 1: Poor quality water in the Pancho Rico is not necessarily associated with the tar sands. We don't see tar sands in the Pancho Rico underlying the basin. P. 19 para : The Santa Margarita Formation varies inpermeability but is typically much lower than the Paso Robles Formation. That is the basis for not including it in the basin sediments. Where the geothermal water is present, groundwater quality is more brackish. P. 19 para 4: Vaqueros Formation groundwater is typically brackish. Fig 4-12 to 4-15: Reference map showing locations of cross sections. Aquifers shown in blue stop abruptly in some areas. Please explain why. P. 25 para 2: sentence 4: Not shown on Figure 14-4. Last sentence: Not clear what is meant by the "shallow aquifer.... may be an isolated aquifer area". Please explain. Table 4-1: Define Q/s. Note that the hydraulic conductivity is an average based on the full perforated interval and is not a specific aquifer hydraulic conductivity. P. 26 Para 2: Is the reference to the Paso Robles Formation and the shallow aquifer zone correct? This seems to be conflicting. P. 27 The specific yield for the Paso Robles Formation gravels is appropriate in light of the flatness and compaction of these gravel beds. P. 27 last para: Folds and faults do affect groundwater flow in the Subbasin. Consider particularly the Red Hills/San Juan faults and the folds near the Rinconada fault. P. 28 para 1: Municipal demands are significantly met by Nacimiento and State Water Project waters (Paso and Shandon) Fig 4-16: This map is incomplete and also not a good representation of where groundwater recharge can occur to the Paso Robles Formation. The alluvial areas are obvious. It may be best to exclude this figure and provide more discussions related to factors for recharge such as is discussed in the Huer Huero and Paso banking studies. P. 31 The areas identified as "discharge areas" just happen to be near where wastewater discharges occur and may not be areas of groundwater discharge. The areas of mapped springs and seeps are likely to be due to stratigraphic and structural conditions and not shallow and perched aquifer units. P. 34 Include the Nacimiento River and Shell Creek in the surface water features. Surface Water Bodies would seem to refer to lakes and ponds and not so much streams. It would be better to take out "bodies" from the title. P. 36 Recommendations should be for a geostatistical analysis of well completion reports and for general geophysics, not just aerial geophysics. Also, note that there is one nested well as is discussed in Chapter 5.		pasogcp.com	12/10/2018 9:36:00 AM	
Timothy Cleath	Additional Comments	General comments: Paso Robles Aquifer suggests there is only one aquifer-change to Aquifers. In light of the need to adjust the basin boundaries, there should be a discussion and illustration showing the 2002 basin boundary and the San Juan/Red Hills faults should be shown. The Base of the Permeable Sediments map from the 2002 Paso study is in need of a revision based on more recent information. The deep basin area near San Miguel is much shallower than was shown in that map. Soils infiltration rates in the table are not quantitative and the clay content and sand and gravel content do not add up. Explain why. Figure 14 has extensive areas where no soil infiltration information is available. Explain why.		pasogcp.com	12/10/2018 9:36:00 AM	
Green River Mutual Water Company	Additional Comments	(See attachment)		Other	1/2019	Link: 20190101_GRM
Dana Merrill	Additional Comments	My comments in brief are: 1. Better detailed data is needed before selecting specific projects by area. Shandon and Creston (depending on where Creston extends) seem to have stable water levels vs the Red Zone. So recharge or supplemental water needs to be likely worth the cost to areas in better shape. Or prove taking there does help the Red Zone. 2. Many small users is Jardine, Squirrel Hollow, etc may need regional systems which could be a few deep Wells or supplemental water. Domestic and AG May have different solutions. Antiquated subdivisions have special challenges that require solutions different than commercial Agriculture. Those are a failure of good Planning which didn't exist when the lots created. Government should now help resolve but wells and septic systems on 1 acre parcels not sound planning. Same as Los Osos faced only worse. 3. More spending on dedicated monitoring has been promised for years but never built. Do that first to be sure the solutions will work. 4. Prioritize getting the County Naci share, where the County Paso Basin was left out, into the Basin. Get the city Paso Robles to take its full allotment which would lessen the salt level of its effluent. More purple pipe water could then go to vineyards . Basin landowners could subsidize the lake water treatment plant expansion cost for the city. 5.there should be an alternative to take State water before treatment at Polonio Pass. Maybe pipe to Estrella River then pump out by Whitley Gardens. Save pipeline costs perhaps. More water at lower cost is available although more pipeline is needed. 6. Get representative monitoring well system going and build projects as results of monitoring dictates. Figure out where our projects should be concentrated.	County of San Luis Obispo GSA	Other	2/25/2019	

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		7. Get Irrigated Land Ordinance renewed for 5 years for stability. Expiring is not going to be good in 2020. County has a system and while it's not perfect it's a start we have experience with. 8. An Economic Study needs to be included to know whether Ramp Down or Supplemental water is best. A Ramp Down is not possible as we have few annual irrigated crops, the economic multiplier factor in reverse will devastate the local economy based on the wine and tourist industry. Winegrapes use so little water we have no lower use crop alternatives. 9. Get the Paso Basin on a priority list for State Water, otherwise urban uses will grab it and its gone. Buy a base amount the add annual purchases on high rainfall years at lower prices for recharge. Continue to rely on wells but support groundwater levels with supplemental water. 10. Adopt a Monterey County mandatory reporting system based on meters for Ag Wells 5 inch or larger. Exempt true non commercial de minimous users. They should contribute a minimal fixed admin fee to the system. Commercial Ag pay based on usage to incentivize efficiency. Group by zones as Monterey does. 11. Get more sophisticated data. Water levels have dropped most in the Red Zone but the Basin is deepest there. So many Wells still produce well. If we were to simply concentrate on the Red Zone and have the whole basin pay, would that be logical or fair? Do we know? If not, find out before proposing projects that likely can't pass a 218 election for funding anyway. 12. Our first 5 years post GSP submission need a vast improvement in data. Measure changes is water levels across the basin so we all have confidence in the data. And know the Economic impacts on us all, farmers, retired folks, city residents. That should help with buy in. Other than the Purple Pipe city of Paso project and getting on the State Water reservation list we are not ready for projects or drastic Ramping Down. Those two projects might be all we need. I may have further comments but wanted to get these in. Thanks for the opportunity. Dana Merrill Paso Robles, CA				
Dana Merrill	Additional Comments	(See attachment)	County of San Luis Obispo GSA	Other	2/26/2019	Link: 20190225_DMerril1_Ch9
Bill Stansbury	Additional Comments	It is good to see a concrete plan taking place. I am a deminimis user. It appears I will not be financially impacted by the GSP. I do fear a large political backlash by land owners, particularly in the Creston area. They always seem to have their alternate version of the facts and refuse to believe there is an overdraft problem. I am 70 years old, survive on a pension and live alone. When my wife was alive, we had to drill a new well in 2006 after moving in in 1992. Our well was 250 feet. The water table was at 135 feet when we moved here in 1992. Our new well is 500 feet deep and the water is now at 320 feet. I cannot afford to drill to 1,000 feet and what guarantee is there that there is potable water at this depth in our area? As you can see the "little guy" is in a tough spot here. I wish you the best and I hope I live to see this plan come to fruition. Thanks, Bill Stansbury		Other	2/27/2019	
George Tracy	Additional Comments	Thanks for sending this. There are a few typos in some of the draft documents but I found them very interesting. The minimal users appear to be exempt from the GSA as the law allows. I hope this will be true in the future too. I assume the county is to be the overriding GSA for the purposes of implementation. I am curious on how the other water purveyors will react to that. Since there is not a written agreement for the implementation of the Paso Basin GSA how are you planning to get it implemented by all the GSA agencies. I have heard there will be an agreement but I have not seen one. As a county resident I have watched my well levels fall year after year. I measure the well every year since 2013 when I had to replace my pump at the level it had been installed in 1997. That level was 252 feet. The initial water level when installed was 150 feet.It has fallen every year. Last year it was at 307 below the ground some 200 feet above the replaced well pump. The plan does not mention what the county ordinance that limits planting will be once the plan has been implemented. Will a new ordinance be put in place to limit installation of new plantings again? Not all crops are listed in the SLO county ordinance. Specifically Hemp and Marijuana are missing, there may be others as well. Brewers are also not listed but several use groundwater for their source of water. Do you have a list of facilities that will be implicated as pumpers? I hope to attend the March 6 meeting but the notice does not indicate time or place. could you send that to me?		Other	2/27/2019	

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Laurie Gage	Additional Comments	To the Paso Basin Cooperative Committee: I am writing in support of the letter to be considered by the Paso Basin Cooperative Committee as Item #8 in its March 6, 2019 meeting. As the holder of an onsite offset clearance, I have carefully reviewed the language of the termination clause in the deed restriction that was required of me by the clearance, and it would appear that without modification of the sunset date of the ordinance, it might be possible for me to begin irrigating the acreage that I fallowed in order to create the credit. I have no intention of pursuing reirrigating fallowed land, but it begs the question whether any owner of property fallowed to create an offset credit needed on that property or transferred/sold elsewhere, would feel the same reluctance to begin irrigating again. If the ordinance sunset date is not modified, I believe it might lead to having the clearance-fallowed land be irrigated again, completely negating any benefit of the one-to-one offset put in place to protect the basin. Add that to the increased water demand by having a gap between the sunset date and some future and, as of yet, unknown and undetermined program in the GSP, and the consequences could be long-lasting and very, very negative. Look to history and the 6-week gap in the ordinance process and what kind of advantage was taken back then. Thank you for your consideration and again, I urge your support of the letter in Item 8 of your March 6 agenda. Laurie Gage Full Sail Farm		Other	3/3/2019	
Sue Luft	Additional Comments	Paso Basin Cooperative Committee, I have reviewed the letter on page 59 of the agenda package for your March 6, 2019 meeting. I ask that your Committee approve this request that the SLO County Board of Supervisors modify the sunset date of the County's Water Conservation Ordinance related to the Paso Basin to when conservation provisions in the adopted Groundwater Sustainability Plan are implemented. Without modifying the sunset date of the County's Water Conservation Ordinance, there will be a gap which may result in increased water demand in the Paso Basin. This increased demand would increase the projected deficit in the basin and would impact the ability to comply with the Sustainable Groundwater Management Act. Thank you. Sue Luft Landowner, El Pomar area of Paso Basin		Other	3/3/2019	
Greg Grewal	Additional Comments	(See attachment)		Other	3/6/2019	Link: 20190306_Grewal
Douglas Brown	Project and Management Actions - Concepts	Appreciate your taking the time to speak with me yesterday. Here are the comments I last submitted on the website on Chapter 9 of the GSP which you indicate have not come through to you and others: I would request that the following alternatives be included as potential projects/management actions for study and implementation: 1.Reducing or eliminating exports of Salinas river water outside of the basin, particularly exports from Santa Margarita to the City of San Luis Obispo. These exports have negative environmental effects on the river as well as the groundwater basin and reduce recharge to the groundwater basin. The County, through the SLOCFCWCD, has significant obligations and control over these exports; 2.Require Shandon to participate in the SWP, as was envisioned in the early 1990's when a contract was executed for that purpose, prior to requiring other water users to participate in the SWP or other supplemental water projects. The County, through the SLOCFCWCD, was a significant, if not the lead, actor involved in such contract; 3.Require the urban agencies to use Nacimiento water for current water users rather than for new development prior to requiring other water users to participate in Nacimiento, SWP or other supplemental water projects. The County, through the SLOCFCWCD, has significant obligations and controls over the Nacimiento project and contracts with the urban agencies. While I understand that these proposals may not be popular options for various of the urban agencies, I do believe that failure to consider them would be inconsistent with the obligations that the GSAs have under state statutes. On the call you indicated that there had been no discussion of the environmental process for the GSP or projects or actions proposed to be undertaken. If true, I believe this is unfair to land owners and water users overlying the Paso Robles groundwater basin who deserve a clear explanation of this process and when they have a right to object. I reiterate my request to speak with the attorney in the county counsel office advising the County on environmental compliance with respect to the GSP. Douglas S. Brown		pasogcp.com	3/21/2019 5:12:00 PM	

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Name	Chapter & Section	Comment	GSA	Comment Source	Date/Time	Attachment(s)
Douglas Brown	Project and Management Actions - Concepts	Courtney, Thank you for your response. The public trust doctrine in California can operate to require additional releases above and beyond the permit conditions if necessary for instream or groundwater basin protection. I would respectfully request that the County (and the other GMAs) analyze this issue as an alternative. I have been told (but do not know) that Shandon does not take its full allocation of SWP water. I would respectfully suggest that the County and the other GMA's study of any SWP water alternative not include any project paid for by rural or agricultural users until Shandon takes its full allocation of SWP. I would respectfully suggest that the GMAs study urban use of Nacimiento water for existing users rather than new development. While I appreciate that other studies may have considered certain of these options, I would respectfully suggest that the GMAs need to re-review these options as part of their statutory duties under the groundwater management act. How much (or little) they can depend on the prior work will presumably depend of whether that prior work meets the standards applicable to the groundwater management act. Douglas S. Brown		pasogcp.com	3/21/2019 5:20:00 PM	
Sheila Lyons	Project and Management Actions - Concepts	Comments from both public and members at CAB Meetings - Administration, Accounting and Management - Ag pumping data collection states that one way would be for the Ag pumpers to report metered pumping to their GSA. How will this be verified? Management Actions - Although land use restrictions are mentioned there is no reference to working with the Planning and Building Dept. at the County to align new ordinances and policies to protect water resources. CAB has recently reviewed proposed ordinance changes for growing cannibis (not considered an ag crop) and for agricultural worker housing. Offsets are stated to be the source of water in one case...offsets do not make water and there aren't enough replacement toilets for the program to do any good. Ag operators agree that giving off-sets is not the answer for cannabis projects. No mention of water source in proposed Ag worker housing ordinance at all and the allowance for this type of housing is being expanded hugelyokay on lots down to 5 acres in size, 1 worker per 1 acre of grapes, expanded zoning allowance, etc. ALL new or modified County ordinances need to have conditions for where the water will come from in new plantings or development. Existing rural residents, most of which will be de minimis users with shallow wells, are still going to be impacted by allowing additional planting and development and no amount of money is going to compensate them for these infractions. Available Water Supplies - State Water Project - Although there is 14,500 AFY currently unused that number will drop in drought years when we would most need it due to increased demand from the subscriber. We would still have to pay for 14,500 AFY, not 8900 AFY to insure that we still get 8900 AFY. Or else, if we only contract for 8900 AFY we will get only 5160 AFY (58% of 8900). Who currently owns the Salinas Dam? What about down stream properties that were dependent on this run off water in the past - legal commitments? Options to Deliver New Water Supplies - Is there consideration that any new recharge basins be covered to prevent excess evaporation? Development of Project Alternatives for GSP - General Assumptions - For direct delivery projects, pipeline alignments were selected to deliver water to the largest users closest to the water source. Do these users pay the most for this benefit? They should. Direct Injection of		pasogcp.com	3/25/2019 5:03:00 PM	
Sheila Lyons	Project and Management Actions - Concepts	CAB felt that the discussion questions are rather vague and non-specific so hard to comment upon in some cases. Here are the comments we were able to obtain.		pasogcp.com	3/25/2019 5:03:00 PM	
Sheila Lyons	Project and Management Actions - Concepts	Introduction - Second point, #4 - and throughout...there appears to be a focus on Growers and how they are impacted. What will be the fall out for Rural Residents who have animals, orchards, etc. and use more than de minimis users?		pasogcp.com	3/25/2019 5:03:00 PM	
Andrew Rainey	Ch. 1003 Summary of Model Update and Modification 1003.5 Comparison of Groundwater Budgets	I do not see how a change in the lines on a map will defy gravity & the change in elevation from a higher point to lower point.if you say that a fault line will act to separate the water basins some how, maybe like a geological dam eventually the water will either come over the dam or fine a way to seep through the dam if the elevation goes from higher to lower.common logic would say that the water shed above the PR water basin has to effect the inflow into the PR water basin area.I do not see how you can not include the Atascadero water area into the PR water basin. they must be linked as the watershed is headed down hill.seems very strange to me to come to any other conclusion.	City of Paso Robles GSA	pasogcp.com	3/29/2019 9:32:00 AM	
Dana Merrill	Project and Management Actions - Concepts	My comments to this Chapter are: Page 4, paragraph 1. Exempting de minimous from water charges is fine but not necessarily from "assessments" as they are users who have a stake in the Basin health. Cumulatively they are a significant use of water. Page 6, Management Action, second paragraph "adversely affecting the local economy" is a significant point. The wine industry and resulting tourism boom has benefitted beyond the ag water users. Cutback will negatively impact the economy and a measurement of that impact should be carried out to help decide what cost of supplemental water or idling of irrigated farming really costs our community. Same paragraph: Water charging framework should prioritize water efficiency and higher water use crops should not be subsidized or favored because of historic use. Page 7: Paragraph 1, last sentence dealing with idled and to save water, should have added "...beneficial uses of the acquired land given its water use limitation." Page 8, Paragraph 2, Naci Water Project: The Naci Water Partners potentially could consider selling to a new partner: the Paso Robles Basin, whether the County entity or other. Perhaps there are willing sellers to carve out a base entitlement which could be augmented by shorter term purchases from other partners' shares. Page 9 "Important Considerations", line 2, what are "Potential water quality issues" associated with Naci lake water that would be limiting as a source?Page 10: General Assumptions: "Local groundwater deficits" require more precise determinations of boundaries, perhaps related to the same issue with "Zones" Page 10 SWP Assumptions: Need to determine definitively whether heavier pumping beyond the Red Zone impacts the Red Zone. And whether adding Supplemental Water to non Red Zone can improve Red Zone water levels. Same paragraph: Buying untreated SWP water farther east pre treatment would be cheaper and allow for more quantity to be acquired potentially. Cost of additional pipeline would have to be evaluated as part of viability review	County of San Luis Obispo GSA	pasogcp.com	3/29/2019 11:53:00 AM	

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Name	Chapter & Section	Comment	GSA	Comment Source	Date/Time	Attachment(s)
Dana Merrill	Project and Management Actions - Concepts	Topics of Discussion section 1. Equity bullet point page 1; define "heavy pumper"; is that volume based upon acreage or by crop (alfalfa vs winegrapes etc)? Projects should be paid via a combination of Capital Project funding and operational charges for recurring operating expenses. 2. Equity bullet #2: monitoring wells, negotiating water charges framework, video logging wells (determining Zone Boundaries), extraction system monitoring etc. could be funded at last initially by a per acre charge, probably on irrigated lands. 3. Bullets page 2: deminimus pumpers: Yes and No to complete exemption. Lower base fee of their own is logical. 4. Pumping allowances: Set a base fixed amount, likely between 1 ac ft/acre/year and 1.25 ac ft/acre/year regardless of irrigated crop grown. Use economics as a tool to encourage water to move to most efficient use within Ag uses. 5. Standarized uses should be Paso Basin oriented. Battany study a good source for one at least. 6. Ramp downs: 10 years to complete, start in 5 at soonest. Need to see what Supplemental water is required. A given hopefully is current County Ordinance regarding new irrigated land is renewed for 5 years or GSAs choose a new approach (don't let it expire and start land development and well drilling rush to put us farther behind). 7. Ramp downs need to be equal until Zone boundaries are established with research. 8. Don't cap carryover or users will make sure to pump to avoid losing 9. County fine to be State Water Contractor IF they will take action to get it going. If not, get different entity motivated to get this going asap to know if it is a viable option supported by those who will pay for it. County record so far is too little, too late on Supplemental sources to Basin in general. 10. State Water contractor could be paid with usage charges and property tax in combination. Many examples statewide to select from	County of San Luis Obispo GSA	pasogcp.com	3/29/2019 12:10:00 PM	
Dana Merrill	Project and Management Actions - Concepts	Re: changes in Pumping Allowance from Ag to M and I: most non Ag uses including Manufacturing and Industrial (M and I) which was mentioned and conversion to urban housing or ranchettes can attract a higher financial return on pumped water than Agriculture, Even tree crops, wine grapes and vegetables cannot compete with non Ag buyers of water whether groundwater or supplemental sources. Agriculture needs to be appreciated when it comes to pricing water. Ag is a key economic contributor today helping to drive the strong local economy. It is possible go the way of southern CA and other regions that can converted to non Ag uses. That could happen is Paso Robles if the combination of cutbacks and high price supplemental water makes it an obvious choice to convert to non Ag uses. Plus pressure from the state to build more housing. Those with high priced water to sell will profit in the near term but the agricultural character will change dramatically from the present. The allure of Paso Robles is not only the town but its setting, led by it becoming a world class wine destination. So be careful about moving Ag water to M and I or other uses, as mentioned as an possible strategy, as our very unique character could be lost.	County of San Luis Obispo GSA	pasogcp.com	3/30/2019 6:12:00 PM	
Dan Penkauskas	Additional Comments	I really like the job you've done - good research and analysis of the current state and several proposed solutions with their costs worked out. I particularly like the proposed cost of water for growers - a nominal cost for the first 12", but sharply (10x?) higher for drafts over that. Some growers have very deep pockets indeed, and only draconian rates after the first 12" will encourage them to comply.Thank you.	County of San Luis Obispo GSA	pasogcp.com	4/5/2019 12:29:00 PM	
Allen Duckworth	Ch. 9 Projects and Management Actions Fact Sheet and Discussion Points 9.2 Discussion Points	It appears that the priorities of the Draft Projects Summaries are in reverse order. Even in a bad year, the Paso Robles Basin and surrounding water shed, receives more than enough good clean rain water to meet our needs so it makes no sense to let that water run down the Salinas River to the Pacific Ocean then purchase water from the unreliable State Water Project that could potentially contaminate our pristine basin. Water from the State Water Project should never be at the top of the list as they have already allocated way more water than they will ever have so we could never count on that water being available when most needed. The pipeline projects are very expensive,should require an Environmental Impact Report and would best serve a limited group of property owners. Such projects would not meet the stated goal of providing equity between who benefits from projects and who pays for projects therefore should only be considered by the individual water districts whose members would be the primary benefactors ratherthan being part of the GSP. Taking advantage of natural recharge methods such as installing check dams in natural percolation areas to redirect more runoff water into the basin would be much more cost effective and benefit a larger portion of the basin. One project that should be at or near the top of the list is enlarging the Salinas Dam because that could restore the Salinas River to the required, year around surface flow which would greatly increase the basin recharge. This project would be financially advantageous because it would be eligible for Proposition 1 grants as well as Federal funds from the RAIL act which will be redirecting money from the failed highspeed rail project to California water storage projects. Let's get our priorities straight and concentrate on providing a sustainable water supply for all the residents rather than a water banking opportunity for a selectgroup of investors. This DRAFT plan looks just like the Assembly Bill 2453 that nearly 80% of the area voters have already rejected. Please listen to the will of the people!	County of San Luis Obispo GSA	pasogcp.com	4/13/2019 1:03:00 PM	
Sheila Lyons	Ch. 9 Projects and Management Actions Fact Sheet and Discussion Points 9.1 Fact Sheet	Has consideration been given to charging cannabis projects for their ability to irrigate from the PR Basin? The state is apparently already doing this. With all the cannabis projects coming into North County this should be considered. See link to state charges: https://www.waterboards.ca.gov/resources/fees/water_rights/docs/fy1819_finalfeeschedulesummary.pdf	County of San Luis Obispo GSA	pasogcp.com	4/11/2019 3:47:00 PM	
Verna Jigour	Ch. 9 Projects and Management Actions Fact Sheet and Discussion Points 9.1 Fact Sheet	"Local Rivers/Streams" Localized recharge of rainfall runoff before it enters a stream or river is also possible. Restoring detention storage functions on *vast areas of rangelands in the watershed* could capture excess stormwater flows more efficiently than engineered structures. Restored native woody and perennial plants, their root systems and associated soil ecosystems, would capture and route more precipitation directly to groundwater right where it falls circumventing the need to capture and divert flood flows to human-maintained basins. [See RainfalltoGroundwater for elaboration.] This is not a small source, as suggested in the second paragraph under Local Rivers/Streams. Applied to the entire watershed/catchment, this is an enormous potential source, as I've strived to point out in my comments on your process.		pasogcp.com	4/15/2019 9:48:00 PM	

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Jerry Reaugh	Combined comments on Chapters 6, 7 & 8	The attached are my comments on Chapters 6,7,& 8. Regards, Jerry Reaugh	County of San Luis Obispo GSA	pasogcp.com	4/15/2019 11:52:00 AM	Link: 20190415_Reaugh
Sandi Matsumoto	Ch. 1001 Methodology for Identifying Potential Groundwater Dependent Ecosystem 1001.1000 N/A	Please specify what field verification methods (e.g., isotope analysis, enhanced shallow groundwater monitoring) will be used to definitively determine whether potential GDEs are true GDEs. It is highly advised that multiple depth to groundwater measurements are used to verify whether an iGDE (or NC dataset polygon) is connected to groundwater, so that fluctuations in the groundwater regime can be adequately represented. The analysis described on p.7 to create Figure B-3 only relies on Spring 2017 depth data, which is also after the Jan 1, 2015 SGMA benchmark date. Also, according to the shallow monitoring well data gaps described in Chapter 5 and 7, there is insufficient data to confidently remove data for NC polygons that are >5km away from a shallow well. See Attachment D of this letter for six best practices when using groundwater data to verify the NC dataset.The NC dataset needs to be ground truthed with aerial photography to screen for changes in land use that many not be reflected in the NC dataset (e.g., recent development, cultivated agricultural land, obvious human-made features). Grouping multiple GDE polygons into larger units by location (proximity to each other) and principal aquifer will simplify the process ofevaluating potential effects on GDE due to groundwater conditions under GSP Chapter 7: Sustainable Management Criteria. Groundwater conditions within GDEs should be briefly described within the portion of the Basin Setting Section where GDEs are being identified. Not all GDEs are created equal. Some GDEs may contain legally protected species or ecologically rich communities, whereas other GDEs may be highly degraded with little conservation value. Including a description of the types of species (protected status, native versus non-native), habitat, and environmental beneficial uses (Refer to Attachment C for a list of freshwater species found in the Paso Robles Subbasin and refer to Worksheet 2, p.74 of GDE Guidance Document) can be helpful in assigning an ecological value to the GDEs. Identifying an ecological value of each GDE can help prioritize limited resources when considering GDEs as well as prioritizing legally protected species or habitat that may need special consideration when setting sustainable management criteria. Decisions to remove, keep, or add polygons from the NC dataset into a basin GDE map should be based on best availablescience in a manner that promotes transparency and accountability with stakeholders. Any polygons that are removed, added, or kept should be inventoried in the submitted shapefile to DWR, and mapped in the plan. We recommend revising Figure 4-11, Appendix B, and including it in Chapter 5 to reflect this change.		pasogcp.com	4/15/2019 1:20:00 PM	
Gail Schoettler	Additional Comments	Steve Sinton has been critical to the development of the local groundwater plan for the Paso Robles Basin, which desperately needs such a plan. I have watched the groundwater level fall for decades and now, with all the vineyards in the area, the time is more important than ever to ensure that the Basin can sustain all the agricultural and domestic uses. Agencies involved need time to implement the plan and evaluate how it is working so they can make adjustments as necessary. Given the long drought in California, the plan should also ensure that water levels be given time to stabilize. It is imperative that existing wells not go dry, so please take this into account as well. If results are not good, localities need to be given the opportunity to fix the problems before the Basin takes charge.	Shandon San Juan GSA	pasogcp.com	4/15/2019 3:20:00 PM	
Greg Grewal	Additional Comments	See attachment on county rainfall data.		PBCC Meeting	4/24/2019	Link: 20190425_Grewal
Dick McKinley	City of Paso Robles GSA public hearing: Chapters 5-8	These are public comments from the City of Paso Robles GSA public hearing regarding Chapters 5-8. 1. Dale Gustin “Asked about the relationship of this draft GSP to the Steinbeck litigation. Noted that there has been a lot of rain in 2019, and if the GSP took that into account. The answer was given that the GSP was based on data prior to 2019 per DWR guidelines. 2. Gerry Stover “Asked about wastewater and was informed about the Recycled Water project currently underway, and the recent completion of the Tertiary Treatment portion of the Wastewater Treatment Plant.	City of Paso Robles GSA	Public Meeting; submitted via pasogcp.com	5/2/2019 9:07:00 AM	
William & Doris Land & Energy Co LLC	Additional Comments	Re: Sustainable Groundwater Management Act Ladies and Gentlemen: William & Doris Land & Energy Co., LLC is the owner of approximately 2,440 acres of open land in San Luis Obispo County identified as Assessor's Parcel Nos. 037-321-016 and 037-331-014. While that property has been irrigated with groundwater in the past, there has been no recent irrigation of the property. We have just become aware that the groundwater sustainability plan (the "GSP") being developed for the subbasin underlying our property under Sustainable Groundwater Management Act may deny our property the right to pump groundwater in the future because groundwater has not been applied to the property for a number of years. We write to express our strenuous opposition to any GSP that fails to recognize our overlying groundwater rights or our right to pump groundwater in the future. Precluding the exercise of our overlying rights simply because they have not recently been exercised would amount to an unconstitutional taking of those rights that could result in an enormous reduction in our land value. Should that occur, we would have no alternative but to bring an action for inverse condemnation and other claims to recover that lost value. We want to avoid that outcome. We therefore urge you to recognize the rights of our property and similarly situated lands to pump groundwater regardless of whether those rights have been recently exercised, and to not adopt any GSP that interferes with those rights or discriminates between currently irrigated land and land that has not recently been irrigated. Very Truly Yours, (signed) Manager		Letter to the County Board of Supervisors Office	5/8/2019	
Various Stakeholders	Additional Comments	Supervisor Peschong provides a summary of comments received from various stakeholders and community members.	County of San Luis Obispo GSA	PBCC Meeting	5/22/2019	Link: 20190522_Summary_of_Comments

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Name	Chapter & Section	Comment	GSA	Comment Source	Date/Time	Attachment(s)
Submitted by Dick McKinley; comments by Dale Gustin, Gary Dunnican, Cody Furguson, and Patty Smith	City of Paso Robles GSA public hearing - comments on Chapters 9-12	Public comments on Chapters 9-12 from the 6/18/2019 Paso Robles City Council/GSA Meeting (See attachment). To view the agenda for this meeting, please click **here**.	City of Paso Robles GSA	City Council/GSA Meeting, submitted via pasogcp.com	6/19/2019 2:18:00 PM	Link: 20190620_PRCityCouncil
County of San Luis Obispo Department of Public Works	Additional Comments	See attached handout on the Paso Basin Aerial Groundwater Mapping Pilot Study distributed during the August 21, 2019 Paso Basin Cooperative Committee Meeting.		PBCC Meeting	8/21/2019	Link: 20190821_PilotStudy
Steve Lohr Jerry Reaugh Jerry Lohr	Additional Comments	See attached presentation received during the public comment period of the August 21, 2019 Paso Basin Cooperative Committee Meeting.		PBCC Meeting	8/21/2019	Link: 20190821_LohrReaugh
Sheila Lyons	Additional Comments	Many things seem to be missing from this plan. How are water sheds going to be handled? What if someone just outside the basin boundary puts in a well and pumps all they want? What if a lot is 1/2 in the basin and 1/2 out of the basin? There doesn't seem to be any recommendation for making use of the County's land use authority for assisting in managing the Basin. The County should review all land use polices for impact on the basin. Implementation of new policies could help with management. Disallowing new ag ponds? Cannabis farms? Another management tool that should be considered is a computer app requiring irrigators to coordinate watering times to limit the impact of well draw down happening all at once. Salinas Valley has such a system...strawberry growers initiated this...in their case it was due to salt water intrusion issues...but it could be used to manage pumping here in Paso Basin to protect rural residential wells adjacent to large ag operations. The growers must log on and reserve times for irrigating. This would seem like a good growing practice as well.	County of San Luis Obispo GSA	pasogcp.com	9/3/2019 11:10:00 AM	
Jerry Lohr	Additional Comments	I would like to submit the project map for the BVB Blended Water Backbone System. Regards, Jerry Lohr	County of San Luis Obispo GSA	pasogcp.com	9/27/2019 11:34:00 AM	Link: 20190927_Lohr3
Jerry Lohr	Additional Comments	On September 9th, my son Steve Lohr and myself met with Supervisors Peschong and Arnold along with Wade Horton and Courtney Howard. We discussed some of our ideas about how to move the Paso Robles Groundwater Subbasin towards sustainability. I was asked at that meeting to prepare a 1-page summary letter. Attached is that letter which was submitted to the Supervisors and the County. I would like to submit that letter to the Cooperative Committee as well. I am attaching the letter. In a subsequent Comment, I will be sending a copy of the Blended Water Backbone Project Map. Regards, Jerry Lohr	County of San Luis Obispo GSA	pasogcp.com	9/27/2019 11:26:00 AM	Link: 20190927_Lohr2
Jerry Lohr	Additional Comments	Please find attached my Comment Letter to the Cooperative Committee. Regards, Jerome J. Lohr	County of San Luis Obispo GSA	pasogcp.com	9/27/2019 10:50:00 AM	Link: 20190927_Lohr
Jerry Reaugh	Additional Comments	I am pleased to submit the attached comment letter to the CC. Regards, Jerry Reaugh	County of San Luis Obispo GSA	pasogcp.com	9/27/2019	Link:20190927_Reaugh
Sheila Lyons	Additional Comments	Many things seem to be missing from this plan. How are water sheds going to be handled? What if someone just outside the basin boundary puts in a well and pumps all they want? What if a lot is 1/2 in the basin and 1/2 out of the basin? There doesn't seem to be any recommendation for making use of the County's land use authority for assisting in managing the Basin. The County should review all land use polices for impact on the basin. Implementation of new policies could help with management. Disallowing new ag ponds? Cannabis farms? Another management tool that should be considered is a computer app requiring irrigators to coordinate watering times to limit the impact of well draw down happening all at once. Salinas Valley has such a system...strawberry growers initiated this...in their case it was due to salt water intrusion issues...but it could be used to manage pumping here in Paso Basin to protect rural residential wells adjacent to large ag operations. The growers must log on and reserve times for irrigating. This would seem like a good growing practice as well.	County of San Luis Obispo GSA	pasogcp.com	8/23/2019 11:10:00 AM	

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Steven Carter	Additional Comments	My family owns and operates a property that has been in irrigated agriculture since the late 1980's. The pumping water level in our well has not significantly dropped since we purchased the property in 2002. It seems evident however that there is a problem basin-wide with the over pumping of our groundwater. This was especially apparent during the recent drought years. I have attended many of the GSA meetings that have now culminated in the proposed GSP. I have been very disappointed in the lack of communication with the SLO County GSA which is supposed to represent my interest. While the individual County Supervisors have been available for one-on-one meetings, the GSA staff have had almost no outreach to the 'white-area' agricultural pumpers who represent more than 50% of the total water usage in the basin. Moreover, the County BOS went out of their way to prohibit the EPC Water District from acting as a GSA. This has essentially left the largest single group of Paso Robles basin water users, the very ones who will be impacted the most by the GSP, on the outside looking in. I believe that going forward, the basin should be managed as a single unit. If cutbacks in pumping are proposed as a method of bringing the basin into sustainability then they should be implemented basin wide. Any proposal that draws lines in the sand will only pit neighbor against neighbor and surely lead to wasteful litigation. As the GSP is being finalized and presumably adopted, for agriculturists life goes on. It is evident to me that I should plan on pumping less groundwater in the future and so have started transitioning my property from growing alfalfa to growing deciduous trees. This should result in a net savings of irrigation usage but at a considerable cost per acre. One of the costs by the way, was a fee paid to the SLO County Planning Department for permission to change irrigated crops. Still, with the proposed GSP, there are many unanswered questions and the following are a few that are of interest to me. What agency is going to monitor water usage and at what cost? Will credit be given to savings in water usage that are implemented before the GSP is adopted? Best management practices, BMP's, are mentioned but not specified. Will there be penalties for pumpers who don't follow BMP's? What is the fate of land owners who don't have historical water usage on their properties? What happens if there is a significant increase in de minimis groundwater users?	County of San Luis Obispo GSA	pasogcp.com	9/29/2019 4:46:00 PM	
Dana Merrill	Additional Comments	Comments on GSP and the formation process	County of San Luis Obispo GSA	pasogcp.com	9/24/2019 3:01:00 PM	Link: 20190924_Merrill
Richard Woodland	Additional Comments	My name is Richard Woodland. I am a native of Paso Robles and have been involved in irrigated farming in or near Paso Robles for approximately 45 years. This farming has included alfalfa farming, where the Woodland Plazas I & II are located today, to current vineyard operations in the north county. First, I would like to thank SLO Co and the other GSAs for their extensive time and effort they have put into the current draft Groundwater Sustainability Plan. I understand the complexity of the situation as I was involved with and a part of the Upper San Gabriel Valley Municipal Water District in So. Calif. for approximately 30 years. I also understand that there may not be a perfect solution for all involved. What I am concerned about are several issues that appear to not have been addressed and are somewhat in the "kick the can down the road" mode. I am concerned that there is virtually no agriculture related representation nor inclusion in the various GSP meetings nor involvement in the draft policies. I am concerned that growth doesn't appear to have been considered regarding de minimis users. I am concerned that there does not appear to be a method for monitoring or policing water use. I am concerned that nothing has been addressed regarding the significant difference between those who use best farming practices, who are already addressing minimal water usage versus those who do no use the latest technology. Should there be a blanket reduction in water use, those who have invested in and have upgraded to the most modern practices stand to be hurt the most. I am really troubled in that San Luis Obispo Co., which is still an agricultural county, has no agricultural voice. There really needs to be at least 1 voting representative from the agriculture community. Thank you once again to the County of SLO and other GSAs for your hard work and dedication in this matter. The GSP will definitely impact everyone in the region and therefore should be represented by all facets of the region. Respectfully, Richard Woodland	City of Paso Robles GSA	pasogcp.com	9/24/2019 10:35:00 AM	
Dana Merrill	Additional Comments	Comments on GSP (see attached letter)	County of San Luis Obispo GSA	pasogcp.com	9/26/2019 2:47:00 PM	Link: 20190926_Merrill
Joe Irick	Additional Comments	Please see attached letter.	County of San Luis Obispo GSA	pasogcp.com	9/26/2019 10:42:00 AM	Link: 20190926_Irick
Fred Hoey	Additional Comments	Supervisor Peschong, & Angela Ruberto: I am sending the attached document as requested. Fred Hoey	County of San Luis Obispo GSA	via email	9/27/2019 0:00	Link: 20190927_Hoey

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Name	Chapter & Section	Comment	GSA	Comment Source	Date/Time	Attachment(s)
Robin Chapman	Additional Comments	RE: Draft GSP Remarks on specific sections of Draft GSP: Definitions: ¨Best available science refers to the use of sufficient and credible information and data, specific to the decision being made ¦. that is consistent with scientific and engineering professional standards of practice. I hereby state unequivocally that Best Science Available was not implemented in determining the San Miguel Area of Severe Decline. The majority of the area thus designated is owned by the Galbraith family and the Galbraith Family Trust, and as a member of that family, I know that no information or data whatsoever was collected regarding well tests, historic water use and/or levels, nor any other information that would indicate decline. The Galbraith family has for years, and routinely continues, to test well levels, and test results show that standing water levels are identical today to those of 1969. I demand that the designation as an Area of Severe Decline be withdrawn unless and until sufficient and credible information and data proves otherwise. Section 3.4 SLO Co. Ag Commissioners office is not fully aware of crop production in the county. The following categories need to be added to Irrigated Crop list: 1) Rotation crops 2) Irrigated grain 3.4.2 I am baffled by the assertion that Most industrial use is associated with agriculture and is lumped into the ag water use sector. What? There are scores of manufacturers and industries in the Subbasin, including within and around the city of Paso Robles, that have nothing to do with agriculture. Examples are: *Firestone Brewing *JIT Companies *Custom Tube and Manufacturing Inc *Trelleborg * Hogue Tool and Machine Industrial use and manufacturing are different than, and should be listed separately from, Agriculture.	County of San Luis Obispo GSA	pasogcp.com	9/29/2019 2:55:00 PM	
Robin Chapman (continued)	Additional Comments	Section 3.6.2 States that USGS has only one (1) water sample and that sampling frequency is unknown. This source is too vague to be used when deciding policy. Section 3.6.4 ETo information rates have been gathered from Atascadero, a site which is not in the Paso Robles Subbasin, and therefore possibly irrelevant. Section 3.10.2 Quotes SLO County General Plan : ¦ as countywide growth declines¦ Is this a mistake? Humans show no trend toward stabilizing their population growth, and SLO County will likewise have its share of population increase. Should it read as the rate of growth declines? Section 7.1.4 Monitoring networks are limited to locations with data that are publicly available and not under confidentiality agreements. Actually, none of the well monitoring information has been available. In attempting to pinpoint the locations of the listed monitoring wells, my inquiries elicited from County staff the explanation that most, or all, of the privately owned wells had confidentiality agreements, and thus no information about them could be shared. It was no easier to obtain information about public wells. After an unusually helpful member of county staff showed me an aerial view of the wells that were used to create the San Miguel Area of Severe Decline, that person was warned by the division supervisor not to provide me with any more information. If well data, or any other information, is used to make public policy, the public has a right to that information. Section 7.1.2 ¦ quantity and density of monitoring sites ¦ shall be sufficient to evaluate conditions of the Subbasin setting ¦ The number of monitoring wells is way too small to characterize such a large area. Section 7.2 SLOFCWCD removed 130 wells from its monitoring program because of privacy agreements. So how many wells remain in the monitoring program? Where are they located?	County of San Luis Obispo GSA	pasogcp.com	9/29/2019 2:55:00 PM	

Public Comments received through 9/29/2019
to be considered while compiling the Draft GSP for the Paso Basin

Name	Chapter & Section	Comment	GSA	Comment Source	Date/Time	Attachment(s)
Robin Chapman (continued)	Additional Comments	Section 7.2.1 Data gaps will be addressed during implementation ¦ When? How? By whom? How will it be guaranteed that data gathering and analysis is done by conscientious and informed personnel? One alluvial well is not enough ¦ If one well is not enough to represent alluvial aquifer(s), how can one be enough to monitor groundwater flow directions? How many more wells do you anticipate adding? When, and where? Section 7.2.2 Galbraith Family Farm should be monitored as an area of rapid recharge. Section 7.3 It is hard to judge from the scale of the illustration, but monitoring well 25S/12E-16K05 appears to be an alluvial aquifer well. Section 7.3.1 Data gap will be addressed by whom, when? How will it be guaranteed that data gathering and analysis is done by conscientious and informed personnel? Section 7.4.1 I dispute that there are no spatial data gaps in the network . The highest density of monitoring wells in any area of the Subbasin is three (3)! That leaves a lot of territory either underrepresented or not monitored at all. Section 7.6 More monitoring is needed than the one currently acceptable well. Section 8 The criteria defining .. is pretty vague.	County of San Luis Obispo GSA	pasogcp.com	9/29/2019 2:55:00 PM	
Robin Chapman (continued)	Additional Comments	Section 8.1 Management Area refers to an area within a basin for which the Plan may identify different minimum thresholds, measurable objectives, monitoring, or projects and management actions based on differences in water use sector, water source type, geology, aquifer characteristics, ¦ or other factors. I suggest that the SM Area of Severe Decline be re-evaluated under this clause. Section 8.1 Shouldnt this sectioned be numbered 8.2, and all following sections be amended accordingly? Section 8.1 Conceptual Projects NWP delivery at confluence of the Salinas and Estrella Rivers. My husbands family has owned this specific property for the past 54 years. These are the facts about this location: 1)NO ONE has approached the Galbraith Family about situating any project on their property. 2)Said property is in one of the highest recharge areas in the Subbasin, and has never had a shortage of water, and therefore no need, for supplemental water. This project was supposedly vetted through an outreach program. Nobody reached out to the landowner. Table 8.1 The shallowest well listed is at 490 feet. Galbraith Family Farm stands at, and has historically stood at, 157 feet. Does that sound like an area of severe decline? Section 8.3.4.4 States that should it determined that water quality is degraded, measures will be taken to avoid any undesirable effect. If water is found to be degraded, it is too late to AVOID. The correct term is mitigated. Ditto on the paragraphs mentioning subsidence and impacts on the Upper Valley Subbasin (8.3.4.5).	County of San Luis Obispo GSA	pasogcp.com	9/29/2019 2:55:00 PM	

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Name	Chapter & Section	Comment	GSA	Comment Source	Date/Time	Attachment(s)
Robin Chapman (continued)	Additional Comments	Section 8.3.4.6 Domestic land uses and users ¦ limited water in some of the shallowest domestic wells may require owners to drill deeper wells. I strongly feel that property owners whose private wells are depleted through no fault of their own should not have to bear the financial burden of drilling a new well. Where it can be shown that irrigation of crops in areas that were previously dry-farmed, or never farmed at all, contributed to depletion of a pre-existing well, surrounding irrigators should either have to supply property owners with water or provide funds for a new well. Policies allowing offsets of existing use to allow new construction ¦. If we assume that the PR Subbasin is in decline (which is the foundation of this Plan, is it not?) then offsets will not reduce groundwater depletion. Offsets do nothing more than maintain the status quo, which equals a continuing cycle of overdraft. Limitations should be imposed on users of great quantities of groundwater before de minimus users are required to cut water use. Section 8.3.5.2 The first sentence doesnt make sense to me. Is it the intention to say a DEFINITION of an undesirable result ¦? The word unanticipated should be deleted after extensive and before drought. Anticipated drought wouldnt be a potential cause of undesirable results? Section 8.6.1 ¦ in groundwater concentrations well above an established ¦ I think well above needs clarification. Section 8.6.2 Shouldnt criteria for constituents of concern be numbered 1 and 2, not 3 and 4? Why must a constituent of concern have already been above a level of concern? Doesnt this omit constituents that were previously present, but have since risen to a level of concern? Likewise with newly detected or newly declared constituents. Unacceptable levels or constituents that are identified in future should be included in this list.	County of San Luis Obispo GSA	pasogcp.com	9/29/2019 2:55:00 PM	
Robin Chapman (continued)	Additional Comments	Why are already-contaminated wells exempt from the current thresholds? Section 8.6.4.2 Groundwater recharge: Shouldnt this read active recharge with imported or ¦? Section 8.7.1 The last sentence in Land Subsidence should read Land subsidence is an inelastic ¦ Section 8.7.2.1 The margin of error is equivalent to one-half of the subsidence allowance. That doesnt instill a lot of confidence. Section 8.7.4.2 Couldnt continued pumping also be a potential cause of undesirable results? Section 9.1 ¦ to make new water supplies available ¦ There are no new water supplies. There is only as much water as there is. Expecting to receive water from out of the area reflects a lack of knowledge of the consequences to habitats deprived of their natural amounts of precipitation, stream flow, storage, etc. Section 9.2 There is a strong need for adequate information to justify area specific management actions. See comments on Sect. 8.1. Section 9.3.1.5 SMGA regulations require identification of data gaps and a plan for filling them. I have previously stated and currently maintain that there are too few wells enlisted in the monitoring program. I have never received an explanation why only wells with pedigrees are allowed in the program. Isnt there valuable information that could be gathered from wells whose dates of drilling are unknown, whose depth and perforations are not recorded? What have these things to do with monitoring well levels? Section 9.3.1.9 - Can public noticing in this and all other chapters please be changed to public notification?	County of San Luis Obispo GSA	pasogcp.com	9/29/2019 2:55:00 PM	

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Name	Chapter & Section	Comment	GSA	Comment Source	Date/Time	Attachment(s)
Robin Chapman (continued)	Additional Comments	Section 9.3.4 Voluntary fallowing I strongly support the creation of a Place Holder category for growers whom have had a hiatus in irrigation. It should be taken into account that the entire time such growers have suspended or reduced irrigation, they have been conserving groundwater. They should be rewarded, not punished. Historic land use and water rights should be duly considered. Section 9.4.1 Mandatory pumping limitations Rather than an across-the-board pumping reduction of 18%, I adamantly feel that groundwater extractors that planted thousands of acres of land that were previously never irrigated have exacerbated the groundwater situation and therefore should bear the brunt of any extraction decrease. It simply is not fair or right to strip growers with long-established irrigation rights of their means of livelihood. Therefore, perhaps a 20% decrease should be mandated for said properties, with re-evalution in two years. Section 9.5 Projects 1)Household and industrial waste dumps pollutants in the city waste water system that may make use of recycled water undesirable. 2)State water is completely allocated 3)Nacimiento water is completely allocated 4)The city of San Luis Obispo has the rights to more water than the dam currently holds. The city has already stated that it will not give up any of its current capacity to any other entity. The possibility of raising the level of the dam is, at best, remote. 5)Again, the pollutant issue 6)Diversions from any river, creek, stream, etc., requires DWR and CEQA approval Section 9.5.2.2 Pollutants, including salts and heavy metals, and their effects on targeted properties,must be assessed. How do landowners along Huer Huero Creek feel about this proposed discharge? Figure 9-2 Who owns the properties on which the proposed pipeline would pass? Are these owners compliant with this proposal?	County of San Luis Obispo GSA	pasogcp.com	9/29/2019 2:55:00 PM	
Robin Chapman (continued)	Additional Comments	How many growers would stand to benefit from this project? Who are they? Who would be required to pay for this pipeline and delivery system? Section 9.5.2.3 See comments under 9.5.2.2 Section 9.5.2.3.3 The information provided by only one monitoring well is entirely insufficient to base any action or project on. In particular, continued unsustainable groundwater level declines in monitoring well 25S/12E-16K05 will trigger implementation of this project. If it is known that a specific well is already pumping at an unsustainable rate, shut that well down. Dont put the onus on landowners and wells that have not demonstrated decline. It is completely unfair, unwarranted, and unprofessional to weight one location with ultimate decision-making status while all other data. If a data gap exists at such a location, then responsibility and diligence dictate that gaps be filled and analyzed before any action or project is considered. Funding for projects If pumping reductions are inadequate for achieving sustainability, funds raised by a water charge framework will be used to initiate projects throughout the Subbasin. Why should everyone have to pay into a fund that benefits only a few growers who most likely are the very extractors who hastened the current groundwater situation? This is welfare for the rich. Section 9.5.2.3.5 Costs can be covered by the bonding capacity¦ assumes that a public entity is willing to take on debt, and that voters are willing to approve that debt for the benefit of two or three water extractors. This is not holding unsustainable extractors accountable and is fobbing off their egregious water use on the community at large. Again, welfare for the rich at the expense of the entire populace.	County of San Luis Obispo GSA	pasogcp.com	9/29/2019 2:55:00 PM	

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Name	Chapter & Section	Comment	GSA	Comment Source	Date/Time	Attachment(s)
Robin Chapman (continued)	Additional Comments	Section 9.5.2.4 Project 3 This project has not been discussed or approved by the landowner, and benefits only one grower. I reiterate: NWP water is completely allotted There are too few monitoring wells to initiate action or projects The burden of finance should be distributed among only the beneficiaries of any such action or project Section 9.5.2.4.3 There are only three (3) monitoring wells that would trigger an expensive project that would benefit only a few individuals. Who owns wells 25S/12E-16K05, 25S/12E-26L01, and 25S/13E-08L02? Why should they be important enough to trigger a publicly funded project? Again, there is no unallocated NWP water. Sections 9.5.2.5; 9.5.2.6.3; 9.5.2.7; 9.5.2.7.3 Refer to previous comments beginning with Section 9.1 Section 9.6.2 improving should be changed to improve. Section 9.6.3 Export of water or water credits should be allowed only to contiguous or near-contiguous sites. Figure 10-1 What is JPA? Section 10.2 In paragraph 2, ¦. implementation ¦ between the four ¦ should read among the four.	County of San Luis Obispo GSA	pasogcp.com	9/29/2019 2:55:00 PM	
Robin Chapman (continued)	Additional Comments	Summation 1) Initial groundwater pumping limitations should fall on properties on which the irrigated crops were planted on previously non-irrigated land. 2) There are too few monitoring wells throughout the Subbasin to be representative of groundwater levels in any given area. 3) De minimus wells that are negatively affected by nearby extraction for the purpose of irrigating previously dry-farmed or never farmed land should have those negative effects mitigated by the causative extractors. 4) There needs to be a minimum of ten wells per area for the purposes of monitoring groundwater levels, extraction limits, and the initiation of projects. If necessary, change the criteria for inclusion in the monitoring program. Projects that benefit only a few growers should not be at the expense of the entire Subbasin	County of San Luis Obispo GSA	pasogcp.com	9/29/2019 2:55:00 PM	
Randy Record	Additional Comments	Good morning, My family and I have owned a wine grape vineyard in San Miguel since 2007. I have been actively involved in attempting to address the groundwater overdraft in the region. I am very concerned with the proposed Groundwater Sustainability Plan (GSP), particularly with the exclusion of irrigated agriculture. It is imperative that the Estrella-El Pomar-Creston Water District (EPA WD) be allowed to provide meaningful input and a voting position within the GSP. It is inconceivable that irrigated ag will be required to curtail groundwater pumping without the opportunity to provide input in the process and decision making. Thank you for your consideration and action.	County of San Luis Obispo GSA	pasogcp.com	9/28/2019 11:07:00 AM	
Patricia Wilmore	Additional Comments	The comments below are submitted on behalf of the Paso Robles Wine Country Alliance (PRWCA). *Please note: Although our offices are in the City of Paso Robles, our comments are made primarily on behalf of our members in the County of San Luis Obispo's Groundwater Sustainability Agency (GSA). Our organization is a 501 c 6 non-profit trade association of some 500 members representing winery, grower, hospitality and related businesses in Paso Robles Wine Country. Many of these members conduct business, growing grapes, making wine and/or providing hospitality, over the Paso Robles Groundwater Basin. While we have provided comments along the way as the draft chapters have been made available, we would like now to provide general comments about the process and its outcome. These comments include some concerns that we hope will be addressed as soon as possible within the first five year implementation period. Looking Back: 1. The irrigated agricultural community, most of whom are our members and who are the largest users over the basin, were not given an opportunity for focused stakeholder input. At the initial Information Meeting, 4/23/18, our Government Affairs Coordinator, Patricia Wilmore, requested that this be addressed. In a subsequent Cooperative Committee Meeting, 7/25/18, the request was made again. The Chair suggested this should be discussed; however, the County's GSA representative dismissed the idea out of hand. No specific outreach to the Ag community, the primary users, was done thereafter despite requests. 2. The document lacks specifics about how decisions will be made in the future. It's not clear how and when the GSP implementation process will begin and who will run it. It has been suggested that the task will fall to County Public Works staff. Do they have sufficient bandwidth to do so?	County of San Luis Obispo GSA	pasogcp.com	9/28/2019 10:39:00 AM	

Public Comments received through 9/29/2019
to be considered while compiling the Draft GSP for the Paso Basin

Name	Chapter & Section	Comment	GSA	Comment Source	Date/Time	Attachment(s)
		[illegible] will run it. It has been suggested that the task will fall to County Public Works staff. Do they have sufficient bandwidth to do so? 3. This lack of detail results in a high level of uncertainty for business planning purposes for our members and others. 4. Best Management Practices (BMPs) are mentioned with few specifics BMPs can be very effective in reducing groundwater pumping. Our stakeholders were (and are) willing provide details on this but were not consulted. 5. We continue to be concerned about the rewrite of Chapter 9, Projects and Management Actions. This section says little about meaningful projects that could be pursued and does not emphasize project-development work that is already taking place. It does not state how the GSAs will promote viable development projects moving forward. Looking Ahead: 1. Provide for the active involvement of the Agricultural Community in the implementation of the GSP. 2. Explain how the GSAs will pursue the construction of water projects that can generate significant and usable water. 3. Clearly define the process by which groundwater pumping allocations will be determined. In conclusion, we appreciate the work that has gone into the GSP thus far and acknowledge the challenges that lie ahead. Our members are willing to be an active part of this process and hope for meaningful inclusion as we move forward.				
Laurie Gage	Additional Comments	TO: The Paso Basin Cooperative Committee RE: Comments to be considered for the final draft of the PBCC As a landowner in the Paso Robles Groundwater Basin and having been involved with water issues in the Basin since 2013, I have been following the development of the SGMA-directed Groundwater Sustainability Plan with interest and some concerns. My Groundwater Sustainability Agency is the San Luis Obispo County Flood Control District and I have been disappointed by the degree to which my GSA has not developed a serious outreach program to all overliers to engage them in serious conversation about the Plan. Apart from some very sparsely noticed and attended early meetings, there has been no visible effort on the part of the County to let the people they represent in the process know about what is going on. I speak with many people on a daily basis who have NO idea that there is anything happening in the Basin at all, let alone be concerned about and have the opportunity to provide input. The County has put the Paso Basin Cooperative Committee meetings up as the resource for landowners to engage in the process, and that is well and good, as long as a landowner even knows about the Plan and the PBCC to begin with. But due to the lack of outreach by the GSA, many sit in ignorance yet will feel the effects of the Plan for years to come. Additionally, the Plan to date is fairly vague not in the concepts of sustainability, but in the details on how achieving sustainability will take place. The implementation of the Plan is the proverbial can getting kicked down the road, and the responsibility will fall to a consortium of the GSAs. If my GSAs actions, or lack thereof, to date are any example, then I fear that there will be more can kicking with no effort to obtain supplemental water through recycled and Nacimiento water, aquifer recharge or other projects. The only solution then that I expect to be offered by my GSA is that of cutbacks across the board and while I am not an irrigator, I fear what impacts across-the-board cutbacks may have on not just the agricultural irrigators, but all the collateral industries and services that intertwine with the agricultural industry: fuel providers, equipment operators, ag employment services, mechanics and so on, filtering on down to the impacts on the businesses and services that support those impacted in the first tier. Currently, the only GSA with an agricultural voice represents only a portion of the agricultural use in the Basin, yet irrigated agriculture accounts for something close to 90% of the pumping in the Basin. I would like to see a voice for irrigated agriculture included in the implementation group as an equal participant with the existing four GSA members. Without that input, irrigated agriculture may not have the opportunity to help formulate consistent policies and approaches to reaching sustainability that allow for reasonable constraints which then allow for business planning and protect the complex economic structure that currently benefits all in the Basin, while working towards the protection sustainability offers us all. I feel that my GSA has not fully represented my interests in developing the current Plan due to their lack of serious intent to reach ALL the landowners they represent and gather them in for their input. Our Basin is a complex combination of irrigated agriculture, dryland farming, ranching, and residential interests, and a few active and loud voices have steered our GSAs approach to the Plan and have had no compensating voice of the rest of the people in our GSAs area because our GSA has made a very scanty effort to include us all. Thank you. Laurie Gage	County of San Luis Obispo GSA	pasogcp.com	9/27/2019 3:30:00 PM	

Public Comments received through 9/29/2019
to be considered while compiling the Draft GSP for the Paso Basin

Name	Chapter & Section	Comment	GSA	Comment Source	Date/Time	Attachment(s)
Debra Dommen	Additional Comments	First, Id like to thank the San Luis Obispo Board of Supervisors for their efforts in drafting the Groundwater Sustainability Plan (GSP). We farm over 1,000 acres of vineyard in San Luis Obispo County and take our responsibility for water conservation seriously. Over the past year we have tracked a 15.8% improvement in water efficiency, and this is just one year. We acknowledge and support that it is the responsibility of all groundwater users in the basin to work together to eliminate the overdraft of water and establish long term sustainability. To that end, the GSP absolutely must involve the agricultural community in the implementation of the plan. This has not been accomplished to date. We recognize that groundwater pumping allocations will come, however it is imperative that the process by which these allocations are determined be clearly outlined in the GSP. As above, it is important that there be a meaningful dialog with the agricultural community and that we have input into the process of determining those allocations. It is essential that the GSP provide an effective monitoring and enforcement program. The draft GSP states that non-dinimis must use a water measuring method satisfactory to the GSAs but does not comment on enforcement. Metering need to be required to ensure accurate monitoring and violations must be enforced. Thank you for taking our comments into consideration and we look forward to being part of the dialog.	County of San Luis Obispo GSA	pasogcp.com	9/27/2019 15:30	
Joe Plummer	Additional Comments	I am concerned that the aquifer, itself, may be mis-represented by the well data and aquifer levels developed from same. For a number of years, I have asked that my irrigation well data from my well (drilled in 2006) be included in the model. County have regularly measured water levels since 2012 have seen very little decline in water table, even though this well sets in the area shown by model in the "-40 to -60 ft decline" zone.	County of San Luis Obispo GSA	pasogcp.com	9/25/2019 2:10:00 PM	

Appendix N

Public Comments
Attachments

All comments received through the PasoGCP.com site were automatically recorded with the time and date of the comment as well as the name of the commenter and, if applicable based on the physical address provided, their GSA. The comments were forwarded to the GSAs and the commenter was notified that their comment had been received. The GSAs reviewed each comment received and incorporated the comment into the text as the GSA felt appropriate. Comments received by mail or other means were considered and incorporated in the same manner. The final GSP reflects the responses to comments incorporated by all four GSAs.

Gregory T. Grewal
[redacted]

[redacted] Residence
Cellular

HAND DELIVERED

May 14, 2018

Mr. John Hamon, Chairperson, Paso Basin Cooperative Committee

Mr. Derek Williams, President, Hydro Metrics

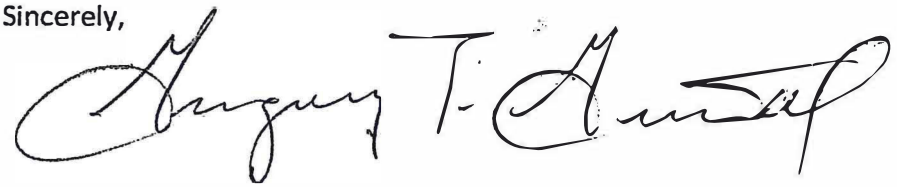
Gentlemen:

I have found the last few meetings of the Paso Basin Cooperative Committee interesting and informative. Likewise the two public workshops have been informative. However, a common occurrence at all meetings has been that very few of the important questions or issues brought forward during public comment are answered or actually addressed by staff or consultants. I believe the lack of thoughtful responses undermines the trustworthiness of the process.

I am also of the opinion that the credibility of the GSP development process would be strengthened if Hydro Metrics staff would quickly endeavor to obtain copies of all of the studies and reports relating to the Paso Robles Groundwater basin completed or sanctioned by the County of San Luis Obispo or the City of Paso Robles since January 2000. Part of this document accumulation should include the Paso Robles Groundwater Basin Agreement of November 8, 2005, commonly known as the PRIOR Agreement.

Since 2013 I have been a member of the Paso Basin Committee and more recently of the Water Resources Advisory Committee (WRAC) representing rural residents. I have also attended many meetings or programs sponsored by the DWR. Accordingly, I am familiar with most of the documents I am encouraging you to compile. A review of these documents will shine light on the history of Paso Basin inter-agency water politics, which produced both successes and failures over the last many years.

Sincerely,



To: Donald Morris; [redacted]
Subject: RE: Comments for the Groundwater Basin Workshop

From: Donald Morris [redacted]
Sent: Monday, May 21, 2018 10:14 AM
To: [redacted]
Subject: Comments for the Groundwater Basin Workshop

Fellow owners in the Basin.

I'm disappointed that I haven't been able to attend the workshops and am not up on what has been decided/discussed. I would like to give an input on my experience and perceptions.
My well water table cycled nearly 20 feet every year but returned until the late 90's when it started progressively getting deeper, in concert with the large plantings of grapes. My Well was drilled in the late 40's and irrigated about 40 acres of alfalfa, but that was a hobby, not a business and was discontinued.
When we joined to form a water district, I was disappointed as to the approach for water usage, which appeared to me to be that the current large users would get a reduced portion and low level users would be forever locked out. Obviously, the investment in the property deserves consideration, but all our deeds have the same rights and I believe, after a transition, that all should be left on some semblance of the same rights, not a pure confiscation of deed rights. My general outline of a "fair and legal" process would be.

1: Determine the long term acceptable draw on the aquifer(I suspect that it is 1/2 or less of current usage)
2: Set a transition period to reduce the usage to #1 draws based on total acreage owned (5 years?)
3: Concurrent with #2 and possibly extending beyond #2 time period, transition from current users having full access to the decreasing draw to a system where each owner has acreage access to their portion and may use, save, or sell/lease their allotment to a pool of users or individually to a user.

This would acknowledge the different levels of investments, but transition to a system that leaves each deeded owner of water rights equal standing based on acreage. Those that choose to not irrigate, could still have land value by leasing their rights to users and the users could maintain some fraction of their plantings. The district should also be inventive to secure/create additional capture and creation of additional sources and sell based on cost. Without #3, the process is a pure confiscation of property rights by a quasi-government agency to the benefit of others without compensation and is a selective destruction of property values. Fairness requires a transition and equal rights at the end.

Donald H Morris

Creston Advisory Body

Chairperson: Sheila Lyons [redacted]

July 18, 2018

San Luis Obsipo County Supervisor John Peschong jpeschong@co.slo.ca.us
San Luis Obispo County Supervisor Debbie Arnold darnold@co.slo.ca.us
Chairperson the Paso Basin Cooperative Committee, John Hamon JHamon@prcity.com

Dear Distinquished Representatives,

The Creston Advisory Body (CAB) represents the landowners of approximately 40,000 acres in District #5, the majority of which live over the Paso Robles Groundwater Basin (Basin), including many who chose not to join the Estrella/El Pomar/Creston Water District but fall well within the general land area that this district overlays. Consequently the management of the Basin is of great concern to those who live here and invariably we discuss "the water situation" at the majority of our monthly meetings. It is our understanding that the County serves as the GSA which represents us as Rural Residents as part of the Memorandum of Agreement (MOA) established to create a Groundwater Sustainability Plan (GSP) for the Basin. The County also represents thousands of other Rural Residents that do not live within the CAB Boundaries and do not have Community Advisory Councils who can take a stand and represent them in these matters. With these facts in evidence we wish to weigh in and express our views on how we believe the Basin should be managed to the benefit of all who live here. First and foremost, we believe that water is a "common resource" and this principle should be accepted as an undisputed fact.

We have summarized below the three top goals that have consistently been expressed during our meetings. We have also assembled the details behind each of these goals, along with additional concerns, in the attached document in order to communicate to you directly our rationale behind the goals recommended. Is is our hope that you will use these goals, along with our concerns and recommendations, as an important resource as you move forward making the momentous water management decisions that will impact our communities at large.

The three top goals for Basin management as recommended by CAB:

1. Declare the non-commercial Rural Residents over the Basin di minimis users exempting them from monitoring and fees for water management and future supplemental projects.
2. Insist upon aggressive conservation efforts by the majority of the Basin's largest pumpers, including irrigated agriculture (Ag) and the City of Paso Robles, thereby minimizing the overall number of shallower well failures across the Basin. Those that can have the greatest impact need to be particularly conscientious and step up to make the most difference.
3. Use County authority to re-examine existing ordinances and policies as a mechanism for developing regulations that equitably apply to ALL residents and businesses over the Basin and work towards achieving Basin sustainability.

Clearly, any fair and sustainable water management program cannot be accomplished in the absence of thorough and thoughtful consideration, and fair resolution, of citizen's concerns. We believe that our claim to the use of Basin water for domestic purposes is codified in Water Code Section 106 which provides as follows: "It is hereby declared to be the established policy of this State that the use of water for domestic purposes is the highest use of water and that the next highest use of water is for irrigation." It is of utmost importance to the Rural Residents of our community that the final management solutions decided upon by your committee take into account the impact they will have on the quality of our lives, in some cases, our very existence.

Thank you for your attention to our concerns.

Sincerely,

Sheila Lyons, CAB Chairperson

CC: Derrik Williams, President HyroMetrics Water Resources, Inc. derrik@hydrometricswri.com

Summary of Concerns and Recommendations

by Rural Residents-at-large over the PR Basin

July 2018

Three Top Goals:

1. Declare the non-commercial Rural Residents over the Basin de minimis users exempting them from monitoring and fees for water management and future supplemental projects.
2. Insist upon aggressive conservation efforts by the majority of the Basin's largest pumpers, including irrigated agriculture (Ag) and the City of Paso Robles, thereby minimizing the overall number of shallower well failures across the Basin. Those that can have the greatest impact need to be particularly conscientious and step up to the make the most difference.
3. Use County authority to re-examine existing ordinances and policies as a mechanism for developing regulations that equitably apply to ALL residents and businesses over the Basin and work towards achieving Basin sustainability.

Goal #1: Declare the non-commercial Rural Residents over the Basin de minimis users exempting them from monitoring and fees for water management and future supplemental projects.

- Rural Residential users should be entitled to at least a de minimis per residence allowance for water usage. They already pay property taxes for management by Flood Control and Water Conservation District The State defines a de minimis allowance below which the user should not be burdened with additional interference of their water usage.
- It should be noted that the average Rural Residential parcel has animals, vegetable gardens, fruit trees and landscaping in addition to the residence itself. Many residents rely upon their small plots as subsistence for their families. Rural Residents have been estimated in County commissioned studies to use between 0.5 and 3.0 AF/year [1], [2] depending on parcel size and the number of residences on the parcel. Whereas, irrigated Ag parcels, such as those with vineyards, typically use 1.0 AF/acre/yr, or more in many cases. County commissioned studies show that Rural Residential has been estimated to only use somewhere in the neighborhood of 13% of the perennial yield, a level that has held consistent over time. This clearly demonstrates that Rural Residential uses have not pushed us into the current water crisis.
- Charges for additional AF over and above de minimis allowances should be on a graduated scale with less unit price for the first AF over the allowance and increased costs as consumption increases. This would encourage conservation efforts by all.
- Non-commercial Rural Residents are the most vulnerable of all entities over the Basin. Historically Rural Residential wells have been much shallower and smaller bores (~100- 400 ft deep, bores of typically 5-6 inches) than Ag wells (several hundred to > 1000 ft deep, bores of a minimum 8 inches).

[1] Fugro West and Cleath and Associates. August 2002. Paso Robles Groundwater Basin Study (Phase I). Prepared for County of San Luis Obispo County Public Works Department.

[2] Fugro West, ETIC Engineers, and Cleath and Associates. February 2005. Paso Robles Groundwater Basin Study, Phase II, Numeri cal Model Development, Calibration, and Application. Prepared for County of San Luis Obispo County Public Works Department.

Many residential wells in Creston are as shallow as 100-200ft (reports from local residents). Some wells have already gone dry. There are several thousand Rural Residential wells over the Basin.

- We believe that our claim to the use of Basin water for domestic purposes is codified in California Water Code Section 106 which provides as follows: "It is hereby declared to be the established policy of this State that the use of water for domestic purposes is the highest use of water and that the next highest use of water is for irrigation." This principle has been upheld in the courts consistently. A local organization, North County Watch, brought this to the attention of The PR Groundwater Basin Blue Ribbon Committee back in 2013 (see the following attached letter).
- Rural Residents are all on septic systems and some 90% of the water they pump from the Basin goes right back into the Basin.
- The monitoring de minimis users would incur an excessive cost to the overall management program for the several thousand residential parcels whose uses are far smaller than irrigated Ag. Large water users should be the first to be monitored and charged for their usage.
- Rural Residents lack the significant financial resources in general (shallow pockets) to deal with the issue (no lobbyists, no public relations people, no board of director members who can attend endless meetings) versus the large Agri-businesses (deep pockets) with the incentive to pass costs on to other entities in order to increase their profits. Additional costs passed on to Rural Residents to solve a problem that irrigated agriculture has created would be an undue burden.
- The owners of vacant parcels should have the right to reasonable & beneficial use of their property, to build a residence if they so desire, even though they have no history of "prior use" water.
- An important consideration is the protection of property values of ALL residents who live over the Basin. In an effort to protect Rural Residential families' health and welfare, as well as property values, the definition of sustainability for Rural Residents must be to minimize the number of overall wells that will fail due to over-drafting and the consequent drop in the water table. Protection of the rights of Rural Residents to "reasonable and beneficial use" of water must be set as a priority equal to, or greater than, the priority set for protecting Agriculture.

Goal #2: Insist upon aggressive conservation efforts by the majority of the Basin's largest pumpers, including irrigated agriculture (Ag) and the City of Paso Robles, thereby minimizing the overall number of shallower well failures across the Basin. Those that can have the greatest impact need to be particularly conscientious and step up to the make the most difference.

- Irrigated agriculture has consistently and significantly increased in acreage over the Basin in the last 20 years. According to the Agricultural Commissioner's Crop Reports, the acreage in vineyards in the County, of which the majority is in the North County, has increased from around 5000 acres in 1999 to nearly 50,000 acres today.
- Irrigation water does not contribute significantly to the recharge of the Basin. It only accounts for 2% of the total recharge[3].
- The outdated concept of "prior use" as establishing, or justifying, a new future use must be reconsidered. Many agriculturalists have intentionally over irrigated in order to establish favorable usage numbers. Additionally, some have planted elaborate landscaping to enhance their properties. Prior usage numbers may have been inflated due to over irrigation in anticipation of future restrictions. Irrigated Ag pumps well over 80% of the perennial yield from the Basin annually,

[3] Hydrologic Budget Summary of the PR Groundwater Basin from Phase I Report Fugro and Cleath 2002.

as estimated in 2005[4], and planting has continued since then. In contrast, many rural residents, who have pumped much less water, but fearing that their wells would go dry, have implemented unilateral cut backs in their water usage, and in many cases let their landscaping die.

- Reasonable and fair controls and limits must be instituted on new permits for large commercial and agricultural developments. There is no reason why so many such projects (new wineries and other commercial developments, etc.), many with extensive landscaping plans, are allowed to proceed, when they are so openly damaging to the welfare and interests of other non-commercial landowners whose numbers so clearly are the majority. Additionally, this type of growth is contradictory to the goal of achieving Basin sustainability.
- A high percentage of the new irrigated acreage within the Basin **is** owned by corporations whose investors do not live here, and who are looking at short-term bottom line profits rather than long-term Basin sustainability. Up until recently some of these corporations have touted their water resources as marketable assets on their websites.
- Water "off sets" should be retired completely, given that the overall goals are Basin sustainability and future growth. Most certainly, offsets from water rich areas of the Basin should not be used over other parts of the Basin, particularly in areas with more severe issues.
- If crop duty factors are used for setting allowance (these would be preferential to prior usage) then the crop factors used need to be realistic, not the inflated values used to set up the Shandon San Juan Water District.
- There should be no "vested rights," beyond a fixed de minimis value, based on prior water usage. There should be no selling of "excess water" when conservation measures are implemented. There is no "excess water." Water is a "common interest" resource and the "excess" should remain in the Basin to prevent further well failures. Fox Canyon Groundwater Management Agency is a well-known example where farmers were allowed to sell off "excess water" much to the detriment of improving water resources for the district's customers.
- Restriction on using overhead sprinklers should be considered. For example: No watering mid-day (between noon and 6 pm) or when it is raining.
- Management of the Basin's groundwater should be paid for pro rata based on usage by the large water users. It was suggested that there should be a County ordinance calling for a proportional fee structure based on specific measurable factors, such as the size of the pump, the number of irrigated acres, and the number of Acre Feet of water pumped.
- The issue of why Paso Robles continues to pump so much groundwater contributing to the problem in Estrella needs to be addressed. Why is additional development getting approved prior to the completion of purification plants that would provide new water supplies? The City of Paso Robles has been behind the curve in constructing water treatment facilities to accommodate their full contractual rights to Lake Nacimiento water causing excessive dependence on groundwater.
- As stated in the PR Groundwater Basin Study, Phase II in 2005, "Because future agricultural trends are so problematic to forecast, slight mis-forecasts in agricultural demand predictions could have large implications relative to changes in groundwater storage and water levels. It is clear a relatively slight adjustment in "build-out" agricultural pumping could make the difference between potential basin overdraft or non-overdraft conditions.[5]"

[4] PR Groundwater Basin Study, Phase II, Fugro, Etic Engineering, and Cleath, 2005

[5] PR Groundwater Basin Study, Phase II, Fugro, Etic Engineering and Cleath, 2005

- "Current (2006) agricultural and commercial pumping have reached or exceeded the amounts estimated as build-out in the Phase II Report Model Scenario 2 while municipal and rural pumping are well below the build-out predictions. " "Given that agriculture accounts for two-thirds of pumping, regular updating of agricultural pumping (land use, cropping, and irrigation rate data) is essential to management of groundwater resources for long-term sustainability[6]."
- It is clear now, in 2018, that the attempt in 2011 to draft and follow voluntary BMO's (Basin Management Objectives) was unsuccessful in stopping the downward trend in water levels in the Basin. Although Rural Residents unilaterally adopted conservation measures in hopes of staving off the continuation of residential well failures, irrigated Ag acreage continued to grow and consume water from the Basin at accelerated rates. As a result, Rural Residential wells have continued to fail.
- Trying to calculate the number of years that we can continue the growth of irrigated Ag, with annual overdrafts, and still not pump the Basin dry is foolhardy. The consequential impact to the longevity of the Basin is unpredictable at best and unreasonable at the very least.

Goal #3: **Use County authority to re-examine existing ordinances and policies as a mechanism for developing regulations that equitably apply to ALL residents and businesses over the Basin and work towards achieving Basin sustainability.**

- Land use zoning needs to be reviewed and potentially revised to assist with water management.
- Why does the County continue to allow planting of more vineyards? Why are Ag ponds allowed at all? Wind machines are more effective and should be used for frost protection, not water. Should we allow ponds to be filled with groundwater? Restrictions on planting must be implemented. Drought tolerant rootstocks and improved irrigation practices need to be conditions required for any future vineyard planting, or replanting, to occur. The County should implement an allocation program, similar to the one that exists for allowing the construction of new residences, that limits the number of acres of irrigated crops that can be planted each year. Establish a fixed number of acres for irrigated crops, that can be planted, or a fixed number of AF that can be pumped, over the Basin, a number that would ensure Basin sustainability. Hold fast to that limit unless significant recharge of the Basin has occurred.
- A review of the County's Agricultural Element, and the provisions in Right to Farm Ordinance (Title 5, Chapter 5.16) of 2002, and how they are contradictory to the mandate by the State to establish Basin sustainability needs to occur. Agriculture is of great importance to San Luis Obispo County but the degree of deferential treatment should be commensurate and complementary to other equally important goals and mandates that the County is committed to achieving. Once again, the rights of Rural Residents to reasonable and beneficial use of water must be given equal priority.
- Permit applications for the drilling of new wells need to be scrutinized thoroughly before issuance, including an evaluation of the harm that could be done to neighboring properties. Deep wells in particular need to be assessed before permits are granted to avoid a future harmful event such as the Cotta well incident that recently occurred in Creston which cross-contaminated water strata. Deeply drilled wells risk cross contamination of multiple strata of our aquifer(s), can't be replenished in a timely manner and can therefore cause permanent damage.

Additional Comments and Recommendations that do not immediately fall within the above three goals, but would assist in achieving these goals:

[6] Evaluation of Paso Robles Groundwater Basin Pumping, Water Year 2006; Todd Engineering, May 2009

- There should be no exporting of water from the Basin.
- The Creston area is located in the southern most portion of the Paso Robles Groundwater Basin. The Paso basin groundwater aquifers generally run north from Creston[7]. The significant pumping by the City of Paso Robles downstream from Creston, has accelerated aquifer flows out of Creston and is also a contributing factor in the decline of Creston groundwater levels. Creston is the "fountainhead" of a significant portion of the groundwater ultimately contained within the Paso basin. Therefore, pragmatically Creston groundwater deserves to receive specific safeguarding, the benefits of which would accrue ultimately to the entire basin.
- There should be no water banking projects considered. In 2008 a SLO County groundwater study identified the greater Shandon area as having the ideal characteristics for water banking activities.[8] In water banking not all acquisitions of water involve the receipt of wet water. The receipt of "paper water," which is an IOU for water delivery in the future, involves a risk that the water delivery may not be made when the water is needed. Water banking can also involve the transfer of water between water districts for delivery to a third party. A benefit to a water district holding water IOUs can be the manipulation of data on the actual water under their control thereby allowing greater water usage. Big money interests want to control water banking activities within the Paso basin, not unlike the Kern Water Bank. The coastal branch pipeline of the State Water Project traverses Shandon on its way south through SLO County and recently, a "Turnout Valve" was installed on that pipeline in Shandon. With only modest modification this valve could be used as part of a water banking operation. Recognize that water banking is not an acceptable activity to alleviate Paso basin issues. Rather it is a scheme for exceedingly large money interests to control and profit from water.
- Recharge efforts are acceptable but only if the water is left in the Basin for normal usage. It should not be withdrawn for other purposes.
- No transferring water from areas with minimal issues to problem areas (e.g. Creston to Estrella) should be allowed.
- Recognize that the state water project is over committed (by seven fold according to some news reports) and has under delivered by less than, or equal to, half of contracted water during the last few years. The state water project water is not a reliable or satisfactory approach to augmenting Paso basin water. It is unlikely that a new contract for state water project water can be negotiated currently.
- To ensure of full compliance to any regulation set forth, inspections need to be conducted on all monitored landowners to determine their degree of compliance. Where violations are found, serious consequences should be instituted and enforced. Large water users need to pay the majority of the enforcement costs, in particular when violations occur and follow-up is required to ensure compliance.
- When Rural Residential properties lose value due to water issues costing thousands to remedy how will those owners be compensated for the loss of value? Will the property taxes be lowered? Ag gets breaks that Rural Residents do not and current practices are clearly discriminatory. Ag gets

[7] Paso Robles Groundwater Sub-basin Water Banking Feasibility Study, 2002.

[8] Paso Robles Groundwater Sub-basin Water Banking Feasibility Study, 2002. Water banking is: any transaction involving water, wet water movement, water contracts, paper water, and the storage of actual water.

crop insurance for failed crops due to drought. Ag gets property tax breaks through the Williamson Act. Ag gets low interest loans for new wells and other infrastructure projects. Also, tax write-offs for losses and depreciation costs of equipment& fences. Rural residents get no such benefits. Some Rural Residents whose wells failed, and who could not afford to drill a new well ($20,000-$30,000), have had to purchase additional storage tanks and resort to water deliveries…all expenses they could ill afford. Programs to assist Rural Residents need to be implemented to offset the burden some are sure to bear when their wells go dry, especially if the final basin management plan exacerbates the problem and wells continue to fail (e.g. Low interest loans, compensation for losses, no permit fees to drill new wells, reduced property taxes (maybe reduce overall property value, or improvements being taxed, by the cost of the new well), loans (like those for special districts) paid back over time). Ideally fines to violators who over pump could also be used to compensate those whose wells have gone dry, for the cost of drilling a new well. Once again, Rural residents did not cause the problem and should not bear the burden of fixing it.

- It should be noted that there is a reason that the majority (some 78% of the voters overall on AB2453) rejected the idea that we should have a water district managed by a few wealthy landowners as board members. No one believed that these members would have the Rural Residents best interests at heart.
- Finally, and one of the most frequently expressed concerns, is that the final basin management solutions will be driven by big money interests at the expense of the majority of the landowners over the Basin. Rural Resident landowners lack the resources to be represented by lobbyists, or public relations agents, but rather must rely on the efforts of unpaid volunteer community advisory representatives trying to protect their interests.

What will determine success? Has sustainability been achieved?

Successful management of the Basin should have measurable outcomes.

1. Keep the number of Rural Residential wells that have failed due to the drop in the water table to less than 10% of the total.
2. Water tables across the Basin have recovered to their 2014 levels (or previous years) and remained there for 5 years or more.
3. The downward slope of the graph showing overall Basin decline has become measurably more positive. For example, if the current downward slope is 4 ft/yr drop, then a recovery to 2ft/yr or better would be showing a positive improvement.

The majority of landowners on wells within the Basin are in unincorporated areas and most are de minimis water users. The GSP will be developed with the participation of competing interests, some powerful and some with limited influence. Nevertheless, four principles must guide the process, namely; 1) water is a common resource; 2) the quantity of Paso basin water is ultimately finite; 3) damage to the basin has been done and needs to be reversed; 4) the GSP must provide for the equitable use of water by all parties with water rights.

North County Watch

Looking Out Today For Tomorrow

MEMO TO: Paso Robles Groundwater Basin Blue Ribbon Committee

FROM: Susan Harvey, President
North County Watch

DATE: May 17, 2013

RE: Water Code Section 106

North County Watch is a 501 c3 non-profit Public Benefit corporation. We are an all-volunteer organization committed to sustainable development in and around north San Luis Obispo County.

We would like to addresses issues around a discussion at the BRC meeting on May 16th, regarding the accuracy of our *a priori* statement regarding the superior rights of rural residential users. Thank you for raising the issue and this opportunity to elucidate our position.

Water Code Section 106

Water Code Section 106 provides "It is hereby declared to be the established policy of this State that the use of water for domestic purposes is the highest use of water and that the next highest use is for irrigation."

Court Support for Section 106

California courts have consistently supported the policy codified in Section 106. In *City of Beaumont v. Beaumont Irrigation District* (1965)[i], the court held that Section 106 is a policy that governs administrative agencies' water allocation decisions, stating that application of "section 106 of the Water Code...is binding upon every California agency," including irrigation districts which were parties to the case.

Meridian v. San Francisco (1939)[ii] stated "It should be the first concern of the court in any case pending before it and of the department in the exercise of its powers under the act to recognize and protect the interests of those who have prior and paramount right to the use the waters and streams. The highest use in accordance with the law is for domestic purposes, and next highest use is for irrigation."

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The California Supreme Court in *National Audubon Society v. Superior Court* (1983)[iii] stated "[a]lthough the primary function of [Water Code Sections 106 and 106.5], particularly section 106, is to establish priorities between competing appropriators, these enactments also declare principles of California water policy applicable to any allocation of water resources."

Central & West Water Basin Replenishment District v. So. California Water Co. (2003)[iv] held that court-supervised mass adjudications of water rights are subject to and governed by Section 106, and it therefore rejected a proposal for water banking by some of the adjudicated parties because the proposal did not comply with the policy in Section 106 of prioritizing domestic use.

California Common Law Supports Section 106

California Common Law codifies the longstanding principle that in allocating California's limited water supplies in time and places of scarcity, water needs for domestic purposes must take priority over water needs for commercial profit, including agriculture.

> *Alta Land & Water Co. v. Hancock* (1890)[v] "the rights...to the use of water for the supply of the natural wants of man and beast" must take precedence over "the rights...to use the water for purposes of irrigation."
>
> *Smith v. Carter* (1897)[vi] "both parties [to the water rights dispute] were entitled to have their natural wants supplied, that is, to use so much of water as was necessary for strictly domestic purposes and to furnish drink for man and beast, before any could be used for irrigation purposes" and that "[a]fter their natural wants were supplied each party was entitled to reasonable use of the remaining water for irrigation".
>
> *Drake v. Tucker* (1919)[vii] the trial court "properly decided that it would be an unreasonable use of the water under all the facts and circumstances for the plaintiff to use it for irrigation before the domestic uses of the defendant had been satisfied."
>
> *Cowell v. Armstrong* (1930)[viii] "Natural uses are those arising out of the necessities of life...such as household use, drinking, [and] watering domestic animals...[and] unquestionably the term 'domestic purposes' would extend to culinary purposes and the purposes of cleaning, washing, the feeding and supplying of an ordinary quantity of cattle, and so on."
>
> *Prather v. Hoberg* (1944)[ix] "Without question the authorities approve the use of water for domestic purposes as first entitled to preference. That use includes consumption for the sustenance of human beings, for household conveniences, and for the care for livestock."
>
> *Deetz v. Carter* (1965)[x] "[p]riority conferred on domestic users by Water Code section 106 is a statutory extension of a traditional preference accorded to 'natural' over 'artificial' uses."

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Reasonable and Beneficial

In "The Reasonable Use Doctrine and Agricultural Water Use Efficiency: A Report to the State Water Resources Control Board and the Delta Stewardship Council" authored by Delta Watermaster Craig M. Wilson, Mr. Wilson lays the foundation for the "reasonable use" doctrine based on the California Constitution Section Article 10 Sec. 2, California Statutes Water Code §§100, 275, 1059, 1051, 1825, 10608, 10801, 85023, and several court cases.

Mr. Wilson, comments that the Reasonable Use Doctrine has been broadly implemented: "The State Water Board and the courts have used the doctrine to find unreasonable water uses in a variety of settings: ...7) The storage and diversion of water that jeopardize compliance with water quality standards, the public trust, and other in situ beneficial uses; 8) Excessive use of groundwater by overlying landowners in an overdrafted basin."

Rights of the Rural Residential Overliers to the Basin

Our purpose for raising the issue is to inform the committee of the primary right of domestic user and to reinforce the importance of the standing of the rural residential user. The court cases arose out of adjudicative situations and while some members of the committee and others might argue that enforcement of Section 106 is only the purview of the courts, that is, strictly speaking, that all overliers have equal rights, it is in the best interest of the rural residential overliers to make it clear that the courts have repeatedly recognized the superior right of water uses for residential purposes over irrigated agriculture.

The question in point during the meeting and clarified by Chair Werner was "What issues do we want to see addressed in the investigation of basin management districts?" It is our position that the rights of rural residential users must be secured within the structure of any management district before the district is formed. Thus far, we have not seen discussion or attention given to these rights that are codified in Section 106. We have been attending committee meetings for over 6 months, and it is not an exaggeration to say that focus has been primarily the needs of irrigated agriculture.

California Water District Not Equitable to Rural Residential Overliers

We are even more concerned about the rights of the rural residential overlier when there appears to be a well orchestrated push to form a California Water District. Water Code Section 35003[xi] [Water Code§§ 34000-35003 codify a California Water District] states that voting rights are based on one vote for each dollar of assessed valuation. North County Watch continues to raise the issue of the rights of the rural residential user because we have not heard anything that would give comfort to the thousands of rural residential users as to how their rights and concerns might be addressed in a California Water District.

Conclusion

North County Watch appreciates that this discussion of management districts is nascent and we fully support the efforts to establish a management structure. We clearly stated this position in

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our letter of March 18, 2013 on the failure of the county to manage the basin. We would be remiss if we waited until a district is formed to see if it protects the rights of rural residential users. We all have the goal of avoiding adjudication. Thus, the time to remind the committee and others of the priority rights of the rural residential user, per Section 106, is now, so that we get some acknowledgement and protection of those rights. Furthermore, North County Watch believes that domestic use includes a level of reasonable use commensurate with social and cultural norms of our community.

CC: Mr. Paavo Ogren, Director of Public Works
Ms. Courtney Howard, P.E.,Water Resources Engineer
SLO County Board of Supervisors

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[i] *City of Beaumont v. Beaumont Irrigation District* (1965), 63 Cal.2d 291, 381, 46 Cal.Rptr. 465, 469

[ii] *Meridian v. San Francisco* (1939), 13 Cal.2d424, 450, 90 P.2d 537, 550

[iii] *National Audubon Society v. Superior Court* (1983), 33 Cal3d 419, 448, n.30, 189 Cal.Rptr. 346,366 n.30

[iv] *Central & West Water Basin Replenishment District v. So. California Water Co.* (2003), 109 Cal.App.4th 891, 912-13, 135 Cal.Rptr.2d 486

[v] *Alta Land & Water Co. v. Hancock* (1890), 85 Cal.219, 230

[vi] *Smith v. Carter* (1897), 116 Cal. 587, 592

[vii] *Drake v. Tucker* (1919), 43 Cal.App 53, 58

[viii] *Cowell v. Armstrong* (1930), 210 Cal. 218, 225

[ix] *Prather v. Hoberg* (1944), 24 Cal.2d 549, 5562, 150 P.2d 405, 412

[x] *Deetz v. Carter* (1965), 232,Cal.App2d 851, 854-55, 43 Cal.Rptr. 321, 323

[xi] 35003. Each voter shall have one vote for each dollar's worth of land to which he or she holds title. The last equalized assessment book of the district is conclusive evidence of ownership and of the value of the land so owned except that in the event that an assessment for a district shall not have been made and levied for the year in which the election is held, the last assessment roll of each affected county shall be used in lieu of the assessment book of the district as evidence of ownership. However, the board may determine by resolution that the assessment book or assessment roll of each affected county shall be corrected to reflect, in the case of transfers of land, those persons who as of the 45th day prior to the election appear as owners on the records of the county. If an equalized assessment book of the district does not exist, then each voter shall be entitled to cast one vote for each acre owned by the voter within the district, provided that if the voter owns less than one acre then the voter shall be entitled to one vote and any fraction shall be rounded to the nearest full acre.

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From: William Enholm
Sent: Wednesday, July 25, 2018 12:17 PM
To: John Peschong <jpeschong@co.slo.ca.us>; Debbie Arnold <darnold@co.slo.ca.us>; JHamon_prcity.com <JHamon@prcity.com>
Cc:
Subject: Re: CAB letter and attachment to Paso Basin Cooperative Committee

Distinguished Representatives,

I make my living financing vineyards and wineries. I love to see Paso regaining its "mojo" and growing. I also live in rural Creston and share the concerns so eloquently expressed in the CAB letter. Please help balance the water concerns of so many. I support the priorities as expressed by the CAB, in their letter dated 7/18/18.

Sincerely,

Bill Enholm

Sent from my iPhone

On Jul 25, 2018, at 10:32 AM,

Important water info

Begin forwarded message:

From: Sheila Lyons
Date: July 25, 2018 at 9:30:15 AM PDT
Subject: CAB letter and attachment to Paso Basin Cooperative Committee

Please find attached the letter from CAB to the Paso Basin Cooperative Committee and the attachment with the supporting information collected from the public and CAB members at meetings over the years.

The Paso Basin Cooperative Committee is responsible for generating the Groundwater Sustainability Plan (GSP) for the management of the Paso Groundwater Basin. This GSP is required by the State of CA to address the Paso Basin's decline. This committee is made up of five entities whose votes on the committee are weighted. As rural residents over the Paso Basin we are represented by the County through Supervisor John Peschong on this committee, with Supervisor Debbie Arnold as his alternate.

Paso Basin Cooperative Committee: 61% San Luis Obispo County, 15% City of Paso Robles, 20% Shandon/San Juan Water District, 3% San Miguel, 1% Heritage Ranch.

Sheila Lyons
CAB Chairperson

<CAB Cover Letter to Paso Basin CC.pdf>

<CAB Summary Goals July 2018 Paso Basin CC.pdf>

In review of the draft, sustainability plan one aspect of the plan that I found of interest was Chapter 3.4 Land Use.

Table 3-1 listed the land use categories, 10 in total, ranging from Citrus, deciduous fruits and nuts, Vineyard, Urban, Grain, Pasture etc.

The table listed the number of acres as of 2014 that were planted in the Paso Robles Basin. What was missing was the amount of water typically applied to these categories on a yearly basis.

In order to be able to manage water usage, a reliable means of determining how much water the basin is using needs to be determined. Since the draft did not include this data, I utilized the average acre-feet per year from Table 9 that was published in the Agricultural Water Offset Program of 2014.

Based on Table 3-1 in the Draft and Table 9, the total that I was able to estimate was just under 100,000 acre feet per year for the basin. No water allowance was given for idle or native vegetation. My urban estimate methodology is flawed in that it is based in acres and not residential units. Having said that, at .75 per acre the urban allowance was 16,649ac ft., so hopefully it is in the ballpark.

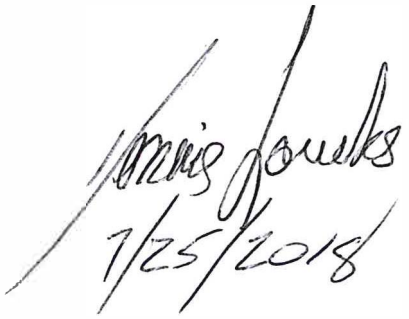
My estimate is that the 438,000 acres in the basin utilizes approx. 100,000 acre-feet per year.

It is vitally important that the methodology in estimating water use totals be well scrutinized. A case in point is when you examine the Engineer's report for the EPC Water District (2016), their methodology estimated that their water use for 41,000 acres would be 59,000 acre feet per year. Their estimates did not breakout the various land use categories as listed in Table 3-1, they just averaged all water use factors for seven Ag uses and came up with 3.5 acre feet per Irrigated acre in their district. This resulted in a grossly inflated figure.

So, as you can see Methodology is very important, 100,000 acre–feet for 438,000 acres verses 59,000 acre-feet for 41,000 acres.

My suggestion is the following:

1. Compare 2014 Land Use Summary to a current Land Use Summary, acres planted as well as estimated water use.
2. Add Cattle operations to Land Use Summary
3. Urban category needs more itemization; residential, industrial, hotel.



3.4 LAND USE

Land use planning authority in the Subbasin is the responsibility of the County of San Luis Obispo and the City of Paso Robles. Land use information for the Subbasin was collected Department of Water Resources, the County of San Luis Obispo's Agricultural Commissioner Offices and from other County departments. Current land use in the Subbasin is shown on Figure 3-4 and is summarized by group in Table 3-1. All land use categories except native vegetation listed on Table 3-1 are the land use categories provided by DWR (2014). The balance of the approximately 438,000 acres in the GSP Plan Area is largely native vegetation and could include dry farmed land.

Table 3-1: Land Use Summary

Land Use Category	Acres
Citrus and subtropical	304
Deciduous fruits and nuts	2,339
Grain and hay crops	266
Idle	10,096
Pasture	3,254
Truck nursery and berry crops	955
Urban	22,199
Vineyard	32,076
Young perennial	71
Native vegetation	366,440
Total	**438,000**

Source: DWR, 2014

2.3 699.-
3.5 3,186-
4.5 1,197
Ø
4.8 15,619
2.5 2,387
.75 16,049
1.7 54,529
1.9 134
Ø
99,400 ac ft/year total

1) 2 LAND USE - 438,000 / 99,400 Ac ft
What is it now four years later?
2) EPC 41,000 Ac - 59,360 a-ft-

3. Possible Sources of Offset Credits

Credits for the Ag Water Offset Program, within the PRGWB, may come from a combination of sources. As technology, information, practices, and irrigation efficiencies evolve and improve, other forms and sources of credits may become available to offset new water use in the PRGWB. Below is a list of potential sources of credits available from current documented practices.

- Fallowing of irrigated land resulting in less pumping;
- Crop conversion(s) to less water intensive crops as designated by the adopted program water use charts (e.g. alfalfa to olives, irrigated pasture to dryland range, water intense deciduous crops to less intensive deciduous, grain or vegetable crops, etc).

3.1 Water available from crop conversion

Calculating the amount of water that is made available by switching from a specific crop to one requiring less water can be done by using the annual crop-specific applied water calculated for each Crop Group within each WPA (SLO 2012). However, as noted above, the methodology used to derive the listed numbers is a standardized accepted approach. This information for the Salinas/Estrella WPA, using the medium value, is shown in Table 9.

Table 9. Existing Crop-Specific Applied Water by Crop Group

Crop Group	Applied Water (AF/Ac/Yr)
Alfalfa	4.5
Citrus	2.3
Deciduous	3.5
Strawberries	2.3[1]
Nursery	2.5
Pasture	4.8
Small Grain	1.2[1]
Vegetables	1.9
Vineyard	1.7

1. Information obtained from Current Cost and Return Studies, UCCE, UC Davis (Small grains 2013 data, Strawberries 2011 data), see section "Strawberries" and "Small Grains" in this report to understand how these crop requirement numbers were derived using the methodology of the Master Water Report

being directly represented in the SGMA process as non-irrigated lands do have overlying groundwater rights and, in the future may rely on groundwater to a greater degree than now. Also as outlined above in addressing the rotation of parcels, or portions of parcels, in and out of irrigation, a database will be maintained to modify assessments accordingly. So even though there may be irrigation facilities (pipes etc.) available to a parcel or portion of the parcel, if no irrigation is applied, then that acreage will be treated as non-irrigated.

Residential

Residential development depends upon a potable, adequate water supply for household needs and therefore will receive an assessment. The PRGWB studies provided research to estimate the average water usage for rural homesteads.[3] However, because the District is focused on the agricultural operations/properties, it is not foreseen that the District will have the capability to serve small lot rural subdivisions

Commercial Operations

Commercial operations depend upon a potable supply for workers and customers alike, similar to residential uses associated with agricultural operations. However, the water usage for these land uses will need to be determined on a case by case basis. For initial funding purposes, commercial uses are proposed to be assessed as if they were a residential use.

4.2 Water Use Factors

The following provides a discussion on the water use factors identified for each assessment class.

Irrigated Agriculture

The Estrella, El Pomar, Creston Water District is home to hundreds of acres of farmed land with a variety of crops. The water use for these crops varies and thus an average water use has been determined for Irrigated Agriculture. The water use for the crops that are typically farmed in the District are as follows:

Land Use Category	Ave. Water Use Factor (AF/acre/yr)	
Alfalfa	4.5	4.8
Citrus	2.3	2.3
Deciduous	3.5	4.1
Nursery	2.5	2.4
Irrigated Pasture	4.8	5.0
Vegetables	1.9	3.9
Vineyards	1.7	1.8
Total	21.2	24.3
Average	3.03	3.5

*Source: applied water factors, SLO County, Paso Robles Groundwater Basin Model Update, 2014, Table 10[4]

The water usage of 1.0 AFY will be utilized as one benefit unit for the purposes of establishing an assessment spread.

Non-Irrigated Agriculture

[3] Ibid, PRGWB Model Update, December 19, 2014
[4] Ibid, PRGWG Model Update, December 19, 2014, Table 10

Depending on the terrain and carrying capacity of the land, non-irrigated agriculture can be dry farmed for hay, other non-irrigated crops, and for grazing. These uses are minimal and are best evaluated as a cattle grazing operation. These operations typically utilize between 0.03 and 0.003 AFY/ac and therefore are minimal users. However, the project proponents have provided an estimate of local non-irrigated water usage as a percentage of irrigated usage; ie. 1.69% of Irrigated Agriculture Usage. This results in 0.06 AFY/ac (1.69% x 3.5 AFY/ac = 0.06 AFY/ac) for a benefit unit to calculate an assessment to be applied to non-irrigated agriculture.

Residential

Residences nominally use 0.29 AFY indoor and 0.46 AFY outdoor for a total of 0.75 AFY per residence in rural hot areas of the county[5]. Therefore, it is assumed that a rural residence is equivalent to: (0.75 AFY/3.5AFY) or 21.4% of water usage for an acre of irrigated crop.

Commercial Operations

Commercial Operation uses will be evaluated as a resident if a small operation on a small lot. Larger commercial users will need to be evaluated on a case by case basis.

4.3 Voluntary Funding

The District will be formed on a voluntary basis. **All the voluntary members of the District will be asked to agree to a maximum funding assessment not to exceed $35.00/acre for irrigated agriculture. Non-irrigated agriculture parcels will be assessed at 1.69% of irrigated agriculture's cost, or $0.59/acre. Each residence or commercial operation will be assessed at $7.50 (maximum) for each unit (0.75AFY/3.5AFY = 21.4% of an irrigated acre assessment = 21.4% x $35 = $7.50).** However, as a basic minimum cost, **all ownerships**, whether made up of one parcel or many parcels will have a minimum assessment of **up to $50 per ownership**, depending on the overall administrative costs to service the GSA. These rates are within the same order of magnitude of the data developed above and are proportional to the special benefit received by each category of parcel based on water usage per parcel. It is noted that one parcel may be assessed for all three classes.

4.4 Benefit Units

A benefit unit is a method of calculating a property's proportional share of the assessment costs. **One benefit unit (BU) is equivalent to the use of 1.0 Acre-foot of water/year.** Table 2 identifies the total number of benefit units assigned to each Assessment Class utilizing the target acreages in each category petitioning at this time. These acreages will vary until District formation is approved.

Table 2-Assessment Class and Total Benefit Units

Assessment Class	Total Acreage or Units (estimated)		Water Use Factor AFY	Benefit Units (rounded)
Irrigated Agriculture	16,500	Acres	3.50	57,750
Non-irrigated Agriculture	24,300	Acres	0.06	1,460
Residential and Commercial Operations	200	Each	0.75	150
Total Benefit Units	41,000			**59,360**

[5] Ibid, PRGWB Model Update, December 19, 2014, Table 13 Rural Residential Water Demand, SLO County,

From: Carol Rowland [redacted]
Sent: Thursday, July 26, 2018 11:01 AM
To: John Peschong <jpeschong@co.slo.ca.us>; Debbie Arnold <darnold@co.slo.ca.us>; jJHamon@prcity.com
Cc: [redacted]
Subject: RE CAB letter of 7/18/18 to Paso Basin Cooperative Committee

Dear Distinguished Representatives of the Paso Basin Cooperative Committee,

I am writing to express my support for the CAB letter and the CAB Summary Goals of July 2018 included at the end of my letter.

I have read the attached CAB letter and the attachment carefully and am in total agreement with everything contained in them.

I have spoken and written to the County BOS on many occasions on this subject and will summarize briefly what my position has been.

We are an older retired couple living in the Creston area since 1975, not far from the Cotta Well property Every year for the last few years we have been afraid our well will go dry.

We have given up our vegetable gardens, our lawn, and have lost or pulled out many landscaping plants and areas. We have replaced some plants in limited areas with drought resistant plants. We are careful with our water use, taking fewer baths and showers, wearing clothes longer before washing, flushing toilets less frequently, etc.

We are living on a fixed income and cannot afford to drill a new well. We are still paying off a mortgage.

In May of 2013 when we started noticing our well was recovering very slowly every day, water delivery was a fixed amount and you had to pay for a full delivery regardless of how much you could accept. We installed another water storage tank so we could accept all the water we paid for if we had to have it delivered because our well had failed.

Our only asset is our property. We are concerned that our property value will drop as the water disappears. How can we sell our property at a reasonable price without a working well and as property values are devalued as a result of lack of water?

Thank you for considering the concerns of one of many thousands of rural residents depending on the Paso Robles Groundwater Basis for water.

Thank you for considering our concerns,

Carol and Harold Rowland

[redacted]

From: Tommy & Kathy Carter [redacted]
Sent: Thursday, July 26, 2018 9:04 PM
To: Debbie Arnold <darnold@co.slo.ca.us>
Subject: Re: paso basin cooperative committee

Dear Supervisor Arnold,

Thank you for standing with all the little people in this water conflict.

Tommy and Kathy Carter

On Thu, Jul 26, 2018 at 11:28 AM, Debbie Arnold <darnold@co.slo.ca.us> wrote:

> Thank you for sharing your comments.
>
> Sincerely,
>
> **Debbie Arnold**
>
> **Supervisor, District 5**
>
> (p) 805-781-4339
>
> (f) 805-781-1350
>
> darnold@co.slo.ca.us
>
> **COUNTY OF SAN LUIS OBISPO**
>
> **BOARD OF SUPERVISORS**
>
> www.slocounty.ca.gov
>
> Follow us on Facebook

From: Tommy & Kathy Carter [mailto [redacted]
Sent: Wednesday, July 25, 2018 7:55 PM
To: Debbie Arnold <darnold@co.slo.ca.us>
Subject: paso basin cooperative committee

We are fully in agreement with the goals of the Creston Advisory Body, and the explanations of these goals.

Tommy and Kathy Carter

[redacted]

The Nature Conservancy

CALIFORNIA WATER | **GROUNDWATER**

To: GSAs

We write to provide a starting point for addressing environmental beneficial users of surface water, as required under the Sustainable Groundwater Management Act (SGMA).

SGMA seeks to achieve sustainability, which is defined as the absence of several undesirable results, including "depletions of interconnected surface water that have significant and unreasonable adverse impacts on beneficial users of surface water" (Water Code §10721).

The Nature Conservancy (TNC) is a science-based, nonprofit organization with a mission *to conserve the lands and waters on which all life depends*. Like humans, plants and animals often rely on groundwater for survival, which is why TNC helped develop, and is now helping to implement, SGMA. Earlier this year, we launched the Groundwater Resource Hub, which is an online resource intended to help make it easier and cheaper to address environmental requirements under SGMA.

As a first step in addressing when depletions might have an adverse impact, The Nature Conservancy recommends identifying the beneficial users of surface water, which include environmental users. This is a critical step, as it is impossible to define "significant and unreasonable adverse impacts" without knowing *what* is being impacted. To make this easy, we are providing this letter and the accompanying documents as the best available science on the freshwater species within the boundary of your groundwater sustainability agency (GSA). Our hope is that this information will help the GSA better evaluate the impacts of groundwater management on environmental beneficial users of surface water.

To help the GSA take this first step, we are providing the following references:

- **Freshwater Species List**. The excel file named for the GSA is a spreadsheet that includes a list of freshwater species found within the GSA's jurisdiction. The list includes fish, amphibians, reptiles, birds, plants, macroinvertebrates and mammals, and provides both the scientific (column C) and common (column D) names for each.

  The freshwater species list includes the conservation status for each species, indicating whether federal (column E) and/or state (column F) endangered species laws may apply to management of the species. The list also includes the sources of the data. Historical observations (pre-1980) and observations of extirpated species were excluded from the analysis.

To produce the freshwater species list, we used ArcGIS to select features within the California Freshwater Species Database version 2.0.9 within the GSA's boundary. This database contains information on ~4,000 vertebrates, macroinvertebrates and vascular plants that depend on fresh water for at least one stage of their life cycle. The spatial database contains locality observations and/or distribution information from ~400 data sources. The database is housed in the California Department of Fish and Wildlife's BIOS as well as on The Nature Conservancy's science website.

- **Field/Column definitions**. This table provides a definition for the column headings in the excel freshwater species list. The title of this file is "Field_Descriptions.xls".

- **Data Sources**. This document describes the data sources for each species in freshwater species list. The document, titled "Freshwater_Species_Data_Sources.xls", provides the name of each source, citation and a link to the data source, if available.

- **PLoSONE Publication**. As evidence that the California Freshwater Species Database is the best available science, we are attaching a peer-reviewed publication, which was the basis of the California Freshwater Species Database. The paper, which is attached as "FW_Paper_PLoSONE", appeared in PLoSONE, an online scientific journal. This paper describes the methods used to compile the freshwater species database, and patterns of species richness (the density and diversity of species), endemism (species found only in a particular region) and vulnerability of freshwater species in California. Also attached is the supplemental material published in PLoSONE (FW_Paper_PLOSONE_S1, FW_Paper_PLOSONE_S2, FW_Paper_PLOSONE_S3, and FW_Paper_PLOSONE_S4).

As next steps, we suggest three actions. First, please share these materials with your consultants and stakeholders, and use them as a starting point to identify environmental beneficial users of surface water. Second, contact staff at the Department of Fish and Wildlife (DFW), United States Fish and Wildlife Service (USFWS) and/or National Marine Fisheries Services (NMFS) to obtain their input on the groundwater and surface water needs of the organisms on the GSA's freshwater species list. Third, please visit the Groundwater Resource Hub at the end of the year, when we will be releasing a Freshwater Species Guidebook, which is under development by a collaboration of agencies and nonprofits, including TNC, CDFW, USFWS and NMFS. The Guidebook will provide a summary of information on each individual freshwater species, which should be useful in determining surface water needs and the habitat conditions needed to sustain these important resources.

Given all that must be accomplished to meet SGMA deadlines, The Nature Conservancy is working hard to provide resources to make addressing environmental beneficial users of groundwater and surface water as simple and inexpensive as possible. With this freshwater species list tailored to the GSA, as well as the Indicators of Groundwater Dependent Ecosystems Database (also known by the Department of Water Resources as the Natural Communities Dataset), we hope to make the first, critical step in managing groundwater resources, which includes identifying environmental users, an easy SGMA requirement to satisfy.

If you have any questions about these materials, please contact me or Jeanette Howard, [redacted]

Sincerely,

Sandi Matsumoto
Associate Director
California Water Program
[redacted]

PLOS ONE

RESEARCH ARTICLE

Patterns of Freshwater Species Richness, Endemism, and Vulnerability in California

Jeanette K. Howard[1☯]*, Kirk R. Klausmeyer[1☯], Kurt A. Fesenmyer[2☯], Joseph Furnish[3], Thomas Gardali[4], Ted Grantham[5], Jacob V. E. Katz[5], Sarah Kupferberg[6], Patrick McIntyre[7], Peter B. Moyle[5], Peter R. Ode[8], Ryan Peek[5], Rebecca M. Quiñones[5], Andrew C. Rehn[7], Nick Santos[5], Steve Schoenig[7], Larry Serpa[1], Jackson D. Shedd[1], Joe Slusark[7], Joshua H. Viers[9], Amber Wright[10], Scott A. Morrison[1]

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OPEN ACCESS

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Data Availability Statement: All data are available from The Nature Conservancy website: scienceforconservation.org. The data used in the study are third-party data. The data sources and third-party contacts are provided in S3 Table. We received permissions from all data providers to publicly use and release the data.

Funding: We thank The Nature Conservancy for supporting development of this database and this research, with additional support from the U. S. Bureau of Land Management. With the exception of the authors, the funders had no role in study design,

Abstract

The ranges and abundances of species that depend on freshwater habitats are declining worldwide. Efforts to counteract those trends are often hampered by a lack of information about species distribution and conservation status and are often strongly biased toward a few well-studied groups. We identified the 3,906 vascular plants, macroinvertebrates, and vertebrates native to California, USA, that depend on fresh water for at least one stage of their life history. We evaluated the conservation status for these taxa using existing government and non-governmental organization assessments (e.g., endangered species act, NatureServe), created a spatial database of locality observations or distribution information from ~400 data sources, and mapped patterns of richness, endemism, and vulnerability. Although nearly half of all taxa with conservation status (n = 1,939) are vulnerable to extinction, only 114 (6%) of those vulnerable taxa have a legal mandate for protection in the form of formal inclusion on a state or federal endangered species list. Endemic taxa are at greater risk than non-endemics, with 90% of the 927 endemic taxa vulnerable to extinction. Records with spatial data were available for a total of 2,276 species (61%). The patterns of species richness differ depending on the taxonomic group analyzed, but are similar across taxonomic level. No particular taxonomic group represents an umbrella for all species, but hotspots of high richness for listed species cover 40% of the hotspots for all other species and 58% of the hotspots for vulnerable freshwater species. By mapping freshwater species hotspots we show locations that represent the top priority for conservation action in the state. This study identifies opportunities to fill gaps in the evaluation of conservation status for freshwater taxa in California, to address the lack of occurrence information for nearly

data collection and analysis, decision to publish, or preparation of the manuscript.

Competing Interests: The authors have declared that no competing interests exist.

40% of freshwater taxa and nearly 40% of watersheds in the state, and to implement adequate protections for freshwater taxa where they are currently lacking.

Introduction

Freshwater habitats cover less than 1% of the earth's surface (about the size of the European Union) but support roughly 125,000 described species, or 10% of the described species on the planet [1]. Species dependent on freshwater habitats are in decline globally [2, 3]; between 10,000 and 20,000 freshwater species are thought to be extinct or imperiled by human activities [1, 3], with freshwater species at higher risk of extinction than their terrestrial counterparts [4]. In North America, extinction rates for freshwater species are four to five times greater than those for terrestrial species [5–7], and increasing human population and climate change are predicted to exacerbate extinctions in the future [7–10]. Estimates of known extinctions however, are likely gross underestimates because most groups of freshwater organisms are understudied [11]. The insular and fragmented nature of freshwater habitats, which often results in high levels of endemism, makes freshwater populations highly vulnerable to extirpation [1].

Although great strides are being made in the methods to adapt conservation planning principals and conservation strategies to the particularities of freshwater systems [12–13], conservation action is hampered by a lack of basic information about the definition and location of these species. The first stage of systematic conservation planning is compiling information about the location of threatened and rare species in a region [14], but for freshwater species, this information tends to be lacking, dispersed, or focused on limited taxonomic groups even in data rich areas.

Because data is lacking, conservation groups often focus on focal species or taxonomic groups that have better distribution data. Recent studies have attempted to systematically address broad-scale patterns of freshwater species distribution, and spatial congruence among taxonomic groups [4, 15]. These studies show that congruence between taxonomic groups at global and continental scales are low, suggesting that focusing on a single species or taxonomic group may not benefit all freshwater species[4, 15].

California (USA) encompasses an exceptionally diverse array of freshwater ecosystem types, from rivers flowing through temperate rainforests to desert springs where ancient aquifers come to the surface [16]. In addition, demands on California's freshwater resources to meet human needs are intensifying as its population grows, and climate change further strains an already over-allocated water supply system [17–18]. Water allocations are currently five times the state's mean annual runoff and, in many of the state's major river basins, rights to divert water lay claim to up to 1,000% of natural surface water supplies [19].

Recent studies have highlighted dramatic declines of California native fishes with 80% either extinct or threatened with extinction within 100 years [10, 20]. Yet, the composition, distribution, and status of the broader suite of freshwater taxa in the state are not well understood. To address this need, we assembled the first comprehensive database of spatial observations for freshwater vascular plants, macroinvertebrates, and vertebrates in California. Here, we use this new and now publicly available database [21] to evaluate the patterns of freshwater species richness, endemism, and vulnerability, identify hotspots of freshwater richness, and to evaluate the spatial congruence of species richness across taxonomic groups.

Fig 1. Study area. The extent of the study area in California and the major hydrologic regions it contains. Inset shows the location of California in North America. Shaded relief is from "The National Map" by the U.S. Geological Survey.

doi:10.1371/journal.pone.0130710.g001

Materials and Methods

Study Area

The spatial unit of analysis for this assessment was the smallest-size watershed (12-digit hydrologic unit code, or HUC12, watershed) available in the nested national dataset compiled by the US Department of Agriculture Natural Resource Conservation Service [22]. Our study area included those watersheds (n = 4,450) within the administrative boundary of the state of California, totaling 410,515 km^2 (Fig 1). For reporting results, we nested the HUC12 watersheds within 10 major hydrologic management regions defined by California's Department of Water Resources corresponding to the state's major drainage basins [23] (Fig 1)(S1 Table).

Taxa List

The taxonomic units of analysis for this assessment were drawn from an initial list of species and sub-species known to utilize freshwater habitats within California from NatureServe (http://natureserve.org) (n = 1,903)[24]. Because NatureServe collects and manages information for only a subset of species throughout the U.S., Canada, Latin America, and the Caribbean we assessed regional and specific taxonomic reviews and checklists to identify missing taxa (S2 Table). For example, we relied on the PISCES for all fish data because the software and database is comprehensive and quality-controlled [25–26].

Comprehensive taxonomic reviews are not available in California for non-vascular plants, such as benthic algae and mosses, planktonic microcrustacea, segmented worms, and water

mites; consequently, these groups are excluded from our effort. The authors, selected for their taxonomic expertise in the state, compiled and reviewed lists of freshwater dependent species and subspecies that occur within California (S1 Table). The experts removed redundancies due to changes in taxonomy or nomenclature, and assembled a definitive list of freshwater taxa (S3 Table). Our final database augmented the freshwater taxa included in the NatureServe list by 105% (n = 2,003), for a total of 3,906 taxa (S3 Table). Species, subspecies, Evolutionary Significant Units, and Distinct Population Segments are hereafter referred to as "taxa" for convenience.

Criteria for categorizing taxa as "freshwater dependent" varied by taxonomic group (S1 File). For example, freshwater fishes were defined as those that spawn in freshwater habitats. Herpetofauna, were included if: 1) they rely on fresh water to complete one or more life stage (e.g., all anurans and many caudates); or, 2) forage within fresh water as obligates (e.g., western pond turtle, *Actinemys marmorata marmorata*) or non-obligates (e.g., western terrestrial garter snake, *Thamnophis elegans elegans*) at some stage of development; or, 3) they would not persist without freshwater microhabitats (e.g., Inyo mountain salamander, *Batrachoseps campi*); or, 4) they are found within splash zones of freshwater springs and creeks (e.g., Dunn's salamander, *Plethodon dunni*). Plant species were included if: 1) they occur exclusively in fresh water and have special adaptations for living submerged in water, or at the water's surface; or, 2) occur primarily in freshwater wetland habitats but are not strictly aquatic; or, 3) require freshwater inundation to complete their life-cycle, such as plants occurring in long-inundated portions of vernal pools (e.g., *Orcuttia californica*); or, 4) were identified in the Jepson Manual of Vascular Plants of California [27] as associated with wetland habitats such as marshes, lakes, vernal pools, fens, springs, and bogs, and dependent on wetland habitat; or, 5) were included as wetland obligates or as facultative wetland plants in the U.S. Army Corps of Engineers list of wetland plant species [28]. See S1 File for criteria used for birds, mammals, vascular plants and invertebrates. We limited our list to taxa native to California.

Taxa were classified as endemic if they are known to be restricted to California based on available data sources (S2 Table).

Conservation Status

We evaluated the conservation status for all taxa on our final list (S3 Table) by reviewing the scientific literature, NatureServe, state and federal Endangered Species Act lists, management agency designations, and taxonomic group reviews (S1 Table). We attempted to be as complete as possible, and use available conservation status sources for the taxonomic groups considered in this study. Table 1 provides sources and criteria for classifying taxon as listed, vulnerable or apparently secure. Note that taxa were not classified as "apparently secure" if they fell under any criteria listed under "vulnerable" in Table 1.

Spatial Data and Summaries

We collected spatial data related to the occurrence or distribution of the freshwater taxa included on our final list (S3 Table), and assembled a geographic database using Esri ArcGIS version 10.1 software. Due to taxonomic changes and differences among data sources, we were not always able to attribute spatial records at the subspecies level. As a result, all spatial data summaries and analyses are conducted at the species level. Data were collected from a variety of sources (S2 Table). The subsequent database includes available spatial data for each taxon categorized by observation type (Table 2), data format (i.e. point, line, and polygon), origin (i.e. native range vs. translocation), conservation status, and habitat usage (e.g. seasonal or migratory use).

Table 1. Sources and criteria used to rank taxa.

Source	Criteria for "listed ranking"	Criteria for "Vulnerable" ranking	Criteria for "Apparently Secure" ranking
ESA federal or state lists [29–30]	• Endangered OR	• Under Review in the Candidate or Petition Process OR	
	• Threatened	• Proposed Threatened OR	
		• Species of Special Concern OR	
		• Candidate OR	
		• Bird of Conservation Concern OR	
		• Special Concern OR	
		• Special	
NatureServe [24]		Ranked at either the global (G) or state (S) scales as:	Ranked at either the global (G) or state (S) scales as:
		• Vulnerable (NatureServe ranking of 3) OR	• Apparently Secure (NatureServe ranking of 4) OR
		• Imperiled (NatureServe ranking of 2) OR Critically imperiled (NatureServe ranking of 1)	• Secure" (NatureServe ranking of 5
Status assessment of California's native inland fishes [20]		• EN (endangered) OR	• NT (near-threatened) OR
		• VU (vulnerable)(following IUCN definitions)	• LC (least concern)
Conservation Status of Freshwater Gastropods of Canada and the United States [31]		• Endangered OR	Currently Stable (CS)
		• Threatened OR	
		• Vulnerable	
California Native Plant Society – Rare Plant Inventory [32]		• 1A (Plants Presumed Extirpated in California and Either Rare or Extinct Elsewhere) OR	
		• 1B (Plants Rare, Threatened, or Endangered in California and Elsewhere) OR	
		• 2A (Plants Presumed Extirpated in California, But Common Elsewhere) OR	
		• 2B (Plants Rare, Threatened, or Endangered in California, But More Common Elsewhere	
Amphibian and Reptile Species of Special Concern (ARSSC) [33]		Appears on list	
California Department of Fish and Wildlife (CDFW) Species of Special Concern [34]		Appears on list	
USFWS Species of Concern [35]		Appears on list	
USFWS Birds of Conservation Concern [36]		Appears on list	
US Forest Service National Threatened, Endangered and Sensitive Species (TES) Program [37]		Appears on list	
US Bureau of Land Management Special Status Species [38]		Appears on list	

A taxon was classified as listed, vulnerable or apparently secure if one of the criteria conditions were met. For example, if a taxon is classified as endangered on the federal ESA list, we designated the taxon as "listed" in our database. Alternatively, if a taxon was classified as EN (endangered) in Moyle et al. 2011, we classified the taxon as "vulnerable" in our database.

doi:10.1371/journal.pone.0130710.t001

While this effort represents the most comprehensive compilation of freshwater species occurrence in the state, we acknowledge that data quality may vary among sources. With the exception of PISCES, which has been expert reviewed for data quality, other data sources have

Table 2. Classifications used to group spatial data records in the California Freshwater Species Database.

Spatial Data Classification Groups
Current observations (post-1980)
Observation with undefined date
Historical observation (pre-1980)
Extirpated
Modeled habitat/ generalized observation
Expert Opinion
Management area designations*
Range
Historical range
Unknown

* e.g., Critical Habitat designation by the U.S. Fish and Wildlife Service

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not undergone such review, and therefore may not accurately represent species ranges. For example, most invertebrate data come from bioassessment monitoring efforts which are known to under sample certain habitats such as non-perennial streams, large rivers, springs, high altitude streams, and wet meadows.

To examine and compare patterns of freshwater species richness, endemism, and vulnerability, we summed and mapped unique species by HUC12 watershed, and calculated the percentage of species that are endemic, vulnerable, and listed in each watershed. We also mapped richness by eight taxonomic groups (fish, herpteofauna, mollusks, birds, crustaceans, plants, mammals, insects and other invertebrates) by summing the number of species in each taxonomic group within the HUC12s. We identified hotspots as the top 5% richest watersheds [39].

We recognize that spatial data for freshwater species is often lacking, so we tested how each taxonomic group serves as a proxy for the full suite of freshwater species. First we calculated the pairwise Pearson's correlation coefficient of species richness counts in HUC12 watersheds by taxonomic group to evaluate the relationship between taxonomic groups. Next, we calculated the Pearson's correlation coefficient for each taxonomic group compared to all other freshwater species not in that taxonomic group. For example, we calculated the correlation coefficient for fish richness compared to all other freshwater species (excluding fish) by HUC12 watershed. In addition, we calculated the correlation of all listed species in each HUC12 compared to all other non-listed species.

We also tested whether geographical patterns of richness in one group act as a surrogate for those in other groups by comparing the overlap of hotspots for one group with corresponding hotspots for other groups [39]. Finally, we compared the hotspots for each group with vulnerable freshwater species to test how well each group acts as a surrogate for vulnerable freshwater biodiversity in most need of conservation action.

Results

Richness, Endemism, and Vulnerability

We identified 3,906 freshwater taxa in California (S3 Table) which included 336 subspecies, evolutionary significant units, or distinct population segments. Insects, arachnids,

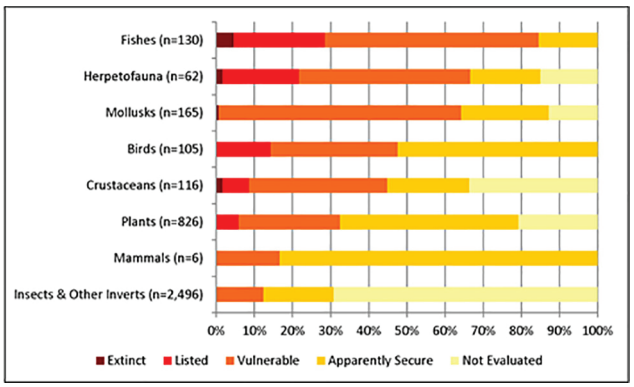

Fig 2. Taxonomic grouping and conservation status of freshwater taxa native to California. Percentage of freshwater species by taxonomic groups that are considered vulnerable (at risk of extinction) in California watersheds, "Insects and other invertebrates" includes the classes Arachnida, Branchiopoda, Insecta and Polychaeta.

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branchiopods, and polychaetes (referred to henceforth as "insects and other invertebrates") comprise over two-thirds (63%) of the freshwater taxa in the study, with 2,496 taxa (Fig 2). The next largest group is vascular plants (n = 826), followed by mollusks (n = 165), fish (n = 130), crustaceans (n = 116) birds (n = 105), herpetofauna (n = 62), and mammals (n = 6) (Table 3). Eleven freshwater taxa that were once found in the study area are now considered extinct, including one plant (*Potentilla multijuga*), two crustaceans (*Pacifastacus nigrescens* and *Syncaris pasadenae*), one mollusk (*Planorbella traski*), one frog (*Rana lithobates] yavapaiensis*), and six fishes (*Cyprinodon nevadensis calidae*, *Siphatales bicolor ssp. 11*, *Gila crassicauda*, *Pogonichthys ciscoides*, *Ptychocheilus lucius*, and *Salvelinus confluentus*). An additional 14 species considered possibly extinct include eight insects (*Farula davisi*, *Hygrotus artus*, *Mesocapnia bakeri*, *Paraleptophlebia californica*, *Paraleptophlebia clara*, *Paraleptophlebia rufivenosa*, *Parapsyche extensa*, *Rhyacophila amabilis*), two amphibians (*Rana pretiosa*, and *Incilius alvarius*), one mollusk (*Valvata virens*), two plants (*Plagiobothrys glaber* and *Potentilla uliginosa*), and one turtle (*Kinosternon sonoriense*).

To date, conservation status has been assessed for only 50% (N = 1,939) of the state's freshwater taxa (Table 3). Moreover, the conservation status of some taxonomic groups is

Table 3. Number of taxa included in each taxonomic group along with the number and percentage of species by conservation status.

Group	All	Extinct	Listed	Vulnerable (but not listed)	Apparently Secure	Not Evaluated
Insects and Other Inverts*	2,496	0	0	309 (12%)	460 (18%)	1,727 (70%)
Plants[1]	826	1 (0%)	47 (5%)	220 (27%)	387 (47%)	171 (21%)
Mollusks	165	1 (0.5%)	0	105 (63.5%)	38 (23%)	21 (13%)
Fishes	130	6 (5%)	31 (24%)	73 (56%)	20 (15%)	0
Crustaceans	116	2 (2%)	8 (7%)	42 (36%)	25 (21%)	39 (34%)
Birds	105	0	15 (14%)	35 (34%)	55 (52%)	0
Herpetofauna	62	1 (2%)	12 (19%)	29 (46%)	11 (18%)	9 (15%)
Mammals	6	0	0	1 (17%)	5 (83%)	0
Total	3,906	11 (0.3%)	113 (3%)	814 (21%)	1,001 (26%)	1,967 (50%)

* Includes Arachnida, Branchiopoda, Insecta and Polychaeta.

[1]All California plants are evaluated for rarity. Due to the lack of a 'secure' category in the CNPS ranking system, common taxa may not appear to have been evaluated.

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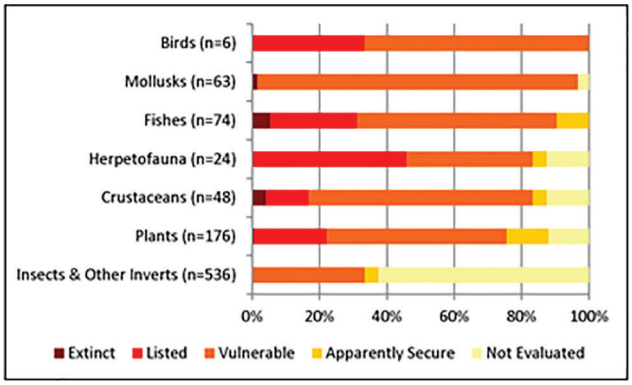

Fig 3. Taxonomic grouping and conservation rank of freshwater taxa endemic to study area. Percentage of freshwater endemic species by taxonomic groups that are considered vulnerable (at risk of extinction) in California watersheds. "Insects and other invertebrates" includes the classes Arachnida, Branchiopoda, Insecta and Polychaeta.

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disproportionally understudied. For example, the conservation status of all fish and bird taxa have been evaluated, but only 31% (n = 769) of insects and other invertebrates (Table 3). Of the freshwater taxa evaluated, 51.5% are considered secure (n = 1,001), 48% are ranked as vulnerable (n = 927), and 0.5% (n = 11) are now considered extinct. Although nearly half of the freshwater taxa were classified as vulnerable, only 113 (6%) are listed as endangered or threatened under the federal or state ESA.

Some taxonomic groups contain considerably more vulnerable taxa than others (Fig 2). For example, 104 of the 130 (80%) fishes, 66% of herpetofauna (n = 41) and 64% (n = 105) of mollusks are considered vulnerable. On the other hand, 83% of the mammals, 52% of the birds, and 47% of the plants are considered secure. However, as noted above, the comprehensiveness of data varies by taxonomic group such that the true level of imperilment could be much greater for taxonomic groups such as insects, other invertebrates and crustaceans where the majority of known taxa have not been evaluated for conservation state (Fig 2 and Table 3).

Nearly a quarter of the 3,906 native freshwater taxa found in California are endemic (n = 927), including 536 insects and other non-molluscan invertebrates, 176 plants, 74 fishes, 63 mollusks, 48 crustaceans, 24 herpetofauna, and 6 birds (Fig 3). Of the 560 endemic taxa that were evaluated for conservation status, nearly 90% (n = 498) are considered vulnerable (Fig 3). All 6 endemic birds are considered vulnerable, as are 98% of the endemic mollusk taxa. In addition, 85% of endemic fishes are considered vulnerable (Fig 3). Eight endemic taxa are considered extinct including four fishes (*Cyprinodon nevadensis calidae*, *Siphatales bicolor ssp. 11*, *Gila crassicauda*, and *Pogonichthys ciscoides*), two crustaceans (*Pacifastacus nigrescens* and *Syncaris pasadenae)*, one plant (*Potentilla multijuga*) and one mollusk (*Planorbella traski*). Only 76 (14%) of vulnerable endemic taxa are formally listed on state or federal endangered species lists.

Spatial Data and Summaries

To map spatial patterns of freshwater diversity in the state, we compiled spatial data from 408 different sources (S2 Table) and assembled a database with over 9,000 polygon, 23,000 line, and 3,484,000 point records. As noted in the above Methods, we compiled spatial data only at the species level. Therefore, although our final species list contains information on 3,906 taxa, we compiled spatial data for the 3,727 species in the database. It should be noted that although

there are 336 subspecies, ESUs, or DPSs in the database, 179 species are comprised of at least two subspecies.

We obtained spatial data (see Table 2 for data types) for 2,276 (61%) of the 3,727 total freshwater species, including 588 (68%) of the 862 endemic species, 752 (90%) of the 838 vulnerable species, and all 94 species listed under state or federal Endangered Species Acts [29–30]. We were unable to find any spatially explicit data for 1,451 (39%) of the species.

Hydrologic regions with the greatest species richness include portions of the San Francisco Bay (average species richness by HUC12 = 111 species), South Coast (average species richness by HUC12 = 91) and Sacramento River (average species richness by HUC12 = 74) (Fig 4A). The average richness of vulnerable taxa per HUC12 by hydrologic regions was greatest in the San Francisco Bay (n = 31), South Coast and San Joaquin (n = 22), Sacramento (n = 21), and North Coast (n = 19). However, the regions with the highest percentage of vulnerable species per HUC12 are the South Lahontan, Tulare Lake, South Coast, Colorado, and Central Coast regions (Fig 4B). Listed species are found across the study area with at least one being as either currently or historically found in watersheds that cover 76% of the state (Fig 4C). However, in contrast to vulnerable species (Fig 4B), the proportion of listed species per HUC12 watershed is relatively low (Fig 4C).

The average richness of endemic taxa per HUC12 by hydrologic regions was greatest in the San Francisco Bay (n = 19), San Joaquin (n = 15), South Coast (n = 14), Sacramento (n = 12), and the Central Coast (n = 11) (Fig 5A). Regions with hydrological connections outside of California–North Coast, North and South Lahontan, and Colorado River–have a lower percentage of California endemic species (n = 7, 5, 3, 4 on average, respectively). More than half of the study area (61%) is comprised of HUC12 watersheds in which over 60% of the endemic species found in those watersheds are considered vulnerable (Fig 5B). As with all native freshwater species, the proportion of endemic species that are listed under state or federal ESA lists is considerably less than the proportion of those considered vulnerable in most HUC12 watersheds (Fig 5C).

Spatial patterns of richness vary by taxonomic group and appear to correspond with distribution of freshwater habitat (Fig 6). For example, fish richness is highest in major rivers in the state including the Sacramento and Klamath river watersheds located in the Sacramento and North Coast hydrologic regions (Fig 6A)(S1 Table). Herpetofauna richness is highest in

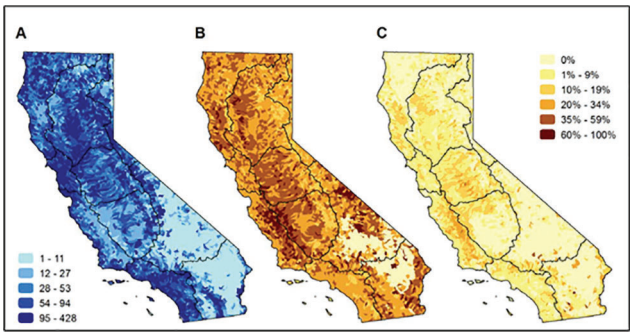

Fig 4. Patterns of richness and vulnerability of freshwater species native to California watersheds. Maps of (A) the number of native freshwater species in each HUC12 watershed (includes current, historic, range and modeled data). The range of species richness is shown in quintiles, therefore the darkest blue is the top 20% of species richness, the lightest blue the lowest 20%.; (B) percentage of species in each HUC12 watershed that are ranked as vulnerable; and (C) percentage of species in each HUC12 watershed that are listed as endangered or threatened under state or federal ESA lists. Maps in panels B and C share the legend on the right of the figure. The black lines on the maps represent the major hydrologic regions in the study area.

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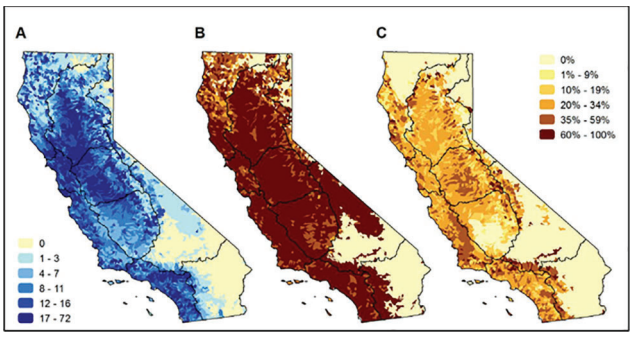

Fig 5. Patterns of richness and vulnerability of freshwater species endemic to California, watersheds. Maps of (A) the number of endemic freshwater species in each HUC12 watershed (includes current, historic, range and modeled data). The range of endemic species richness is shown in quintiles, therefore the darkest blue is the top 20% of species richness, the lightest blue the lowest 20%.; (; (B) percentage of endemic species considered vulnerable in each HUC12 watershed; and (C) percentage of endemic species in each HUC12 watershed that are listed as endangered or threatened under state or federal ESA lists. Maps in panels B and C share the legend on the right of the figure. The black lines on the maps represent the major hydrologic regions in the study area.

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mountain foothill and coastal areas (Fig 6B), with bird richness being highest in wetland, coastal, and compatible agriculture (e.g., flooded rice) regions of the state (Fig 6C). Richness of mollusks/crustaceans, insects and other invertebrates is concentrated in headwater, spring systems and more isolated pockets of habitat (Fig 6D and 6E). Plant richness appears distributed throughout the state with pockets of high richness even in desert regions which are underrepresented by other taxonomic groups (Fig 6F).

Geographies noted for high species richness are consistent regardless of observation type (Table 2). The San Francisco Bay, Sacramento River, and portions of the South Coast hydrologic regions are consistently identified as biodiversity hotpots whether observational, range, or modeled data are considered (Fig 7). Patterns of diversity for historical observations and

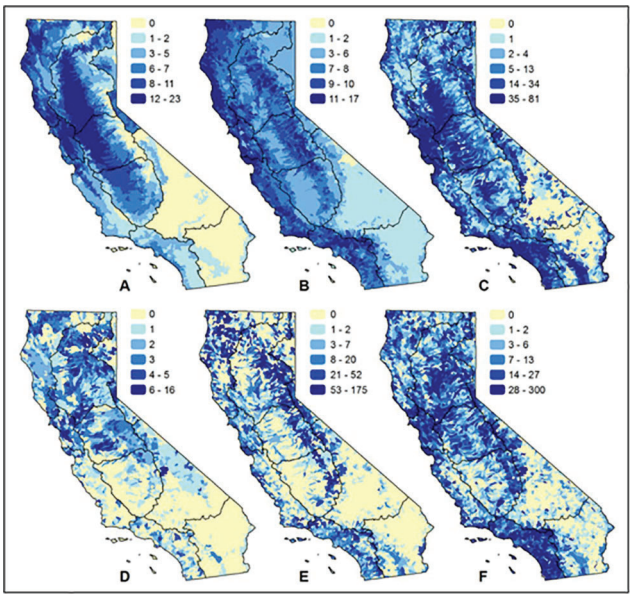

Fig 6. Patterns of freshwater species richness by taxonomic group. Maps show richness of: (A) fishes; (B) herpetofauna; (C) birds; (D) mollusks/crustaceans; (E) insects and other invertebrates; (F) plants.

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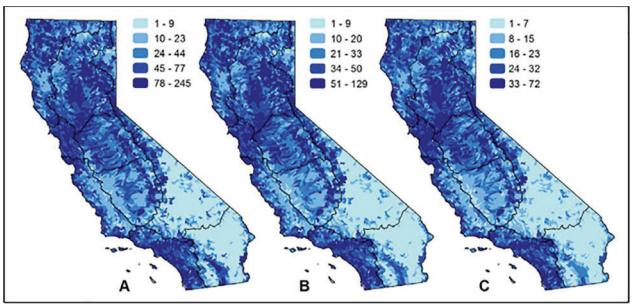

Fig 7. Patterns of richness by data type of California freshwater species. Maps show the number of native freshwater species when summarized by: (A) observational data recorded after 1980; (B) observational data recorded before 1980 or observations of extirpated populations; and (C) data that includes range maps, historical range maps, modeled habitat, professional judgment, critical habitat designations, and management area designations. Spatial data with an unknown observation date or unknown type are not included in any panel. The black lines on the maps represent the major hydrologic regions in the study area.

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extirpated populations appear similar to current observations (Fig 7A and 7B). Modeled and generalized data such as range maps completely cover the study area and provide perhaps the clearest pattern of diversity of freshwater taxa (Fig 7C); however, these patterns are only predictions of taxa presence. Nearly 40% of the study area does not contain a recent (post-1980) observation for any of the freshwater taxa considered in this study (Fig 7A).

The correlation coefficients of species richness at the HUC12 watershed scale between the various taxonomic groups are relatively low (Table 4), with the highest being between mollusks and mammals (0.52); fishes and mammals (0.52); and fishes and herps (0.51). The lowest correlations coefficients are between insects and other inverts and birds (0.03); crustaceans (0.06) and fishes (0.07).

We tested how the richness of various groups of species (taxonomic groups and listed species) serve as a proxy for the richness of all other freshwater species using correlation and hotspot overlap analysis. Listed species were the most correlated at the HUC12 watershed scale with the richness of all other freshwater species (0.63), followed by herpetofauna (0.51) and mollusks and plants (0.45) (Fig 8). Insects and other invertebrates had the lowest correlation to all other species (0.23). With the hotspot overlap analysis, we found again that listed species serve as the best proxy for all other species, with a 40% overlap in hotspots, followed by plants (29%), mollusks (27%) and crustaceans (25%) (Fig 9). We also compared hotspots for each group with hotspots of vulnerable freshwater species, since these are in the highest need of conservation action. Hotspots for listed species overlapped with 58% of the hotspots for vulnerable

Table 4. Correlation matrix of the richness within each HUC12 watershed summarized by taxonomic groups.

	Fishes	Crustaceans	Herps	Insects & Other Inverts	Mollusks	Plants	Birds	Mammals
Fishes	1.00	0.33	0.51	0.07	0.35	0.22	0.42	0.52
Crustaceans		1.00	0.09	0.06	0.14	0.20	0.26	0.11
Herps			1.00	0.32	0.32	0.34	0.32	0.32
Insects & Other Inverts				1.00	0.44	0.26	0.03	0.28
Mollusks					1.00	0.23	0.17	0.52
Plants						1.00	0.38	0.15
Birds							1.00	0.09
Mammals								1.00

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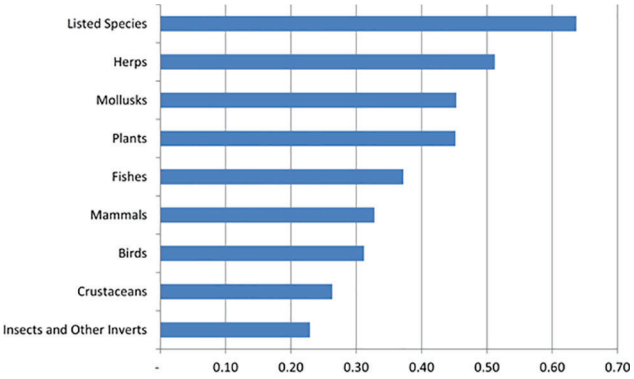

Fig 8. Relationship among taxonomic groups. Correlation of the richness within each HUC12 watershed for taxonomic groups of species when compared to all other freshwater species (excluding that group).

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freshwater species (excluding listed species). Mapping the hotspots shows that hotspots for listed species overlap with hotspots for all other species in the Sacramento River, San Francisco Bay, and South Coast hydrologic regions (Fig 10). However, hotspots congruence is lower in the North Coast and San Joaquin hydrologic regions.

Discussion

We compiled the most comprehensive database of freshwater species richness and distribution for the state of California to date. Using that database, we provide the first multi-taxa analysis of richness, endemism, and vulnerability for the majority of freshwater diversity in the state. Our study finds that the plight of freshwater species in California mirrors global trends [1–3]. We found that nearly half of freshwater taxa native to California are considered vulnerable to extinction, however only 6% of those taxa are currently listed under state or federal ESA. Even more disconcerting is that 90% of the freshwater taxa endemic to California—and so wholly reliant on conservation actions within the state—are vulnerable to extinction. However, only 14% of these endemic taxa are listed under state or federal ESAs (Fig 3). Therefore, legal listing does not appear to accurately reflect the state of vulnerability of freshwater taxa in the state.

We found that freshwater fishes, amphibians, reptiles, and mollusks are the most vulnerable taxonomic groups, a finding that is consistent with other studies [5, 10, 40–42]. However, this

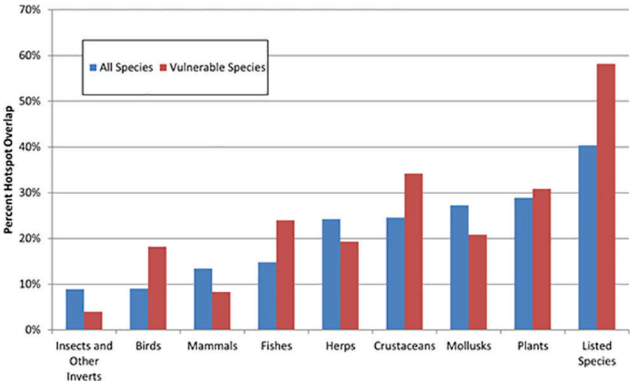

Fig 9. Overlap of hotspots. The relative performance of hotspots (top 5% of watersheds by richness) for taxonomic groups of species in matching hotspots for all (blue bars) and vulnerable (red bars) freshwater species. To avoid double counting, hotspots for all and vulnerable species were identified excluding the species in each subgroup for each comparison.

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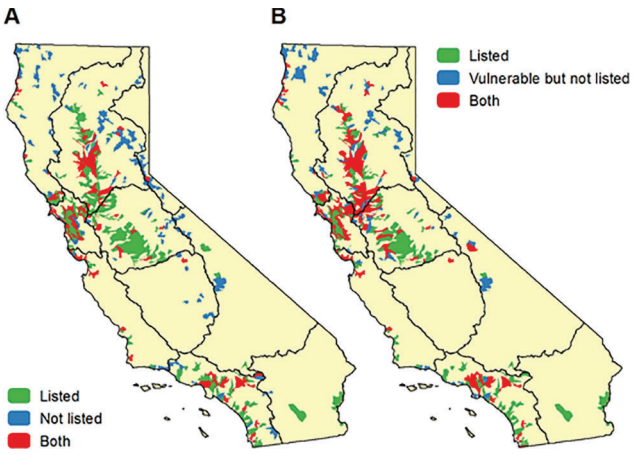

Fig 10. Location of hotspots. Comparison of the location of hotspot watersheds (top 5% by richness) for A) listed species with all non-listed species, and B) vulnerable but non-listed species.

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finding could be biased by the general lack of information about vulnerability of other taxonomic groups (Fig 3). These results provide evidence that some taxonomic groups are much better evaluated for conservation status than others (Table 3). For example, all fish and bird taxa have been evaluated as have most of the reptiles, amphibians, plants, and mollusks. In contrast, only 31% of the insects and other invertebrates have been evaluated for conservation status. Furthermore, we still lack spatially-explicit information for 1,448 freshwater species, including many known or suspected to be vulnerable to extinction. Evaluating the conservation status and locations of understudied freshwater species is priority for future research. Given that data acquisition is costly and time intensive, a recent study has shown that concentrating survey efforts on species with the highest uncertainty, such as rare species, provides an effective way to enhance the accuracy of conservation planning [43].

While there are some significant data gaps in our knowledge about the locations of many freshwater species, we were able to compile spatial data for 90% of the vulnerable species in the state, and all of the listed species. With this rich dataset, we were able to test how well a conservation focus on a particular subset of species would benefit other freshwater species. We found that a conservation focus on hotspots for a single taxonomic group such as fishes would provide poor overlap with hotspots for all other freshwater species. Our results are similar to a recent study on global patterns of freshwater species distribution [4]. Interestingly, we found that listed species do provide a reasonable proxy for other freshwater species, since hotspots for listed species cover 40% of the hotspots for non-listed species and 58% of the hotspots for non-listed vulnerable species (Figs 9 and 10). In our study area, focusing conservation action on the hotspots for listed species will likely benefit other freshwater species that need conservation action but have not yet been listed. If these patterns hold for other locations, this finding has implications for conservation strategies outside of our study area because there is generally more spatially explicit information about the distribution of listed species.

The publicly-available dataset [21] we have produced provides a means to place a wide range of freshwater management actions, including water rights administration and water use permitting within the larger context of freshwater-dependent species conservation. Furthermore, the dataset supports conservation planning initiatives by federal and state agencies and non-governmental organizations at the landscape scale, including efforts to delineate priority watershed networks which, if protected or restored, can most efficiently encompass freshwater biodiversity in the state for multiple species groups.

Conclusions

Human population growth, increasing demands for freshwater resources, and climate change are projected to exacerbate strains on freshwater resources and lead to further imperilment and extinction of freshwater taxa [1, 8–10, 44–45]. Fundamental to addressing this conservation challenge is information to elucidate what taxa are at risk and where best to focus efforts to improve conservation of freshwater species diversity. This study provides a foundation for freshwater conservation planning in California and highlights key hotspots of freshwater species which serve as priorities for conservation action. Yet, major gaps remain in our understanding of freshwater species distribution and status, as well as in the conservation protections afforded that diversity. Filling these knowledge gaps–e.g., with targeted surveys for understudied taxa, especially the listed, vulnerable, and endemic forms–is essential to inform current and future water management decisions. Addressing the gaps and inadequacies in conservation protections will be critical if we are to reverse the alarming declines of freshwater diversity seen in California as around the world.

Supporting Information

S1 File. Criteria used to define freshwater species by taxonomic group.
(DOCX)

S1 Table. Summary of stream characteristics for regions. Values from National Hydrography Dataset Plus, version 1 (EPA and USGS).
(DOCX)

S2 Table. List of sources for freshwater taxa included in our freshwater species list.
(DOCX)

S3 Table. List of sources that supplied spatial data for freshwater species occurrence.
(DOCX)

S4 Table. List of freshwater taxa included in study.
(DOCX)

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Author Contributions

Conceived and designed the experiments: JKH KRK KAF JF T. Gardali T. Grantham JVEK SK PM PBM PRO RP RMQ ACR NS SS LS JDS JS JHV AW SAM. Performed the experiments: JKH KRK KAF JF T. Gardali T. Grantham JVEK SK PM PBM PRO RP RMQ ACR NS SS LS JDS JS JHV AW SAM. Analyzed the data: JKH KRK KAF JF T. Gardali T. Grantham JVEK SK PM PBM PRO RP RMQ ACR NS SS LS JDS JS JHV AW SAM. Contributed reagents/materials/analysis tools: JKH KRK KAF JF T. Gardali T. Grantham JVEK SK PM PBM PRO RP RMQ ACR NS SS LS JDS JS JHV AW SAM. Wrote the paper: JKH KRK KAF JF T. Gardali T. Grantham JVEK SK PM PBM PRO RP RMQ ACR NS SS LS JDS JS JHV AW SAM.

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S1 File. Criteria used to define freshwater species

1. FISH

- Freshwater fishes are defined as those that spawn in freshwater. Catadromous species wouldn't qualify, however, we do not have any catadromous species in California. This also precludes several estuarine species commonly found in brackish water such as starry flounder, striped mullet and staghorn sculpin.

2. PLANTS

- Plant species that occur exclusively in freshwater and have special adaptations for living submerged in water, or at the water's surface. Includes free-floating aquatic plans and emergent wetland plants rooted beneath the water surface (e.g., *Nuphar polysepala*).
- Plant species that occur primarily in freshwater wetland habitats but are not strictly aquatic (e.g. *Typha angustifolia*).
- Plant species requiring freshwater inundation to complete their life-cycle, such as plants occurring in long-inundated portions of vernal pools (e.g., *Orcuttia californica*).
- Plant species associated with freshwater and aquatic habitats over much of their range or life-cycle as identified by expert botanists.
- Plant species identified in the Jepson Manual of Vascular Plants of California as associated with wetland habitats such as marshes, lakes, vernal pools, fens, springs, and bogs, and dependent on wetland habitat.
- Plant species identified as Wetland Obligates in the U.S. Army Corps of Engineers list of wetland plant species.
- Plant species identified as Facultative Wetland plants in the U.S. Army Corps of Engineers list of wetland plant species, and identified by expert botanists as dependent on freshwater wetland or aquatic habitats.

3. HERPETOFAUNA

- Species that exclusively rely on freshwater or freshwater-dependent vegetation communities in California in order to complete one or more stages of a reproductive cycle.
- Species that forage within freshwater, either as obligates (e.g., *Actinemys marmorata* and *Thamnophis gigas*), non-obligates (e.g., *T. elegans* and *T. ordinoides*), or as obligates and non-obligates depending on point of ontogeny (i.e., larval and adult amphibian of a single species).
- Relict species occurring within mesic microhabitats within xeric landscapes that would not persist in such regions without freshwater springs, such as *Batrachoseps campi* (a plethodontid salamander that exhibits direct development and does not have a larval stage).
- Species that do not require freshwater for foraging or any part of their reproductive cycle, but are typically found in California occurring within the splash zone of freshwater springs and creeks, such as *Plethodon dunni* (a plethodontid salamander with direct development).

4. BIRDS

A) Criteria for Inclusion

- Species that exclusively rely on freshwater or freshwater-dependent vegetation communities in California, including taxa strongly associated with riparian vegetation.
- Species that breed widely across western North America in freshwater habitats and migrate to California where a substantial portion, but not all, of their wintering habitat consists of freshwater habitats
- Species that use coastal waters during winter and migration but rely completely on freshwater for breeding in California (e.g, Harlequin Duck, American White Pelican, Western Grebe)
- Species that require freshwater inputs in to saline systems where reductions in freshwater inputs could result in complete habitat loss or substantial changes vegetation and habitat suitability (e.g., species that are only found at the Salton Sea , Saltmarsh Common Yellowthroat).
- Species that winter or breed in both freshwater and saline wetlands, but have large portions of their California population dependent on inland freshwater habitats, including flooded agriculture.

B) Criteria for Exclusion

- Species not dependent on the regular presence of freshwater or freshwater-dependent habitats.
- Species that no longer occur in or are not native to the region.
- Species were omitted if they are rare and do not contribute in a meaningful way to the avifauna of the region. – i.e., primarily lost "vagrants," even if the occur every year (e.g., Swamp Sparrow, American Redstart).

5. INVERTEBRATES

- Benthic macroinvertebrates (BMIs) are those included on the Southwest Association of Freshwater Invertebrate Taxonomists (SAFIT) Standard Taxonomic Effort (STE) list collected as part of freshwater bioassessment in the southwestern United States. The list contains BMI species known to occur in streams, lakes, or wetlands, including vernal pools, but special emphasis was placed on stream taxa since freshwater bioassessment is most frequently conducted in that habitat type. The list was compiled from published literature sources and from records in the State Water Board's bioassessment database, the latter being derived from surveys of thousands of stream sites throughout California.
- All species in the SAFIT list are benthic in one or more life stages and utilize freshwater habitats in one or more of the following critical life functions: feeding, mating, egg deposition/development, and larval development to maturity.
- The species list is more comprehensive for some taxonomic groups than others, reflecting the knowledge base and interests of the authors and other taxonomists at California's Aquatic Bioassessment Lab, availability and regional synoptic coverage of primary taxonomic literature, and likelihood of obtaining properly preserved specimens in typical benthic samples. For example, the list is comprehensive for most aquatic insect groups such as mayflies, stoneflies, dragonflies, caddisflies, beetles, the dipteran suborder Nematocera, etc. The dipteran suborder Brachycera is a notable exception, with most taxa being listed at genus level. The species lists also include surface-dwelling groups like Gerridae (water striders, order Hemiptera) and Gyrinidae (whirligig beetles, order Coleoptera), but exclude taxa associated with riparian zones,

shore-dwelling species, and plant tissue inhabitants in taxonomic groups such as Collembola, Staphylinidae, Heteroceridae, Chrysomelidae, Curculionidae, Saldidae, Isopoda and Amphipoda.

- The list is comprehensive for benthic crustaceans except Ostracoda. The list does not include planktonic microcrustacea (Copepoda and Cladocera). No attempt has been made to provide comprehensive species lists for freshwater Annelida (segmented worms) as preservation is typically poor in benthic samples, but generic lists are provided for leeches and polychaetes. Similarly, generic listings are included for Acari (water mites). An extensive taxonomic literature is available for these groups and could support compilation of species lists by appropriate experts in future versions. The list also excludes freshwater parasites such as Branchiura and mermithid Nematoda, the Branchiobdella, which are commensals on crayfish, and the Nematomorpha which are parasitic on terrestrial insects but are found in freshwater for part of their life cycle.
- Phylum Mollusca is variably treated: species lists are generally comprehensive for taxa that occur in larger streams and rivers, despite improper preservation that prevents species-level identifications in typical benthic samples that are collected for bioassessment purposes. Pebblesnails (Families Hydrobiidae and Lithoglyphidae) are a diverse group in springs of the southwestern US, but a species list has not been included.

S1 Table. Summary of stream characteristics for regions. Values from National Hydrography Dataset Plus, version 1 (EPA and USGS).

Region	Area (km^2)	Streams (km)	Ratio of perennial to intermittent stream km	Canals & pipelines (km)	Ave. stream slope (%)	Ave. mean annual flow (m^3/sec.)	Ave. annual temp. (°C)	Ave. annual total ppt (cm)	Hydrological connections outside CA	Major features
Central Coast	29,313	27,830	0.15	228	0.07	0.13	14.0	52	-	Salinas River
Colorado River	51,431	31,668	0.04	3,859	0.04	18.20	18.8	21	Colorado basin (WY, CO, UT, AZ, NM, NV)	Colorado River, Salton Sea
North Coast	50,662	34,915	2.14	796	0.18	8.42	11.5	145	Klamath basin (OR)	Klamath, Trinity, Mad, Russian rivers
North Lahontan	15,863	8,917	0.75	391	0.07	0.85	6.4	74	Drains to closed basins in NV	Lake Tahoe, terminal basins
Sacramento River	70,684	49,773	0.72	11,306	0.06	6.23	12.2	98	-	Sacramento and Pit rivers, springs
San Francisco Bay	11,718	7,984	0.58	1,531	0.04	1.61	14.7	66	-	San Francisco Bay, vernal pools
San Joaquin River	39,686	29,145	0.57	9,559	0.06	4.03	12.5	77	-	San Joaquin River
South Coast	28,295	22,400	0.10	1,694	0.07	0.08	14.9	51	-	Santa Clara River
South Lahontan	69,063	43,867	0.07	1,179	0.06	0.41	14.1	27	Drains to closed basins in NV	Owens River, isolated springs
Tulare Lake	43,592	25,412	0.30	9,591	0.09	1.41	12.2	50	-	Kern River

S3 Table. Sources used to compile spatial data occurrences.

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S4 Table. List of taxa included in the database.

Scientific Name	Common Name	Group
Abedus breviceps		Insects & other
Abedus herberti		Insects & other
Abedus indentatus		Insects & other
Abedus ovatus		Insects & other
Abedus parkeri		Insects & other
Abedus vicinus		Insects & other
Ablabesmyia annulata		Insects & other
Ablabesmyia aspera		Insects & other
Ablabesmyia cinctipes		Insects & other
Ablabesmyia mallochi		Insects & other
Ablabesmyia monilis		Insects & other
Ablabesmyia peleensis		Insects & other
Acalyptonotus pacificus		Insects & other
Acanthomysis aspera		Crustaceans
Acanthomysis hwanhaiensis		Crustaceans
Acentrella insignificans	A Mayfly	Insects & other
Acentrella turbida	A Mayfly	Insects & other
Acerpenna pygmaea		Insects & other
Acilius abbreviatus		Insects & other
Acipenser medirostris ssp. 1	Southern green sturgeon	Fishes
Acipenser medirostris ssp. 2	Northern green sturgeon	Fishes
Acipenser transmontanus	White sturgeon	Fishes
Acneus beeri		Insects & other
Acneus burnelli		Insects & other
Acneus oregonensis		Insects & other
Acneus quadrimaculatus		Insects & other
Actinemys marmorata marmorata	Western Pond Turtle	Herps
Actinemys marmorata pallida	Southern Pacific Pond Turtle	Herps
Actitis macularius	Spotted Sandpiper	Birds
Aechmophorus clarkii	Clark's Grebe	Birds
Aechmophorus occidentalis	Western Grebe	Birds
Aedes aegypti		Insects & other
Aedes cinereus		Insects & other
Aedes vexans		Insects & other
Aeshna canadensis	Canada Darner	Insects & other
Aeshna interrupta interna		Insects & other
Aeshna juncea		Insects & other
Aeshna palmata	Paddle-tailed Darner	Insects & other

Aeshna persephone		Insects & other
Aeshna subarctica		Insects & other
Aeshna umbrosa occidentalis	Shadow Darner	Insects & other
Aeshna walkeri	Walker's Darner	Insects & other
Agabinus glabrellus		Insects & other
Agabinus sculpturellus		Insects & other
Agabus ancillus		Insects & other
Agabus anthracinus		Insects & other
Agabus apache		Insects & other
Agabus approximatus		Insects & other
Agabus austinii		Insects & other
Agabus austrodiscors		Insects & other
Agabus bjorkmanae		Insects & other
Agabus brevicollis		Insects & other
Agabus confertus		Insects & other
Agabus cordatus		Insects & other
Agabus discors		Insects & other
Agabus disintegratus		Insects & other
Agabus erichsoni		Insects & other
Agabus euryomus		Insects & other
Agabus griseipennis		Insects & other
Agabus hoppingi		Insects & other
Agabus hypomelas		Insects & other
Agabus ilybiiformis		Insects & other
Agabus jimzim		Insects & other
Agabus klamathensis		Insects & other
Agabus kootenai		Insects & other
Agabus lineelus		Insects & other
Agabus lugens		Insects & other
Agabus lutosus		Insects & other
Agabus minnesotensis		Insects & other
Agabus morosus		Insects & other
Agabus obliteratus nectris		Insects & other
Agabus obliteratus obliteratus		Insects & other
Agabus oblongulus		Insects & other
Agabus obsoletus		Insects & other
Agabus pandurus		Insects & other
Agabus perplexus		Insects & other
Agabus punctulatus		Insects & other
Agabus regularis		Insects & other
Agabus roguus		Insects & other
Agabus rumppi	Death Valley Agabus Diving Beetle	Insects & other

Agabus sasquatch		Insects & other
Agabus semivittatus		Insects & other
Agabus seriatus		Insects & other
Agabus smithi		Insects & other
Agabus strigulosus		Insects & other
Agabus tristis		Insects & other
Agabus vandykei		Insects & other
Agabus versimilis		Insects & other
Agabus walsinghami		Insects & other
Agapetus arcita	A Caddisfly	Insects & other
Agapetus bifidus		Insects & other
Agapetus boulderensis		Insects & other
Agapetus celatus	A Caddisfly	Insects & other
Agapetus denningi		Insects & other
Agapetus joannia	A Caddisfly	Insects & other
Agapetus malleatus	A Caddisfly	Insects & other
Agapetus marlo	A Caddisfly	Insects & other
Agapetus occidentis		Insects & other
Agapetus orosus	A Caddisfly	Insects & other
Agapetus taho	A Caddisfly	Insects & other
Agathon arizonica		Insects & other
Agathon aylmeri		Insects & other
Agathon comstocki		Insects & other
Agathon dismalea		Insects & other
Agathon doanei	A Net-winged Midge	Insects & other
Agathon elegantulus		Insects & other
Agathon markii		Insects & other
Agathon sequoiarum		Insects & other
Agelaius phoeniceus aciculatus	Kern Red-winged Blackbird	Birds
Agelaius tricolor	Tricolored Blackbird	Birds
Agraylea multipunctata		Insects & other
Agraylea saltesea	A Caddisfly	Insects & other
Agrostis oregonensis	Oregon Bentgrass	Plants
Agrypnia dextra		Insects & other
Agrypnia glacialis	A Caddisfly	Insects & other
Agrypnia improba		Insects & other
Agrypnia vestita		Insects & other
Aix sponsa	Wood Duck	Birds
Alienacanthomysis macropsis		Crustaceans
Alisma gramineum	Narrowleaf Water-plantain	Plants
Alisma triviale	Northern Water-plantain	Plants

Alisotrichia arizonica		Insects & other
Allium validum	Tall Swamp Onion	Plants
Allocosmoecus partitus	A Caddisfly	Insects & other
Allomyia acanthis		Insects & other
Allomyia cascadis		Insects & other
Allomyia cidoipes	A Caddisfly	Insects & other
Allomyia renoa		Insects & other
Alloperla chandleri	Mariposa Sallfly	Insects & other
Alloperla delicata	Delicate Sallfly	Insects & other
Alloperla elevata	A Stonefly	Insects & other
Alloperla fraterna	Cascades Sallfly	Insects & other
Alloperla thalia		Insects & other
Alnus rhombifolia	White Alder	Plants
Alnus rubra	Red Alder	Plants
Alnus viridis fruticosa	Siberian Alder	Plants
Alnus viridis sinuata	Sitka Alder	Plants
Alnus viridis virdis	Green Alder	Plants
Alopecurus aequalis aequalis	Short-awn Foxtail	Plants
Alopecurus aequalis sonomensis	Sonoma Shortawn Foxtail	Plants
Alopecurus carolinianus	Tufted Foxtail	Plants
Alopecurus geniculatus geniculatus	Meadow Foxtail	Plants
Alopecurus myosuroides	NA	Plants
Alopecurus pratensis	NA	Plants
Alopecurus saccatus	Pacific Foxtail	Plants
Alotanypus venustus		Insects & other
Ambrysus amargosus	Ash Meadows Naucorid	Insects & other
Ambrysus arizonus		Insects & other
Ambrysus californicus		Insects & other
Ambrysus circumcinctus		Insects & other
Ambrysus funebris	Nevares Spring Naucorid Bug	Insects & other
Ambrysus melanopterus		Insects & other
Ambrysus mormon		Insects & other
Ambrysus occidentalis		Insects & other
Ambrysus pulchellus		Insects & other
Ambrysus puncticollis		Insects & other
Ambrysus relictus		Insects & other
Ambrysus thermarum		Insects & other
Ambrysus woodburyi		Insects & other
Ambystoma californiense "Santa Barbara"	Santa Barbara Tiger Salamander	Herps
Ambystoma californiense	Sonoma Tiger Salamander	Herps

"Sonoma"		
Ambystoma californiense californiense	California Tiger Salamander	Herps
Ambystoma gracile	Northwestern Salamander	Herps
Ambystoma macrodactylum		Herps
Ambystoma macrodactylum croceum	Santa Cruz Long-toed Salamander	Herps
Ambystoma macrodactylum sigillatum	Southern Long-toed Salamander	Herps
Ameletus amador	A Mayfly	Insects & other
Ameletus andersoni	A Mayfly	Insects & other
Ameletus bellulus	A Mayfly	Insects & other
Ameletus celer	A Mayfly	Insects & other
Ameletus cooki	A Mayfly	Insects & other
Ameletus dissitus	A Mayfly	Insects & other
Ameletus doddsianus		Insects & other
Ameletus edmundsi	A Mayfly	Insects & other
Ameletus exquisitus		Insects & other
Ameletus falsus		Insects & other
Ameletus imbellis	A Mayfly	Insects & other
Ameletus majusculus	A Mayfly	Insects & other
Ameletus minimus	A Mayfly	Insects & other
Ameletus oregonensis		Insects & other
Ameletus pritchardi	A Mayfly	Insects & other
Ameletus quadratus		Insects & other
Ameletus shepherdi	A Mayfly	Insects & other
Ameletus similior	A Mayfly	Insects & other
Ameletus sparsatus	A Mayfly	Insects & other
Ameletus subnotatus	A Mayfly	Insects & other
Ameletus suffusus	A Mayfly	Insects & other
Ameletus tolae		Insects & other
Ameletus validus	A Mayfly	Insects & other
Ameletus vancouverensis	A Mayfly	Insects & other
Ameletus velox	A Mayfly	Insects & other
Ameletus vernalis	A Mayfly	Insects & other
Americorophium salmonis		Crustaceans
Americorophium spinicorne		Crustaceans
Americorophium stimpsoni		Crustaceans
Ametor latus		Insects & other
Ametor scabrosus		Insects & other
Ametropus ammophilus	A Mayfly	Insects & other
Amiocentrus aspilus	A Caddisfly	Insects & other

Ammannia coccinea	Scarlet Ammannia	Plants
Ammannia robusta	Grand Redstem	Plants
Amnicola limosa		Mollusks
Amphiagrion abbreviatum	Western Red Damsel	Insects & other
Amphicosmoecus canax	A Caddisfly	Insects & other
Amphinemura apache		Insects & other
Amphinemura mogollonica		Insects & other
Amphinemura venusta		Insects & other
Amphiscirpus nevadensis		Plants
Amphizoa insolens		Insects & other
Amphizoa lecontei		Insects & other
Amphizoa striata		Insects & other
Ampumixis dispar		Insects & other
Anabolia bimaculata		Insects & other
Anacaena limbata		Insects & other
Anacaena signaticollis		Insects & other
Anacroneuria wipukupa		Insects & other
Anagapetus aisha	A Caddisfly	Insects & other
Anagapetus bernea	A Caddisfly	Insects & other
Anagapetus chandleri	A Caddisfly	Insects & other
Anagapetus debilis		Insects & other
Anagapetus hoodi		Insects & other
Anas acuta	Northern Pintail	Birds
Anas americana	American Wigeon	Birds
Anas clypeata	Northern Shoveler	Birds
Anas crecca	Green-winged Teal	Birds
Anas cyanoptera	Cinnamon Teal	Birds
Anas discors	Blue-winged Teal	Birds
Anas platyrhynchos	Mallard	Birds
Anas strepera	Gadwall	Birds
Anax junius	Common Green Darner	Insects & other
Anax walsinghami	Giant Green Darner	Insects & other
Anaxyrus boreas boreas	Boreal Toad	Herps
Anaxyrus boreas halophilus	California Toad	Herps
Anaxyrus californicus	Arroyo Toad	Herps
Anaxyrus canorus	Yosemite Toad	Herps
Anaxyrus cognatus	Great Plains Toad	Herps
Anaxyrus exsul	Black Toad	Herps
Anaxyrus punctatus	Red-spotted Toad	Herps
Anaxyrus woodhousii woodhousii	Rocky Mountain Toad	Herps

Anchycteis velutina		Insects & other
Anemopsis californica	Yerba Mansa	Plants
Anodonta californiensis	California Floater	Mollusks
Anodonta dejecta	Woebegone Floater	Mollusks
Anodonta oregonensis	Oregon Floater	Mollusks
Anopheles franciscanus		Insects & other
Anopheles freeborni		Insects & other
Anopheles hermsi		Insects & other
Anopheles judithae		Insects & other
Anopheles occidentalis		Insects & other
Anopheles punctipennis		Insects & other
Anser albifrons	Greater White-fronted Goose	Birds
Anser albifrons elgasi	Tule White-fronted Goose	Birds
Anthopotamus verticis	Walker's Tusked Sprawler	Insects & other
Antocha monticola		Insects & other
Apanisagrion lais		Insects & other
Apatania arizona		Insects & other
Apatania chasica		Insects & other
Apatania sorex	A Caddisfly	Insects & other
Apatania tavala	Cascades Apatanian Caddisfly	Insects & other
Apedilum elachistum		Insects & other
Apedilum subcinctum		Insects & other
Aphodius alternatus		Insects & other
Apobaetis etowah	A Mayfly	Insects & other
Aponogeton distachyos	NA	Plants
Apsectrotanypus florens		Insects & other
Apteraliplus parvulus		Insects & other
Aquarius amplus arizonensis		Insects & other
Aquarius remigis		Insects & other
Aquilegia eximia	Van Houtte's Columbine	Plants
Aquilegia shockleyi	NA	Plants
Araeopidius monochus		Insects & other
Archilestes californica	California Spreadwing	Insects & other
Archilestes grandis	Great Spreadwing	Insects & other
Archoplites interruptus	Sacramento perch	Fishes
Arctitalitus sylvaticus		Crustaceans
Arctocorisa sutilis		Insects & other
Arctopsyche californica	A Caddisfly	Insects & other
Arctopsyche grandis	A Caddisfly	Insects & other
Ardea alba	Great Egret	Birds
Ardea herodias	Great Blue Heron	Birds

Arenaria paludicola	Marsh Sandwort	Plants
Argia agrioides	California Dancer	Insects & other
Argia alberta	Paiute Dancer	Insects & other
Argia emma	Emma's Dancer	Insects & other
Argia fumipennis		Insects & other
Argia hinei	Lavender Dancer	Insects & other
Argia immunda	Kiowa Dancer	Insects & other
Argia lacrimans		Insects & other
Argia lugens	Sooty Dancer	Insects & other
Argia moesta	Powdered Dancer	Insects & other
Argia munda		Insects & other
Argia nahuana	Aztec Dancer	Insects & other
Argia oenea		Insects & other
Argia pallens		Insects & other
Argia pima		Insects & other
Argia plana		Insects & other
Argia sabino		Insects & other
Argia sedula	Blue-ringed Dancer	Insects & other
Argia tarascana		Insects & other
Argia tezpi		Insects & other
Argia tonto		Insects & other
Argia translata		Insects & other
Argia vivida	Vivid Dancer	Insects & other
Artemia franciscana	San Francisco Brine Shrimp	Crustaceans
Artemia monica	Mono Lake Brine Shrimp	Crustaceans
Arundo donax	NA	Plants
Asarum lemmonii	Lemmon's Wild Ginger	Plants
Ascaphus truei	Coastal Tailed Frog	Herps
Asioplax edmundsi	A Mayfly	Insects & other
Assiminea californica		Mollusks
Assiminea infima	Badwater Snail	Mollusks
Asynarchus aldinus		Insects & other
Asynarchus cinnamoneus		Insects & other
Asynarchus montanus		Insects & other
Asynarchus pacificus		Insects & other
Atherix pachypus		Insects & other
Atopsyche sperryi		Insects & other
Atopsyche tripunctata		Insects & other
Atractelmis wawona	Wawona Riffle Beetle	Insects & other
Attenella attenuata		Insects & other
Attenella delantala	A Mayfly	Insects & other

Attenella margarita	A Mayfly	Insects & other
Attenella soquele	A Mayfly	Insects & other
Augyles mundulus		Insects & other
Axonopsis californica		Insects & other
Aythya affinis	Lesser Scaup	Birds
Aythya americana	Redhead	Birds
Aythya collaris	Ring-necked Duck	Birds
Aythya marila	Greater Scaup	Birds
Aythya valisineria	Canvasback	Birds
Azolla filiculoides	NA	Plants
Azolla microphylla	Mexican mosquito fern	Plants
Baccharis glutinosa	NA	Plants
Baccharis salicina		Plants
Bacopa eisenii	Gila River Water-hyssop	Plants
Bacopa monnieri	NA	Plants
Bacopa rotundifolia	NA	Plants
Baetis adonis	A Mayfly	Insects & other
Baetis alius	A Mayfly	Insects & other
Baetis bicaudatus	A Mayfly	Insects & other
Baetis diablus	A Mayfly	Insects & other
Baetis flavistriga	A Mayfly	Insects & other
Baetis magnus	A Mayfly	Insects & other
Baetis notos	A Mayfly	Insects & other
Baetis palisadi	A Mayfly	Insects & other
Baetis piscatoris	A Mayfly	Insects & other
Baetis tricaudatus	A Mayfly	Insects & other
Baetisca lacustris		Insects & other
Baetodes alleni		Insects & other
Baetodes arizonensis		Insects & other
Baetodes bibranchius		Insects & other
Baetodes edmundsi		Insects & other
Bandakia fragilis		Insects & other
Bandakia longipalpis		Insects & other
Bandakia oregonensis		Insects & other
Banksiola crotchi	A Caddisfly	Insects & other
Batis maritima	Saltwort	Plants
Batrachoseps campi	Inyo Mountains Salamander	Herps
Baumannella alameda	Alameda Springfly	Insects & other
Beckmannia syzigachne	American Sloughgrass	Plants
Belostoma bakeri		Insects & other
Belostoma confusum		Insects & other

Belostoma flumineum		Insects & other
Belostoma saratogae	Saratoga Springs Belostoman Bug	Insects & other
Belostoma subspinosum		Insects & other
Bergia texana	Texas Bergia	Plants
Berosus fraternus		Insects & other
Berosus hatchi		Insects & other
Berosus infuscatus		Insects & other
Berosus ingeminatus		Insects & other
Berosus maculosus		Insects & other
Berosus metalliceps		Insects & other
Berosus notapeltatus		Insects & other
Berosus oregonensis		Insects & other
Berosus punctatissimus		Insects & other
Berosus sayi		Insects & other
Berosus stylifera		Insects & other
Berula erecta	Wild Parsnip	Plants
Betula glandulosa	Resin Birch	Plants
Bibiocephala grandis		Insects & other
Bidens cernua	Nodding Beggarticks	Plants
Bidens laevis	Smooth Bur-marigold	Plants
Bidens tripartita	NA	Plants
Bidens vulgata	NA	Plants
Bilyjomyia algens		Insects & other
Biomphalaria havanensis	Ghost Rams-horn	Mollusks
Bisancora pastina	Antelope Sallfly	Insects & other
Bisancora rutriformis	Scooped Sallfly	Insects & other
Bistorta bistortoides		Plants
Bittacomorpha clavipes		Insects & other
Bittacomorpha occidentalis		Insects & other
Bittacomorphella ostenii		Insects & other
Bittacomorphella pacifica		Insects & other
Blennosperma bakeri	Baker's Blennosperma	Plants
Blepharicera jordani		Insects & other
Blepharicera kalmiopsis		Insects & other
Blepharicera micheneri	A Net-winged Midge	Insects & other
Blepharicera ostensackeni		Insects & other
Blepharicera zionensis		Insects & other
Boehmeria cylindrica	NA	Plants
Bolboschoenus fluviatilis		Plants
Bolboschoenus glaucus	NA	Plants
Bolboschoenus maritimus	NA	Plants

paludosus		
Bolboschoenus robustus		Plants
Bolshecapnia maculata	Spotted Snowfly	Insects & other
Boreoclus persimilis		Insects & other
Boreoclus sinuaticornis		Insects & other
Boreoheptagyia lurida		Insects & other
Botaurus lentiginosus	American Bittern	Birds
Bowmanasellus sequoiae	Sequoia cave isopod	Crustaceans
Brachycentrus americanus	A Caddisfly	Insects & other
Brachycentrus echo	A Caddisfly	Insects & other
Brachycentrus occidentalis		Insects & other
Brachymesia furcata	Red-tailed Pennant	Insects & other
Brachymesia gravida		Insects & other
Branchinecta campestris	Pocket Pouch Fairy Shrimp	Crustaceans
Branchinecta coloradensis	Colorado Fairy Shrimp	Crustaceans
Branchinecta conservatio	Conservancy Fairy Shrimp	Crustaceans
Branchinecta cornigera		Crustaceans
Branchinecta dissimilis	Dissimilar Fairy Shrimp	Crustaceans
Branchinecta gigas	Giant Fairy Shrimp	Crustaceans
Branchinecta hiberna	Winter Fairy Shrimp	Crustaceans
Branchinecta kaibabensis		Crustaceans
Branchinecta lindahli	Versatile Fairy Shrimp	Crustaceans
Branchinecta longiantenna	Longhorn Fairy Shrimp	Crustaceans
Branchinecta lynchi	Vernal Pool Fairy Shrimp	Crustaceans
Branchinecta mackini	Alkali Fairy Shrimp	Crustaceans
Branchinecta mesovallensis	Midvalley Fairy Shrimp	Crustaceans
Branchinecta oriena	A Fairy Shrimp	Crustaceans
Branchinecta packardi		Crustaceans
Branchinecta sandiegonensis	San Diego Fairy Shrimp	Crustaceans
Brasenia schreberi	Watershield	Plants
Brechmorhoga mendax	Pale-faced Clubskimmer	Insects & other
Brechmorhoga pertinax		Insects & other
Brillia flavifrons		Insects & other
Brillia laculata		Insects & other
Brillia parva		Insects & other
Brillia retifinis		Insects & other
Brodiaea nana		Plants
Brodiaea orcuttii	Orcutt's Brodiaea	Plants
Brodiaea pallida	Chinese Camp Brodiaea	Plants
Brundiniella eumorpha		Insects & other
Brychius hornii		Insects & other

Brychius pacificus		Insects & other
Bucephala albeola	Bufflehead	Birds
Bucephala clangula	Common Goldeneye	Birds
Buenoa arida		Insects & other
Buenoa arizonis		Insects & other
Buenoa hungerfordi		Insects & other
Buenoa margaritacea		Insects & other
Buenoa omani		Insects & other
Buenoa scimitra		Insects & other
Buenoa uhleri		Insects & other
Butorides virescens	Green Heron	Birds
Caecidotea sequoiae	An Isopod	Crustaceans
Caecidotea tomalensis	Tomales Isopod	Crustaceans
Caenis amica	A Mayfly	Insects & other
Caenis bajaensis	A Mayfly	Insects & other
Caenis latipennis	A Mayfly	Insects & other
Caenis punctata	A Mayfly	Insects & other
Caenis youngi	A Mayfly	Insects & other
Caladomyia pistra		Insects & other
Calamagrostis nutkaensis	Pacific Small-reedgrass	Plants
Calasellus californicus	An Isopod	Crustaceans
Calasellus longus	An Isopod	Crustaceans
Calidris alpina	Dunlin	Birds
Calidris mauri	Western Sandpiper	Birds
Calidris minutilla	Least Sandpiper	Birds
Calileuctra dobryi	Elsmere Needlefly	Insects & other
Calileuctra ephemera	Napa Needlefly	Insects & other
Calineuria californica	Western Stone	Insects & other
Callibaetis californicus	A Mayfly	Insects & other
Callibaetis ferrugineus	A Mayfly	Insects & other
Callibaetis fluctuans	A Mayfly	Insects & other
Callibaetis montanus		Insects & other
Callibaetis pallidus	A Mayfly	Insects & other
Callibaetis pictus	A Mayfly	Insects & other
Callicorixa audeni		Insects & other
Callicorixa scudderi		Insects & other
Callicorixa vulnerata		Insects & other
Calliperla luctuosa	Coast Stripetail	Insects & other
Callitriche fassettii	NA	Plants
Callitriche heterophylla bolanderi	Large Water-starwort	Plants

Callitriche heterophylla heterophylla	Northern Water-starwort	Plants
Callitriche longipedunculata	Longstock Water-starwort	Plants
Callitriche marginata	Winged Water-starwort	Plants
Callitriche palustris	Vernal Water-starwort	Plants
Callitriche trochlearis	Waste-water Water-starwort	Plants
Calochortus uniflorus	Shortstem Mariposa Lily	Plants
Calopteryx aequabilis	River Jewelwing	Insects & other
Caltha leptosepala	Slender-sepal Marsh-marigold	Plants
Caltha palustris	NA	Plants
Camelobaetidius kickapoo		Insects & other
Camelobaetidius maidu	Maidu Mayfly	Insects & other
Camelobaetidius mexicanus		Insects & other
Camelobaetidius musseri		Insects & other
Camelobaetidius warreni	A Mayfly	Insects & other
Campanula californica	Swamp Harebell	Plants
Capnia barberi	Plumas Snowfly	Insects & other
Capnia californica	California Snowfly	Insects & other
Capnia caryi		Insects & other
Capnia confusa		Insects & other
Capnia coyote	Coyote Snowfly	Insects & other
Capnia decepta		Insects & other
Capnia elongata	Caascades Snowfly	Insects & other
Capnia erecta		Insects & other
Capnia excavata	Saddleback Snowfly	Insects & other
Capnia fialai	Humboldt Snowfly	Insects & other
Capnia giulianii	Whitney Snowfly	Insects & other
Capnia glabra	Smooth Snowfly	Insects & other
Capnia gracilaria	Slender Snowfly	Insects & other
Capnia hitchcocki	Arroyo Snowfly	Insects & other
Capnia hornigi		Insects & other
Capnia inyo	Inyo Snowfly	Insects & other
Capnia jewetti		Insects & other
Capnia kersti		Insects & other
Capnia lacustra	Lake Snowfly	Insects & other
Capnia licina		Insects & other
Capnia lineata	Straight Snowfly	Insects & other
Capnia mariposa	Mariposa Snowfly	Insects & other
Capnia melia	Northwest Snowfly	Insects & other
Capnia mono	Mono Snowfly	Insects & other
Capnia nana		Insects & other

Capnia nedia		Insects & other
Capnia ophiona	Snakehead Snowfly	Insects & other
Capnia oregona		Insects & other
Capnia palomar	Palomar Snowfly	Insects & other
Capnia petila		Insects & other
Capnia pileata	Birdhead Snowfly	Insects & other
Capnia promota	Pacific Snowfly	Insects & other
Capnia quadrituberosa	Four-knobbed Snowfly	Insects & other
Capnia regilla	Royal Snowfly	Insects & other
Capnia saratoga	Saratoga Snowfly	Insects & other
Capnia scobina	Rasp Snowfly	Insects & other
Capnia sequoia	Sequoia Snowfly	Insects & other
Capnia sextuberculata		Insects & other
Capnia shasta		Insects & other
Capnia shepardi	Yuba Snowfly	Insects & other
Capnia spinulosa	San Gabriel Snowfly	Insects & other
Capnia teresa	Bernardino Snowfly	Insects & other
Capnia tumida	Swollen Snowfly	Insects & other
Capnia uintahi		Insects & other
Capnia umpqua	Umpqua Snowfly	Insects & other
Capnia utahensis	Utah Snowfly	Insects & other
Capnia valhalla	Viking Snowfly	Insects & other
Capnia ventura	Ventura Snowfly	Insects & other
Capnia willametta		Insects & other
Capnia yosemite	Yosemite Snowfly	Insects & other
Capnura anas		Insects & other
Capnura elevata		Insects & other
Capnura fibula		Insects & other
Capnura intermontana		Insects & other
Capnura venosa		Insects & other
Capnura wanica		Insects & other
Cardiocladius platypus		Insects & other
Carex alma	Sturdy Sedge	Plants
Carex amplifolia	Bigleaf Sedge	Plants
Carex aquatilis aquatilis	Water Sedge	Plants
Carex aquatilis dives	Sitka Sedge	Plants
Carex arcta	Northern Clustered Sedge	Plants
Carex atherodes	Awned Sedge	Plants
Carex aurea	Golden-fruit Sedge	Plants
Carex buxbaumii	Buxbaum's Sedge	Plants
Carex canescens canescens	Hoary Sedge	Plants

Carex comosa	Bristly Sedge	Plants
Carex cusickii	Cusick's Sedge	Plants
Carex densa	Dense Sedge	Plants
Carex diandra	Lesser Panicled Sedge	Plants
Carex disperma	Softleaf Sedge	Plants
Carex echinata echinata	Little Prickly Sedge	Plants
Carex echinata phyllomanica	Star Sedge	Plants
Carex exsiccata	Beaked Sedge	Plants
Carex feta	Green-sheath Sedge	Plants
Carex fissuricola	Cleft Sedge	Plants
Carex harfordii	Harford's Sedge	Plants
Carex hendersonii	Henderson's Sedge	Plants
Carex hirtissima	Fuzzy Sedge	Plants
Carex hystericina	Porcupine Sedge	Plants
Carex integra	Smooth-beak Sedge	Plants
Carex interior	Inland Sedge	Plants
Carex jonesii	Jones' Sedge	Plants
Carex klamathensis		Plants
Carex lasiocarpa	Slender Sedge	Plants
Carex lemmonii	Lemmon's Sedge	Plants
Carex lenticularis	Shore Sedge	Plants
Carex leporina		Plants
Carex leporinella	Sierra Hare Sedge	Plants
Carex leptalea	NA	Plants
Carex limosa	Mud Sedge	Plants
Carex livida	Livid Sedge	Plants
Carex longii	NA	Plants
Carex luzulina luzulina	Woodrush Sedge	Plants
Carex lyngbyei	Lyngbye's Sedge	Plants
Carex mertensii	Mertens' Sedge	Plants
Carex nebrascensis	Nebraska Sedge	Plants
Carex nervina	Sierra Sedge	Plants
Carex neurophora	Alpine-nerved Sedge	Plants
Carex nigricans	Black Alpine Sedge	Plants
Carex nudata	Torrent Sedge	Plants
Carex obnupta	Slough Sedge	Plants
Carex pellita	Woolly Sedge	Plants
Carex praeceptorum	Teacher's Sedge	Plants
Carex praticola	Northern Meadow Sedge	Plants
Carex saliniformis	Santa Cruz Sedge	Plants
Carex sartwelliana	Yosemite Sedge	Plants

Carex scabriuscula	Cascade Sedge	Plants
Carex schottii	Schott's Sedge	Plants
Carex scoparia scoparia	Broom Sedge	Plants
Carex scopulorum bracteosa	Holm's Rocky Mountain Sedge	Plants
Carex senta	Western Rough Sedge	Plants
Carex sheldonii	Sheldon's Sedge	Plants
Carex simulata	Copycat Sedge	Plants
Carex spectabilis	Northwestern Showy Sedge	Plants
Carex stipata stipata	Stalk-grain Sedge	Plants
Carex utriculata	Beaked Sedge	Plants
Carex vesicaria vesicaria	Inflated Sedge	Plants
Carex viridula viridula	Little Green Sedge	Plants
Carex vulpinoidea	NA	Plants
Cascadia nuttallii	NA	Plants
Cascadoperla trictura	Cascades Stripetail	Insects & other
Castilleja campestris succulenta	Fleshy Owl's-clover	Plants
Castilleja miniata elata	Siskiyou Indian-paintbrush	Plants
Castilleja miniata miniata	Greater Red Indian-paintbrush	Plants
Castilleja minor minor	Alkali Indian-paintbrush	Plants
Castilleja minor spiralis	Large-flower Annual Indian-paintbrush	Plants
Castor canadensis	American Beaver	Mammals
Catostomus fumeiventris	Owens sucker	Fishes
Catostomus latipinnis	Flannelmouth sucker	Fishes
Catostomus luxatus	Lost River sucker	Fishes
Catostomus microps	Modoc sucker	Fishes
Catostomus occidentalis humboldtianus	Humboldt sucker	Fishes
Catostomus occidentalis lacusanserinus	Goose Lake sucker	Fishes
Catostomus occidentalis mnioltiltus	Monterey sucker	Fishes
Catostomus occidentalis occidentalis	Sacramento sucker	Fishes
Catostomus platyrhynchus	Lahontan mountain sucker	Fishes
Catostomus rimiculus	Klamath smallscale sucker	Fishes
Catostomus santaanae	Santa Ana sucker	Fishes
Catostomus snyderi	Klamath largescale sucker	Fishes
Catostomus tahoensis	Tahoe sucker	Fishes
Caudatella columbiella		Insects & other
Caudatella edmundsi	A Mayfly	Insects & other
Caudatella heterocaudata	A Mayfly	Insects & other
Caudatella hystrix	A Mayfly	Insects & other

Caudatella jacobi	A Mayfly	Insects & other
Celina occidentalis		Insects & other
Cenocorixa andersoni		Insects & other
Cenocorixa blaisdelli		Insects & other
Cenocorixa kuiterti	A Water Boatman	Insects & other
Cenocorixa utahensis		Insects & other
Cenocorixa wileyae		Insects & other
Centroptilum album	A Mayfly	Insects & other
Centroptilum asperatum	A Mayfly	Insects & other
Centroptilum bifurcatum	A Mayfly	Insects & other
Centroptilum conturbatum	A Mayfly	Insects & other
Centroptilum elsa		Insects & other
Centroptilum oreophilum		Insects & other
Centroptilum selanderorum		Insects & other
Cephalanthus occidentalis	Common Buttonbush	Plants
Ceraclea annulicornis	A Caddisfly	Insects & other
Ceraclea latahensis	A Caddisfly	Insects & other
Ceraclea maculata	A Caddisfly	Insects & other
Ceraclea resurgens		Insects & other
Ceraclea tarsipunctata	A Caddisfly	Insects & other
Ceraclea vertreesi		Insects & other
Ceratophyllum demersum	Common Hornwort	Plants
Chaetarthria bicolor		Insects & other
Chaetarthria hespera		Insects & other
Chaetarthria leechi	Leech's Chaetarthrian Water Scavenger Beetle	Insects & other
Chaetarthria magna		Insects & other
Chaetarthria nigrella		Insects & other
Chaetarthria ochra		Insects & other
Chaetarthria pallida		Insects & other
Chaetarthria punctulata		Insects & other
Chaetarthria pusilla		Insects & other
Chaetarthria spinata		Insects & other
Chaetarthria truncata		Insects & other
Chaetocladius ligni		Insects & other
Chamaecyparis lawsoniana		Plants
Chasmatonotus hyalinus		Insects & other
Chasmatonotus maculipennis		Insects & other
Chasmatonotus univittatus		Insects & other
Chasmistes brevirostris	Shortnose sucker	Fishes
Chelomideopsis brunsoni		Insects & other

Chelomideopsis minuta		Insects & other
Chelomideopsis occidentalis		Insects & other
Chelomideopsis siskiyouensis		Insects & other
Chen caerulescens	Snow Goose	Birds
Chen rossii	Ross's Goose	Birds
Chernokrilus misnomus	Oregon Springfly	Insects & other
Chernovskiia orbicus		Insects & other
Cheumatopsyche analis		Insects & other
Cheumatopsyche arizonensis	A Caddisfly	Insects & other
Cheumatopsyche campyla	A Caddisfly	Insects & other
Cheumatopsyche enonis		Insects & other
Cheumatopsyche gelita		Insects & other
Cheumatopsyche lasia		Insects & other
Cheumatopsyche mickeli	A Caddisfly	Insects & other
Cheumatopsyche mollala	A Caddisfly	Insects & other
Cheumatopsyche pasella		Insects & other
Cheumatopsyche pinula		Insects & other
Cheumatopsyche wabasha		Insects & other
Chimarra adella		Insects & other
Chimarra angustipennis	A Caddisfly	Insects & other
Chimarra butleri	A Caddisfly	Insects & other
Chimarra elia	A Caddisfly	Insects & other
Chimarra lara		Insects & other
Chimarra primula		Insects & other
Chimarra ridleyi		Insects & other
Chimarra schiza		Insects & other
Chimarra siva		Insects & other
Chimarra texana		Insects & other
Chimarra utahensis	A Caddisfly	Insects & other
Chironomus anonymus		Insects & other
Chironomus anthracinus		Insects & other
Chironomus atrella		Insects & other
Chironomus calligraphus		Insects & other
Chironomus cucini		Insects & other
Chironomus decorus		Insects & other
Chironomus frommeri		Insects & other
Chironomus longipes		Insects & other
Chironomus maturus		Insects & other
Chironomus mendax		Insects & other
Chironomus plumosus		Insects & other
Chironomus riparius		Insects & other

Chironomus staegeri		Insects & other
Chironomus stigmaterus		Insects & other
Chironomus tuxis		Insects & other
Chironomus utahensis		Insects & other
Chironomus whitseli		Insects & other
Chlidonias niger	Black Tern	Birds
Chloropyron maritimum canescens		Plants
Chloropyron maritimum maritimum		Plants
Chloropyron maritimum palustre		Plants
Chloropyron molle hispidum		Plants
Chloropyron molle molle		Plants
Chloropyron palmatum	NA	Plants
Chloropyron tecopense		Plants
Choroterpes albiannulata	A Mayfly	Insects & other
Choroterpes inornata	A Mayfly	Insects & other
Choroterpes terratoma	A Mayfly	Insects & other
Chroicocephalus philadelphia	Bonaparte's Gull	Birds
Chrysosplenium glechomifolium	Pacific Golden-saxifrage	Plants
Chyrandra centralis	A Caddisfly	Insects & other
Cicendia quadrangularis	Oregon Microcala	Plants
Cicuta douglasii	Western Water-hemlock	Plants
Cicuta maculata angustifolia	Spotted Water-hemlock	Plants
Cicuta maculata bolanderi	Bolander's Water-hemlock	Plants
Cicuta maculata maculata	Spotted Water-hemlock	Plants
Cinclus mexicanus	American Dipper	Birds
Cinygma dimicki	A Mayfly	Insects & other
Cinygma integrum	A Mayfly	Insects & other
Cinygma lyriforme	A Mayfly	Insects & other
Cinygmula gartrelli	A Mayfly	Insects & other
Cinygmula mimus	A Mayfly	Insects & other
Cinygmula par	A Mayfly	Insects & other
Cinygmula ramaleyi	A Mayfly	Insects & other
Cinygmula reticulata	A Mayfly	Insects & other
Cinygmula tarda		Insects & other
Cinygmula tioga	A Mayfly	Insects & other
Cinygmula uniformis	A Mayfly	Insects & other
Cirsium crassicaule	Slough Thistle	Plants
Cirsium douglasii breweri		Plants

Cirsium douglasii douglasii	Douglas' Thistle	Plants
Cirsium fontinale campylon	Mt. Hamilton Thistle	Plants
Cirsium fontinale fontinale	Fountain Thistle	Plants
Cirsium fontinale obispoense	Chorro Creek Bog Thistle	Plants
Cirsium hydrophilum hydrophilum	Suisun Thistle	Plants
Cirsium hydrophilum vaseyi	Mt. Tamalpais Thistle	Plants
Cirsium scariosum loncholepis		Plants
Cirsium scariosum robustum		Plants
Cirsium scariosum scariosum	Drummond's Thistle	Plants
Cistothorus palustris clarkae	Clark's Marsh Wren	Birds
Cistothorus palustris palustris	Marsh Wren	Birds
Claassenia sabulosa	Shortwing Stone	Insects & other
Cladium californicum	California Sawgrass	Plants
Cladopelma amachaerum		Insects & other
Cladopelma edwardsi		Insects & other
Cladopelma forcipis		Insects & other
Cladopelma viridulum		Insects & other
Cladotanytarsus marki		Insects & other
Cladotanytarsus viridiventris		Insects & other
Cleptelmis addenda		Insects & other
Climacia californica		Insects & other
Clinopodium mimuloides	Monkey-flower Savory	Plants
Clinotanypus pinguis		Insects & other
Clistoronia formosa		Insects & other
Clistoronia maculata		Insects & other
Clistoronia magnifica	A Caddisfly	Insects & other
Cloeodes excogitatus	A Mayfly	Insects & other
Cloeodes macrolamellus		Insects & other
Cloeodes peninsulus		Insects & other
Clostoeca disjuncta	A Caddisfly	Insects & other
Clunio californiensis		Insects & other
Cnodocentron yavapai		Insects & other
Coccyzus americanus occidentalis	Western Yellow-billed Cuckoo	Birds
Coenagrion resolutum	Taiga Bluet	Insects & other
Colligyrus convexus	Canary Duskysnail	Mollusks
Colligyrus greggi		Mollusks
Colymbetes crotchi		Insects & other
Colymbetes densus		Insects & other
Colymbetes incognitus		Insects & other
Colymbetes strigatus		Insects & other

Comarum palustre	Marsh Cinquefoil	Plants
Conchapelopia mera		Insects & other
Conchapelopia pallens		Insects & other
Copelatus chevrolati		Insects & other
Copelatus glyphicus		Insects & other
Coptotomus longulus longulus		Insects & other
Coquillettidia peturbans		Insects & other
Cordulegaster diadema		Insects & other
Cordulegaster dorsalis	Pacific Spiketail	Insects & other
Cordulia shurtleffii	American Emerald	Insects & other
Corisella decolor		Insects & other
Corisella edulis		Insects & other
Corisella inscripta		Insects & other
Corisella tarsalis		Insects & other
Corydalus bidenticulatus		Insects & other
Corydalus texanus		Insects & other
Cosumnoperla hypocrena	Cosumnes Stripetail	Insects & other
Cosumnoperla sequoia	A Stonefly	Insects & other
Cottus aleuticus	Coastrange sculpin	Fishes
Cottus asper ssp. 1	Prickly sculpin	Fishes
Cottus asper ssp. 2	Clear Lake prickly sculpin	Fishes
Cottus asperrimus	Rough sculpin	Fishes
Cottus beldingi	Paiute sculpin	Fishes
Cottus gulosus	Riffle sculpin	Fishes
Cottus klamathensis klamathensis	Upper Klamath marbled sculpin	Fishes
Cottus klamathensis macrops	Bigeye marbled sculpin	Fishes
Cottus klamathensis polyporus	Lower Klamath marbled sculpin	Fishes
Cottus perplexus	Reticulate sculpin	Fishes
Cottus pitensis	Pit sculpin	Fishes
Cotula coronopifolia	NA	Plants
Coturnicops noveboracensis	Yellow Rail	Birds
Crangonyx richmondensis	Ellis Bog Crangonyctid	Crustaceans
Crassula aquatica	Water Pygmyweed	Plants
Crassula solieri	NA	Plants
Crenitis alticola		Insects & other
Crenitis dissimilis		Insects & other
Crenitis malkini		Insects & other
Crenitis morata		Insects & other
Crenitis palpalis		Insects & other
Crenitis paradigma		Insects & other

Crenitis rufiventris		Insects & other
Crenitis seriellus		Insects & other
Crenitis snoqualmie		Insects & other
Crenophylax sperryi		Insects & other
Cricotopus annulator		Insects & other
Cricotopus bicinctus		Insects & other
Cricotopus blinni		Insects & other
Cricotopus edurus		Insects & other
Cricotopus furtivus		Insects & other
Cricotopus fuscatus		Insects & other
Cricotopus globistylus		Insects & other
Cricotopus herrmanni		Insects & other
Cricotopus infuscatus		Insects & other
Cricotopus nostocicola		Insects & other
Cricotopus obscurifuscus		Insects & other
Cricotopus ornatus		Insects & other
Cricotopus parafuscatus		Insects & other
Cricotopus subfuscus		Insects & other
Cricotopus subletteorum		Insects & other
Cricotopus sylvestris		Insects & other
Cricotopus tremulus		Insects & other
Cricotopus trifascia		Insects & other
Crypsis vaginiflora	NA	Plants
Cryptochia califca	A Caddisfly	Insects & other
Cryptochia denningi	Denning's Cryptic Caddisfly	Insects & other
Cryptochia excella	Kings Canyon Cryptochian Caddisfly	Insects & other
Cryptochia neosa		Insects & other
Cryptochia pilosa		Insects & other
Cryptochia shasta	Confusion Caddisfly	Insects & other
Cryptochironomus curryi		Insects & other
Cryptochironomus digitatus		Insects & other
Cryptochironomus fulvus		Insects & other
Cryptochironomus ponderosus		Insects & other
Cryptochironomus psittacinus		Insects & other
Cryptotendipes ariel		Insects & other
Cryptotendipes darbyi		Insects & other
Culex anips		Insects & other
Culex apicalis		Insects & other
Culex arizonensis		Insects & other
Culex boharti		Insects & other
Culex coronator		Insects & other

Culex erythrothorax		Insects & other
Culex interrogator		Insects & other
Culex pipiens		Insects & other
Culex quinquefasciatus		Insects & other
Culex reevesi		Insects & other
Culex restuans		Insects & other
Culex salinarius		Insects & other
Culex stigmatosoma		Insects & other
Culex tarsalis		Insects & other
Culex territans		Insects & other
Culex thriambus		Insects & other
Culiseta impatiens		Insects & other
Culiseta incidens		Insects & other
Culiseta inornata		Insects & other
Culiseta minnesotae		Insects & other
Culiseta morsitans		Insects & other
Culiseta particeps		Insects & other
Culoptila cantha		Insects & other
Culoptila kimminsi		Insects & other
Culoptila moselyi		Insects & other
Culoptila thoracica		Insects & other
Cultus aestivalis		Insects & other
Cultus pilatus		Insects & other
Cultus tostonus	Toston Springfly	Insects & other
Curicta pronotata		Insects & other
Cybister ellipticus		Insects & other
Cybister explanatus		Insects & other
Cyclothyas siskiyouensis		Insects & other
Cygnus buccinator	Trumpeter Swan	Birds
Cygnus columbianus	Tundra Swan	Birds
Cylloepus abnormis		Insects & other
Cylloepus parkeri		Insects & other
Cymbiodyta arizonica		Insects & other
Cymbiodyta columbiana		Insects & other
Cymbiodyta dorsalis		Insects & other
Cymbiodyta fraterculus		Insects & other
Cymbiodyta howdeni		Insects & other
Cymbiodyta imbellis		Insects & other
Cymbiodyta leechi		Insects & other
Cymbiodyta minima		Insects & other
Cymbiodyta occidentalis		Insects & other

Cymbiodyta pacifica		Insects & other
Cymbiodyta pseudopacifica		Insects & other
Cymbiodyta puella		Insects & other
Cymbiodyta punctatostriata		Insects & other
Cymbiodyta seriata		Insects & other
Cyperus acuminatus	Short-point Flatsedge	Plants
Cyperus bipartitus	Shining Flatsedge	Plants
Cyperus erythrorhizos	Red-root Flatsedge	Plants
Cyperus flavescens	NA	Plants
Cyperus fuscus	NA	Plants
Cyperus involucratus	NA	Plants
Cyperus iria	NA	Plants
Cyperus squarrosus	Awned Cyperus	Plants
Cyphomella gibbera		Insects & other
Cyphon arcuatus		Insects & other
Cyphon brevicollis		Insects & other
Cyphon exiguus		Insects & other
Cyphon johni		Insects & other
Cyphon spinulosus		Insects & other
Cyphon variabilis		Insects & other
Cyprinodon macularius	Desert pupfish	Fishes
Cyprinodon nevadensis amargosae	Amargosa River pupfish	Fishes
Cyprinodon nevadensis calidae	Tecopa Pupfish	Fishes
Cyprinodon nevadensis nevadensis	Saratoga Springs pupfish	Fishes
Cyprinodon nevadensis shoshone	Shoshone pupfish	Fishes
Cyprinodon radiosus	Owens pupfish	Fishes
Cyprinodon salinus milleri	Cottonball Marsh pupfish	Fishes
Cyprinodon salinus salinus	Salt Creek pupfish	Fishes
Cypripedium californicum	California Lady's-slipper	Plants
Cypseloides niger	Black Swift	Birds
Cyzicus californicus	California Clam Shrimp	Crustaceans
Cyzicus elongatus	Elongate Clam Shrimp	Crustaceans
Cyzicus mexicanus	Mexican Clam Shrimp	Crustaceans
Cyzicus setosa	Bristletail Clam Shrimp	Crustaceans
Damasonium californicum		Plants
Darlingtonia californica	California Pitcherplant	Plants
Darmera peltata	Umbrella Plant	Plants
Datisca glomerata	Durango Root	Plants
Delphinium uliginosum	Swamp Larkspur	Plants

Deltamysis homquistae		Crustaceans
Demeijerea brachialis		Insects & other
Dendrocygna bicolor	Fulvous Whistling-Duck	Birds
Derotanypus aclines		Insects & other
Desmona bethula	Amphibious Caddisfly	Insects & other
Desmona mono	A Caddisfly	Insects & other
Desmopachria dispersa		Insects & other
Desmopachria latissima		Insects & other
Desmopachria mexicana		Insects & other
Desmopachria portmanni		Insects & other
Despaxia augusta	Smooth Needleflyl	Insects & other
Deuterophlebia coloradensis		Insects & other
Deuterophlebia inyoensis		Insects & other
Deuterophlebia nielsoni		Insects & other
Deuterophlebia personata		Insects & other
Deuterophlebia shasta	A Mountain Midge	Insects & other
Diamesa aberrata		Insects & other
Diamesa ancysta		Insects & other
Diamesa chorea		Insects & other
Diamesa davisi		Insects & other
Diamesa haydaki		Insects & other
Diamesa heteropus		Insects & other
Diamesa japonica		Insects & other
Diamesa sonorae		Insects & other
Diamesa spinacies		Insects & other
Dicamptodon ensatus	California Giant Salamander	Herps
Dicamptodon tenebrosus	Pacific Giant Salamander	Herps
Dicosmoecus atripes	A Caddisfly	Insects & other
Dicosmoecus gilvipes	A Caddisfly	Insects & other
Dicosmoecus pallicornis	A Caddisfly	Insects & other
Dicrotendipes adnilus		Insects & other
Dicrotendipes aethiops		Insects & other
Dicrotendipes californicus		Insects & other
Dicrotendipes crypticus		Insects & other
Dicrotendipes fumidus		Insects & other
Dicrotendipes milleri		Insects & other
Dicrotendipes modestus		Insects & other
Dicrotendipes nervosus		Insects & other
Dicrotendipes tritomus		Insects & other
Dineutus solitarius		Insects & other
Dineutus sublineatus		Insects & other

Diphetor hageni	Hagen's Small Minnow Mayfly	Insects & other
Diplectrona californica	California Diplectronan Caddisfly	Insects & other
Distichlis littoralis	NA	Plants
Diura knowltoni	Nearctic Springfly	Insects & other
Doddsia occidentalis	Western Willowfly	Insects & other
Doithrix barberi		Insects & other
Doithrix ensifer		Insects & other
Dolophilodes aequalis	A Caddisfly	Insects & other
Dolophilodes andora	A Caddisfly	Insects & other
Dolophilodes dorcus	A Caddisfly	Insects & other
Dolophilodes novusamericanus	A Caddisfly	Insects & other
Dolophilodes pallidipes	A Caddisfly	Insects & other
Doroneuria baumanni	Cascades Stone	Insects & other
Downingia bacigalupii	Bacigalup's Downingia	Plants
Downingia bella	Hoover's Downingia	Plants
Downingia bicornuta	NA	Plants
Downingia concolor	NA	Plants
Downingia cuspidata	Toothed Calicoflower	Plants
Downingia elegans	NA	Plants
Downingia insignis	Parti-color Downingia	Plants
Downingia laeta	Great Basin Downingia	Plants
Downingia montana	Sierra Downingia	Plants
Downingia ornatissima	NA	Plants
Downingia pulchella	Flat-face Downingia	Plants
Downingia pulcherrima		Plants
Downingia pusilla	Dwarf Downingia	Plants
Downingia willamettensis		Plants
Downingia yina	NA	Plants
Drosera anglica	English Sundew	Plants
Drosera rotundifolia	NA	Plants
Drunella coloradensis	A Mayfly	Insects & other
Drunella doddsii	A Mayfly	Insects & other
Drunella flavilinea	A Mayfly	Insects & other
Drunella grandis	A Mayfly	Insects & other
Drunella pelosa	A Mayfly	Insects & other
Drunella spinifera	A Mayfly	Insects & other
Drymocallis cuneifolia ewanii		Plants
Dryops arizonensis		Insects & other
Dubiraphia brunnescens	Brownish Dubiraphian Riffle Beetle	Insects & other
Dubiraphia giulianii	Giuliani's Dubiraphian Riffle Beetle	Insects & other
Dulichium arundinaceum	NA	Plants

Dumontia oregonensis	A Water Flea	Crustaceans
Dysmicohermes disjunctus		Insects & other
Dysmicohermes ingens		Insects & other
Dythemis fugax		Insects & other
Dythemis nigrescens		Insects & other
Dythemis velox		Insects & other
Dytiscus cordieri		Insects & other
Dytiscus dauricus		Insects & other
Dytiscus habilis		Insects & other
Dytiscus hatchi		Insects & other
Dytiscus hybridus		Insects & other
Dytiscus marginicollis		Insects & other
Ecclisocosmoecus scylla		Insects & other
Ecclisomyia bilera	King's Creek Ecclisomyian Caddisfly	Insects & other
Ecclisomyia conspersa	A Caddisfly	Insects & other
Ecclisomyia maculosa	A Caddisfly	Insects & other
Ecdyonurus criddlei	A Mayfly	Insects & other
Ecdyonurus simplicoides		Insects & other
Echinochloa oryzoides	NA	Plants
Echinodorus berteroi	Upright Burhead	Plants
Edmundsius agilis	A Mayfly	Insects & other
Egretta thula	Snowy Egret	Birds
Elatine brachysperma	Shortseed Waterwort	Plants
Elatine californica	California Waterwort	Plants
Elatine heterandra	Mosquito Waterwort	Plants
Elatine rubella	Southwestern Waterwort	Plants
Eleocharis acicularis acicularis	Least Spikerush	Plants
Eleocharis acicularis gracilescens	Least Spikerush	Plants
Eleocharis acicularis occidentalis		Plants
Eleocharis atropurpurea	Purple Spikerush	Plants
Eleocharis bella	Delicate Spikerush	Plants
Eleocharis bernardina		Plants
Eleocharis bolanderi	Bolander's Spikerush	Plants
Eleocharis coloradoensis		Plants
Eleocharis decumbens	Decumbent Spikerush	Plants
Eleocharis engelmannii detonsa		Plants
Eleocharis engelmannii engelmannii	Engelmann's Spikerush	Plants
Eleocharis flavescens flavescens	Pale Spikerush	Plants
Eleocharis geniculata	Capitate Spikerush	Plants

Eleocharis macrostachya	Creeping Spikerush	Plants
Eleocharis montevidensis	Sand Spikerush	Plants
Eleocharis obtusa	Blunt Spikerush	Plants
Eleocharis ovata		Plants
Eleocharis palustris	Creeping Spikerush	Plants
Eleocharis parishii	Parish's Spikerush	Plants
Eleocharis parvula	Small Spikerush	Plants
Eleocharis quadrangulata	NA	Plants
Eleocharis quinqueflora	Few-flower Spikerush	Plants
Eleocharis radicans	Rooted Spikerush	Plants
Eleocharis rostellata	Beaked Spikerush	Plants
Eleocharis suksdorfiana	NA	Plants
Eleocharis torticulmis	Twisted Spikerush	Plants
Elodea bifoliata	NA	Plants
Elodea canadensis	Broad Waterweed	Plants
Elodea nuttallii	Nuttall's Waterweed	Plants
Elodes angusta		Insects & other
Elodes apicalis		Insects & other
Elodes aquatica		Insects & other
Elodes emarginata		Insects & other
Elodes impressa		Insects & other
Elodes nunenmacheri		Insects & other
Empidonax traillii	Willow Flycatcher	Birds
Empidonax traillii adastus	A Willow Flycatcher	Birds
Empidonax traillii brewsteri	Willow Flycatcher	Birds
Empidonax traillii extimus	Southwestern Willow Flycatcher	Birds
Enallagma anna	River Bluet	Insects & other
Enallagma basidens	Double-striped Bluet	Insects & other
Enallagma boreale	Boreal Bluet	Insects & other
Enallagma carunculatum	Tule Bluet	Insects & other
Enallagma civile	Familiar Bluet	Insects & other
Enallagma clausum	Alkali Bluet	Insects & other
Enallagma cyathigerum		Insects & other
Enallagma praevarum	Arroyo Bluet	Insects & other
Enallagma semicirculare		Insects & other
Endochironomus nigricans		Insects & other
Endotribelos hesperium		Insects & other
Enochrus aridus		Insects & other
Enochrus californicus		Insects & other
Enochrus carinatus		Insects & other
Enochrus cristatus		Insects & other

Enochrus cuspidatus		Insects & other
Enochrus diffusus		Insects & other
Enochrus fimbriatus		Insects & other
Enochrus hamiltoni		Insects & other
Enochrus ochraceus		Insects & other
Enochrus piceus		Insects & other
Enochrus pygmaeus		Insects & other
Entosphenus folletti	Northern California brook lamprey	Fishes
Entosphenus similis	Klamath River lamprey	Fishes
Entosphenus tridentata ssp. 1	Pacific lamprey	Fishes
Entosphenus tridentata ssp. 2	Goose Lake lamprey	Fishes
Eobrachycentrus gelidae		Insects & other
Eocosmoecus frontalis		Insects & other
Eocyzicus digueti	Straightbacked Clam Shrimp	Crustaceans
Epeorus albertae	A Mayfly	Insects & other
Epeorus deceptivus	A Mayfly	Insects & other
Epeorus dulciana	A Mayfly	Insects & other
Epeorus grandis	A Mayfly	Insects & other
Epeorus hesperus	A Mayfly	Insects & other
Epeorus lagunitas	A Mayfly	Insects & other
Epeorus longimanus	A Mayfly	Insects & other
Epeorus margarita	A Mayfly	Insects & other
Epeorus permagnus		Insects & other
Ephemera simulans		Insects & other
Ephemerella alleni		Insects & other
Ephemerella aurivillii	A Mayfly	Insects & other
Ephemerella dorothea dorothea	A Mayfly	Insects & other
Ephemerella excrucians	A Mayfly	Insects & other
Ephemerella maculata	A Mayfly	Insects & other
Ephemerella tibialis	A Mayfly	Insects & other
Ephemerella velmae	A Mayfly	Insects & other
Ephemerella verruca		Insects & other
Ephoron album	A Mayfly	Insects & other
Epilobium campestre	NA	Plants
Epilobium cleistogamum	Cleistogamous Spike-primrose	Plants
Epilobium hallianum		Plants
Epilobium oreganum	Oregon Willowherb	Plants
Epilobium oregonense	Oregon Willow-herb	Plants
Epilobium palustre	Marsh Willowherb	Plants
Epipactis gigantea	Giant Helleborine	Plants
Epitheca canis	Beaverpond Baskettail	Insects & other

Epitheca spinigera	Spiny Baskettail	Insects & other
Equisetum palustre	NA	Plants
Eragrostis hypnoides	Teal Lovegrass	Plants
Erebaxonopsis nearctica		Insects & other
Eremopyrgus eganensis		Mollusks
Eretes sticticus		Insects & other
Eretmoptera browni		Insects & other
Erigeron coulteri	Coulter's Fleabane	Plants
Eriophorum crinigerum	Fringed Cotton-grass	Plants
Eriophorum gracile gracile	Slender Cotton-grass	Plants
Erpetogomphus compositus	White-belted Ringtail	Insects & other
Erpetogomphus crotalinus		Insects & other
Erpetogomphus designatus		Insects & other
Erpetogomphus lampropeltis lampropeltis	Serpent Ringtail	Insects & other
Eryngium alismifolium	Inland Coyote-thistle	Plants
Eryngium aristulatum aristulatum	California Eryngo	Plants
Eryngium aristulatum hooveri	Hoover's Coyote-thistle	Plants
Eryngium aristulatum parishii	San Diego Button Celery	Plants
Eryngium articulatum	Jointed Coyote-thistle	Plants
Eryngium castrense	Great Valley Eryngo	Plants
Eryngium constancei	Loch Lomond Button-celery	Plants
Eryngium jepsonii	NA	Plants
Eryngium mathiasiae	Mathias' Coyote-thistle	Plants
Eryngium pinnatisectum	Tuolumne Coyote-thistle	Plants
Eryngium racemosum	Delta Coyote-thistle	Plants
Eryngium spinosepalum	Spiny Sepaled Coyote-thistle	Plants
Eryngium vaseyi vallicola		Plants
Eryngium vaseyi vaseyi	Vasey's Coyote-thistle	Plants
Erythemis collocata	Western Pondhawk	Insects & other
Erythemis simplicicollis		Insects & other
Erythemis vesiculosa		Insects & other
Erythrodiplax basifusca		Insects & other
Erythrodiplax funerea		Insects & other
Eubranchipus bundyi	Knobbedlip Fairy Shrimp	Crustaceans
Eubranchipus oregonus	Oregon Fairy Shrimp	Crustaceans
Eubranchipus serratus	Ethologist Fairy Shrimp	Crustaceans
Eubrianax edwardsii		Insects & other
Eucapnopsis brevicauda	Shorttailed Snowfly	Insects & other
Eucorethra underwoodi		Insects & other
Eucyclogobius newberryi	Tidewater goby	Fishes

Eukiefferiella claripennis		Insects & other
Eukiefferiella coerulescens		Insects & other
Eukiefferiella cyanea		Insects & other
Eukiefferiella devonica		Insects & other
Eukiefferiella ilkleyensis		Insects & other
Eulimnadia diversa	Diversity Clam Shrimp	Crustaceans
Eulimnadia texana	Texan Clam Shrimp	Crustaceans
Eulimnichus analis		Insects & other
Eulimnichus californicus		Insects & other
Eulimnichus evanescens		Insects & other
Eulimnichus montanus		Insects & other
Eulimnichus perpolitus		Insects & other
Euphorbia hooveri	NA	Plants
Euryhapsis annuliventris		Insects & other
Euryhapsis illoba		Insects & other
Eurylophella lodi	A Mayfly	Insects & other
Eustoma exaltatum	NA	Plants
Euthamia occidentalis	Western Fragrant Goldenrod	Plants
Exopalaemon carinicauda		Crustaceans
Fallceon eatoni	A Mayfly	Insects & other
Fallceon quilleri	A Mayfly	Insects & other
Fallceon sonora	A Mayfly	Insects & other
Fallceon thermophilos	A Mayfly	Insects & other
Farula davisi	Green Springs Mountain Farulan Caddisfly	Insects & other
Farula geyseri	A Farulan Caddisfly	Insects & other
Farula honeyi	A Farulan Caddisfly	Insects & other
Farula jewetti		Insects & other
Farula malkini		Insects & other
Farula moweri	A Caddisfly	Insects & other
Farula petersoni	A Farulan Caddisfly	Insects & other
Farula praelonga	Long-tailed Caddisfly	Insects & other
Farula raineri		Insects & other
Farula reapiri		Insects & other
Farula wigginsi		Insects & other
Ferrissia fragilis	Fragile Ancylid	Mollusks
Ferrissia rivularis	Creeping Ancylid	Mollusks
Ferrissia walkeri	Cloche Ancylid	Mollusks
Ficopotamus enigmaticus		Insects & other
Fimbristylis autumnalis	NA	Plants
Fimbristylis thermalis	Hot Springs Fimbry	Plants
Floerkea proserpinacoides	False Mermaidweed	Plants

Fluminicola ahjumawi	Ahjumawi pebblesnail	Mollusks
Fluminicola anserinus	Goose Valley pebblesnail	Mollusks
Fluminicola caballensis	Horse Creek pebblesnail	Mollusks
Fluminicola erosus	Smokey Charley pebblesnail	Mollusks
Fluminicola favillaceus	Ash Valley pebblesnail	Mollusks
Fluminicola fremonti	Fremont pebblesnail	Mollusks
Fluminicola lunsfordensis	Lunsford pebblesnail	Mollusks
Fluminicola modoci	Modoc Pebblesnail	Mollusks
Fluminicola multifarius	Shasta pebblesnail	Mollusks
Fluminicola neritoides	Willow Creek pebblesnail	Mollusks
Fluminicola potemicus	Potem Creek pebblesnail	Mollusks
Fluminicola scopulinus	Castle Creek pebblesnail	Mollusks
Fluminicola seminalis	Nugget Pebblesnail	Mollusks
Fluminicola turbiniformis	Turban Pebblesnail	Mollusks
Fluminicola umbilicatus	Hat Creek pebblesnail	Mollusks
Fluminicola warnerensis	Warner pebblesnail	Mollusks
Frankenia palmeri	Palmer's Frankenia	Plants
Frisonia picticeps	Painted Springfly	Insects & other
Fulica americana	American Coot	Birds
Fundulus parvipinnis	California killifish	Fishes
Galba bulimoides	Prairie Fossaria	Mollusks
Galba cubensis	Carib Fossaria	Mollusks
Galba modicella	Rock Fossaria	Mollusks
Galba obrussa	Golden Fossaria	Mollusks
Galba perplexa	A Freshwater Snail	Mollusks
Galba sonomaensis	Sonoma Fossaria	Mollusks
Galba techella	A Freshwater Snail	Mollusks
Galium trifidum	Small Bedstraw	Plants
Gallinago delicata	Wilson's Snipe	Birds
Gallinula chloropus	Common Moorhen	Birds
Gammarus lacustris		Crustaceans
Gasterosteus aculeatus aculeatus	Coastal threespine stickleback	Fishes
Gasterosteus aculeatus microcephalus	Inland threespine stickleback	Fishes
Gasterosteus aculeatus ssp. 1	Shay Creek stickleback	Fishes
Gasterosteus aculeatus williamsoni	Unarmored threespine stickleback	Fishes
Gelastocoris oculatus		Insects & other
Gelastocoris rotundatus		Insects & other
Gelochelidon nilotica vanrossemi	Gull-billed Tern	Birds
Gentiana calycosa	Explorer's Gentian	Plants

Gentiana sceptrum	Pacific Gentian	Plants
Gentiana setigera	Elegant Gentian	Plants
Gentianella amarella acuta	Autumn Dwarf Gentian	Plants
Gentianopsis holopetala	Sierra Gentian	Plants
Gentianopsis simplex	One-flower Gentian	Plants
Georissus californicus		Insects & other
Georthocladius platystylus		Insects & other
Georthocladius wirthi		Insects & other
Geothelpusa dehaani		Crustaceans
Geothlypis trichas sinuosa	Saltmarsh Common Yellowthroat	Birds
Geothlypis trichas trichas	Common Yellowthroat	Birds
Gerris comatus		Insects & other
Gerris gillettei		Insects & other
Gerris incognitis		Insects & other
Gerris incurvatus		Insects & other
Gerris insperatus		Insects & other
Gigantodax adleri		Insects & other
Gila coerulea	Blue chub	Fishes
Gila crassicauda	Thicktail Chub	Fishes
Gila elegans	Bonytail	Fishes
Gila orcutti	Arroyo chub	Fishes
Glinus radiatus	NA	Plants
Glossosoma alascense	A Caddisfly	Insects & other
Glossosoma bruna	A Caddisfly	Insects & other
Glossosoma califica	A Caddisfly	Insects & other
Glossosoma excitum		Insects & other
Glossosoma mereca	A Caddisfly	Insects & other
Glossosoma montanum		Insects & other
Glossosoma oregonense	A Caddisfly	Insects & other
Glossosoma penitum	A Caddisfly	Insects & other
Glossosoma pternum	A Caddisfly	Insects & other
Glossosoma pyroxum		Insects & other
Glossosoma schuhi		Insects & other
Glossosoma sequoia	A Caddisfly	Insects & other
Glossosoma traviatum		Insects & other
Glossosoma velonum		Insects & other
Glossosoma ventrale		Insects & other
Glossosoma verdonum	A Caddisfly	Insects & other
Glossosoma wenatchee		Insects & other
Glyceria borealis	Small Floating Mannagrass	Plants
Glyceria elata	Tall Mannagrass	Plants

Glyceria fluitans	NA	Plants
Glyceria grandis	American Mannagrass	Plants
Glyceria leptostachya	Slim-head Mannagrass	Plants
Glyceria striata var. stricta	Fowl Mannagrass	Plants
Glyphopsyche irrorata	A Caddisfly	Insects & other
Glyptotendipes barbipes		Insects & other
Glyptotendipes lobiferus		Insects & other
Glyptotendipes paripes		Insects & other
Gnorimosphaeroma insulare	An Isopod	Crustaceans
Gnorimosphaeroma noblei	An Isopod	Crustaceans
Goeldichironomus amazonicus		Insects & other
Goeldichironomus holoprasinus		Insects & other
Goera archaon	A Caddisfly	Insects & other
Goeracea genota		Insects & other
Goeracea oregona	Sagehen Creek Goeracean Caddisfly	Insects & other
Gomphus kurilis	Pacific Clubtail	Insects & other
Gomphus lynnae		Insects & other
Gonidea angulata	Western Ridged Mussel	Mollusks
Grammotaulius betteni		Insects & other
Graphoderus liberus		Insects & other
Graphoderus occidentalis		Insects & other
Graphoderus perplexus		Insects & other
Graptocorixa abdominalis		Insects & other
Graptocorixa californica		Insects & other
Graptocorixa gerhardi		Insects & other
Graptocorixa serrulata		Insects & other
Graptocorixa uhleri		Insects & other
Graptocorixa uhleroidea	A Water Boatman	Insects & other
Gratiola ebracteata	Bractless Hedge-hyssop	Plants
Gratiola heterosepala	Boggs Lake Hedge-hyssop	Plants
Gratiola neglecta	Clammy Hedge-hyssop	Plants
Greneria humeralis		Insects & other
Grus canadensis	Sandhill Crane	Birds
Grus canadensis canadensis	Lesser Sandhill Crane	Birds
Grus canadensis tabida	Greater Sandhill Crane	Birds
Gumaga griseola	A Bushtailed Caddisfly	Insects & other
Gumaga nigricula	A Bushtailed Caddisfly	Insects & other
Gymnochthebius falli		Insects & other
Gymnochthebius fossatus		Insects & other
Gymnochthebius laevipennis		Insects & other
Gyraulus circumstriatus	Disc Gyro	Mollusks

Gyraulus crista	Star Gyro	Mollusks
Gyraulus deflectus		Mollusks
Gyraulus parvus	Ash Gyro	Mollusks
Gyraulus vermicularis	Pacific Coast Gyraulus	Mollusks
Gyretes sinuatus		Insects & other
Gyretes torosus		Insects & other
Gyrinus affinis		Insects & other
Gyrinus bifarius		Insects & other
Gyrinus confinis		Insects & other
Gyrinus consobrinus		Insects & other
Gyrinus latilimbus		Insects & other
Gyrinus maculiventris		Insects & other
Gyrinus parcus		Insects & other
Gyrinus picipes		Insects & other
Gyrinus pleuralis		Insects & other
Gyrinus plicifer		Insects & other
Gyrinus rugosus		Insects & other
Halesochila taylori		Insects & other
Haliaeetus leucocephalus	Bald Eagle	Birds
Haliaeetus leucocephalus pop. 4	Bald Eagle - Wintering Population	Birds
Haliplus concolor		Insects & other
Haliplus cylindricus		Insects & other
Haliplus distinctus		Insects & other
Haliplus dorsomaculatus		Insects & other
Haliplus eremicus		Insects & other
Haliplus gracilis		Insects & other
Haliplus leechi		Insects & other
Haliplus longulus		Insects & other
Haliplus mimeticus		Insects & other
Haliplus robertsi		Insects & other
Haliplus rugosus		Insects & other
Haliplus subguttatus		Insects & other
Haliplus tumidus		Insects & other
Halobates sericeus		Insects & other
Haploperla chilnualna	Yosemite Sallfly	Insects & other
Harnischia curtilamellata		Insects & other
Hastingsia alba	White Rushlily	Plants
Hayesomyia senata		Insects & other
Hebrus buenoi		Insects & other
Hebrus hubbardi		Insects & other
Hebrus longivillus		Insects & other

Hebrus major		Insects & other
Hebrus obscurus		Insects & other
Hebrus sobrinus		Insects & other
Helenium autumnale	Common Sneezeweed	Plants
Helenium bigelovii	Bigelow's Sneezeweed	Plants
Helenium bolanderi	Coast Sneezeweed	Plants
Helenium puberulum	Rosilla	Plants
Helichus columbianus		Insects & other
Helichus striatus		Insects & other
Helichus suturalis		Insects & other
Helichus triangularis		Insects & other
Helicopsyche borealis	A Caddisfly	Insects & other
Helicopsyche mexicana	A Caddisfly	Insects & other
Helicopsyche pietia		Insects & other
Helicopsyche sinuata	A Caddisfly	Insects & other
Helisoma anceps	Two-ridge Rams-horn	Mollusks
Helisoma minus	A Freshwater Snail	Mollusks
Helisoma newberryi newberryi	Great Basin Rams-horn	Mollusks
Helisoma subcrenatum		Mollusks
Helochares normatus		Insects & other
Helodon beardi		Insects & other
Helodon chaos		Insects & other
Helodon diadelphus		Insects & other
Helodon mccreadiei		Insects & other
Helodon newmani		Insects & other
Helodon onchyodactylus		Insects & other
Helodon protus		Insects & other
Helodon susanae		Insects & other
Helodon trochus		Insects & other
Helophorus alternatus		Insects & other
Helophorus auricollis		Insects & other
Helophorus californicus		Insects & other
Helophorus columbianus		Insects & other
Helophorus cuspifer		Insects & other
Helophorus eclectus		Insects & other
Helophorus fenderi		Insects & other
Helophorus fortis		Insects & other
Helophorus hatchi		Insects & other
Helophorus lacustris		Insects & other
Helophorus lecontei		Insects & other
Helophorus ledatus		Insects & other

Helophorus leechi		Insects & other
Helophorus linearis		Insects & other
Helophorus linearoides		Insects & other
Helophorus nitiduloides		Insects & other
Helophorus nitidulus		Insects & other
Helophorus oblongus		Insects & other
Helophorus oregonus		Insects & other
Helophorus orientalis		Insects & other
Helophorus parasplendidus		Insects & other
Helophorus robertsi		Insects & other
Helophorus schuhi		Insects & other
Helophorus tuberculatus		Insects & other
Hemiosus exilis		Insects & other
Heptagenia adaequata		Insects & other
Heptagenia elegantula	A Mayfly	Insects & other
Heptagenia solitaria	A Mayfly	Insects & other
Herthania compta		Insects & other
Herthania concinna		Insects & other
Hesperagrion heterodoxum		Insects & other
Hesperocorixa atopodonta		Insects & other
Hesperocorixa laevigata		Insects & other
Hesperocorixa vulgaris		Insects & other
Hesperoperla hoguei	Banded Stone	Insects & other
Hesperoperla pacifica	Golden Stone	Insects & other
Hesperophylax alaskensis	A Caddisfly	Insects & other
Hesperophylax consimilis		Insects & other
Hesperophylax designatus	A Caddisfly	Insects & other
Hesperophylax magnus	A Caddisfly	Insects & other
Hesperophylax minutus	A Caddisfly	Insects & other
Hesperophylax occidentalis	A Caddisfly	Insects & other
Hetaerina americana	American Rubyspot	Insects & other
Hetaerina vulnerata		Insects & other
Heteranthera limosa	NA	Plants
Heterelmis glabra		Insects & other
Heterelmis obesa		Insects & other
Heterelmis stephani		Insects & other
Heterlimnius corpulentus		Insects & other
Heterlimnius koebelei		Insects & other
Heterocerus brunneus		Insects & other
Heterocerus gemmatus		Insects & other
Heterocerus gnatho		Insects & other

Heterocerus mexicanus		Insects & other
Heterocerus mollinus		Insects & other
Heterocerus parrotus		Insects & other
Heterocerus sinuosus		Insects & other
Heterocerus tristis		Insects & other
Heterocerus unicus		Insects & other
Heterocloeon anoka		Insects & other
Heteroplectron californicum	A Caddisfly	Insects & other
Heterotrissocladius oliveri		Insects & other
Hexagenia limbata	A Mayfly	Insects & other
Hibiscus lasiocarpos occidentalis		Plants
Himalopsyche phryganea	A Caddisfly	Insects & other
Himantopus mexicanus	Black-necked Stilt	Birds
Hippuris vulgaris	Common Mare's-tail	Plants
Histrionicus histrionicus	Harlequin Duck	Birds
Holorusia hespera		Insects & other
Homoleptohyphes dimorphus	A Mayfly	Insects & other
Homoleptohyphes mirus		Insects & other
Homoleptohyphes quercus		Insects & other
Homophylax adriana		Insects & other
Homophylax andax		Insects & other
Homophylax flavipennis		Insects & other
Homophylax insulas	A Caddisfly	Insects & other
Homophylax nevadensis	A Caddisfly	Insects & other
Homophylax rentzi	A Caddisfly	Insects & other
Homoplectra alseae		Insects & other
Homoplectra luchia		Insects & other
Homoplectra nigripennis	A Caddisfly	Insects & other
Homoplectra norada	A Caddisfly	Insects & other
Homoplectra oaklandensis	A Caddisfly	Insects & other
Homoplectra schuhi	Schuh's Homoplectran Caddisfly	Insects & other
Homoplectra shasta	A Caddisfly	Insects & other
Homoplectra sierra	A Caddisfly	Insects & other
Homoplectra spora	A Caddisfly	Insects & other
Hosackia oblongifolia	NA	Plants
Howellia aquatilis	Water Howellia	Plants
Hyalella azteca	An Amphipod	Crustaceans
Hyalella muerta	An Amphipod	Crustaceans
Hyalella sandra	An Amphipod	Crustaceans
Hydaticus aruspex		Insects & other

Hydatophylax hesperus	A Caddisfly	Insects & other
Hydraena alternata		Insects & other
Hydraena arenicola		Insects & other
Hydraena arizonica		Insects & other
Hydraena bituberculata		Insects & other
Hydraena californica		Insects & other
Hydraena circulata		Insects & other
Hydraena leechi		Insects & other
Hydraena mignymixys		Insects & other
Hydraena nigra		Insects & other
Hydraena occidentalis		Insects & other
Hydraena pacifica		Insects & other
Hydraena petila		Insects & other
Hydraena sierra		Insects & other
Hydraena tuolumne		Insects & other
Hydraena vandykei		Insects & other
Hydraena yosemitensis		Insects & other
Hydrobaenus pilipes		Insects & other
Hydrobaenus saetheri		Insects & other
Hydrobius fuscipes		Insects & other
Hydrochara lineata		Insects & other
Hydrochara rickseckeri	Ricksecker's Water Scavenger Beetle	Insects & other
Hydrochus pseudosquamifer		Insects & other
Hydrochus squamifer		Insects & other
Hydrochus vagus		Insects & other
Hydrochus variolatus		Insects & other
Hydrocotyle ranunculoides	Floating Marsh-pennywort	Plants
Hydrocotyle umbellata	Many-flower Marsh-pennywort	Plants
Hydrocotyle verticillata verticillata	Whorled Marsh-pennywort	Plants
Hydrometra aemula		Insects & other
Hydrometra australis		Insects & other
Hydrometra lillianis		Insects & other
Hydrometra martini		Insects & other
Hydrophilus insularis		Insects & other
Hydrophilus triangularis		Insects & other
Hydroporus axillaris		Insects & other
Hydroporus carri		Insects & other
Hydroporus despectus		Insects & other
Hydroporus fortis		Insects & other
Hydroporus klamathensis		Insects & other

Hydroporus leechi	Leech's Skyline Diving Beetle	Insects & other
Hydroporus longiusculus		Insects & other
Hydroporus mannerheimi		Insects & other
Hydroporus notabilis		Insects & other
Hydroporus occidentalis		Insects & other
Hydroporus pervicinus	Wooly Hydroporus Diving Beetle	Insects & other
Hydroporus simplex	Simple Hydroporus Diving Beetle	Insects & other
Hydroporus sinuatipes		Insects & other
Hydroporus subpubescens		Insects & other
Hydroporus tademus		Insects & other
Hydroporus tenebrosus		Insects & other
Hydroporus transpunctatus		Insects & other
Hydroporus tristis		Insects & other
Hydroporus zackii		Insects & other
Hydropsyche alternans		Insects & other
Hydropsyche amblis	A Caddisfly	Insects & other
Hydropsyche andersoni		Insects & other
Hydropsyche auricolor		Insects & other
Hydropsyche californica	A Caddisfly	Insects & other
Hydropsyche centra		Insects & other
Hydropsyche cockerelli	A Caddisfly	Insects & other
Hydropsyche cora	A Caddisfly	Insects & other
Hydropsyche dorata		Insects & other
Hydropsyche intrica	A Caddisfly	Insects & other
Hydropsyche occidentalis	A Caddisfly	Insects & other
Hydropsyche oslari	A Caddisfly	Insects & other
Hydropsyche philo	A Caddisfly	Insects & other
Hydropsyche protis		Insects & other
Hydropsyche tana	A Caddisfly	Insects & other
Hydropsyche venada		Insects & other
Hydropsyche winema		Insects & other
Hydroptila ajax	A Caddisfly	Insects & other
Hydroptila arctia	A Caddisfly	Insects & other
Hydroptila argosa	A Caddisfly	Insects & other
Hydroptila consimilis		Insects & other
Hydroptila hamata	A Caddisfly	Insects & other
Hydroptila icona	A Caddisfly	Insects & other
Hydroptila lenora		Insects & other
Hydroptila modica		Insects & other
Hydroptila pecos		Insects & other
Hydroptila rono	A Caddisfly	Insects & other

Hydroptila xera	A Caddisfly	Insects & other
Hydroscapha natans		Insects & other
Hydrotrupes palpalis		Insects & other
Hydrovatus brevipes		Insects & other
Hydrovatus davidis		Insects & other
Hygrotus acaroides		Insects & other
Hygrotus artus	Mono Lake Hygrotus Diving Beetle	Insects & other
Hygrotus bruesi		Insects & other
Hygrotus collatus		Insects & other
Hygrotus curvipes	Curved-foot Hygrotus Diving Beetle	Insects & other
Hygrotus dissimilis		Insects & other
Hygrotus femoratus		Insects & other
Hygrotus fontinalis	Travertine Band-thigh Diving Beetle	Insects & other
Hygrotus fraternus		Insects & other
Hygrotus hydropicus		Insects & other
Hygrotus impressopunctatus		Insects & other
Hygrotus infuscatus		Insects & other
Hygrotus intermedius		Insects & other
Hygrotus lutescens		Insects & other
Hygrotus marklini		Insects & other
Hygrotus masculinus		Insects & other
Hygrotus nigrescens		Insects & other
Hygrotus nubilis		Insects & other
Hygrotus obscureplagiatus		Insects & other
Hygrotus patruelis		Insects & other
Hygrotus pedalis		Insects & other
Hygrotus sayi		Insects & other
Hygrotus semivittatus		Insects & other
Hygrotus sharpi		Insects & other
Hygrotus thermarum		Insects & other
Hygrotus tumidiventris		Insects & other
Hygrotus turbidus		Insects & other
Hygrotus unguicularis		Insects & other
Hygrotus wardii		Insects & other
Hyperacanthomysis longirostris		Crustaceans
Hypericum anagalloides	Tinker's-penny	Plants
Hypomesus pacificus	Delta smelt	Fishes
Hysterocarpus traskii lagunae	Clear Lake tule perch	Fishes
Hysterocarpus traskii pomo	Russian River tule perch	Fishes
Hysterocarpus traskii traskii	Sacramento tule perch	Fishes
Icteria virens	Yellow-breasted Chat	Birds

Iliamna rivularis		Plants
Ilybius angustior		Insects & other
Ilybius fraterculus		Insects & other
Ilybius quadrimaculatus		Insects & other
Incilius alvarius	Colorado River Toad	Herps
Ioscytus cobbeni		Insects & other
Ioscytus franciscanus		Insects & other
Ioscytus nasti		Insects & other
Ioscytus politus		Insects & other
Ioscytus tepidarius		Insects & other
Ipnobius robustus	Robust Tryonia	Mollusks
Iris missouriensis	Western Blue Iris	Plants
Ironodes arcticus		Insects & other
Ironodes californicus	A Mayfly	Insects & other
Ironodes lepidus	A Mayfly	Insects & other
Ironodes nitidus	A Mayfly	Insects & other
Ischnura barberi	Desert Forktail	Insects & other
Ischnura cervula	Pacific Forktail	Insects & other
Ischnura damula		Insects & other
Ischnura demorsa		Insects & other
Ischnura denticollis	Black-fronted Forktail	Insects & other
Ischnura erratica	Swift Forktail	Insects & other
Ischnura gemina	San Francisco Forktail	Insects & other
Ischnura hastata	Citrine Forktail	Insects & other
Ischnura perparva	Western Forktail	Insects & other
Ischnura ramburii		Insects & other
Isocapnia abbreviata	Shortlimb Snowfly	Insects & other
Isocapnia agassizi		Insects & other
Isocapnia eichlini	A Stonefly	Insects & other
Isocapnia grandis	Giant Snowfly	Insects & other
Isocapnia mogila	Irregular Snowfly	Insects & other
Isocapnia palousa		Insects & other
Isocapnia rickeri		Insects & other
Isocapnia spenceri	Chilliwack Snowfly	Insects & other
Isocapnia vedderensis		Insects & other
Isoetes bolanderi	NA	Plants
Isoetes echinospora	NA	Plants
Isoetes howellii	NA	Plants
Isoetes nuttallii	NA	Plants
Isoetes occidentalis	NA	Plants
Isoetes orcuttii	NA	Plants

Isogenoides colubrinus	Blackfoot Springfly	Insects & other
Isogenoides elongatus		Insects & other
Isogenoides zionensis		Insects & other
Isolepis cernua	Low Bulrush	Plants
Isolepis setacea	NA	Plants
Isonychia intermedia		Insects & other
Isonychia velma	A Mayfly	Insects & other
Isoperla acula	Fresno Stipetail	Insects & other
Isoperla adunca	Arroyo Stripetail	Insects & other
Isoperla baumanni	California Stripetail	Insects & other
Isoperla bifurcata	Forked Stripetail	Insects & other
Isoperla denningi	Angeles Stripetail	Insects & other
Isoperla fulva	Western Stripetail	Insects & other
Isoperla gravitans		Insects & other
Isoperla karuk	Klamath Stripetail	Insects & other
Isoperla laucki	Humboldt Stripetail	Insects & other
Isoperla marmorata	Red Stripetail	Insects & other
Isoperla miwok	Miwok Stripetail	Insects & other
Isoperla mormona	Mormon Stripetail	Insects & other
Isoperla muir		Insects & other
Isoperla phalerata		Insects & other
Isoperla pinta	Checkered Stripetail	Insects & other
Isoperla quinquepunctata	Fivespot Stripetail	Insects & other
Isoperla raineri		Insects & other
Isoperla roguensis	Rogue Stripetail	Insects & other
Isoperla sobria	Colorado Stripetail	Insects & other
Isoperla sordida	Notched Stripetail	Insects & other
Isoperla tilasqua		Insects & other
Ithytrichia clavata	A Caddisfly	Insects & other
Ithytrichia mexicana		Insects & other
Ixobrychus exilis hesperis	Western Least Bittern	Birds
Jaumea carnosa	Fleshy Jaumea	Plants
Juga acutifilosa	Topaz Juga	Mollusks
Juga chacei	Chace Juga	Mollusks
Juga nigrina	Black Juga	Mollusks
Juga occata	Scalloped Juga	Mollusks
Juga orickensis	Redwood Juga	Mollusks
Juncus acuminatus	Sharp-fruit Rush	Plants
Juncus acutus leopoldii	Spiny Rush	Plants
Juncus anthelatus	NA	Plants
Juncus articulatus articulatus		Plants

Juncus bolanderi	Bolander's Rush	Plants
Juncus bryoides	Moss Rush	Plants
Juncus chlorocephalus	Green-head Rush	Plants
Juncus diffusissimus	NA	Plants
Juncus digitatus	Finger Rush	Plants
Juncus dubius	Mariposa Rush	Plants
Juncus duranii	Duran's Rush	Plants
Juncus effusus austrocalifornicus		Plants
Juncus effusus effusus	NA	Plants
Juncus effusus pacificus		Plants
Juncus exiguus		Plants
Juncus falcatus falcatus	Sickle-leaf Rush	Plants
Juncus falcatus sitchensis		Plants
Juncus hemiendytus abjectus	Dwarf Rush	Plants
Juncus hemiendytus hemiendytus	Dwarf Rush	Plants
Juncus hesperius		Plants
Juncus leiospermus	NA	Plants
Juncus lescurii		Plants
Juncus luciensis	Santa Lucia Dwarf Rush	Plants
Juncus macrandrus	Long-anther Rush	Plants
Juncus macrophyllus	Longleaf Rush	Plants
Juncus marginatus	NA	Plants
Juncus mertensianus	Mertens' Rush	Plants
Juncus nevadensis inventus	Sierra Rush	Plants
Juncus nodosus	NA	Plants
Juncus phaeocephalus paniculatus	Brownhead Rush	Plants
Juncus phaeocephalus phaeocephalus	Brown-head Rush	Plants
Juncus planifolius	NA	Plants
Juncus regelii	Regel's Rush	Plants
Juncus rugulosus	Wrinkled Rush	Plants
Juncus saximontanus	Rocky Mountain Rush	Plants
Juncus supiniformis	Hairyleaf Rush	Plants
Juncus textilis	Basket Rush	Plants
Juncus uncialis	Inch-high Rush	Plants
Juncus usitatus	NA	Plants
Juncus xiphioides	Iris-leaf Rush	Plants
Kathroperla perdita	Longhead Sallfly	Insects & other
Kathroperla takhoma	Slenderhead Sallfly	Insects & other

Kiefferulus dux		Insects & other
Kiefferulus modocensis		Insects & other
Kinosternon sonoriense	Sonoran Mud Turtle	Herps
Kobresia myosuroides	Pacific Kobresia	Plants
Kogotus nonus	Smooth Springfly	Insects & other
Konikea expansipalpis		Insects & other
Krenopelopia narda		Insects & other
Kyhosia bolanderi		Plants
Labrundinia maculata		Insects & other
Labrundinia pilosella		Insects & other
Laccobius acutipenis		Insects & other
Laccobius agilis		Insects & other
Laccobius borealis		Insects & other
Laccobius bruesi		Insects & other
Laccobius californicus		Insects & other
Laccobius carri		Insects & other
Laccobius ellipticus		Insects & other
Laccobius hardyi		Insects & other
Laccobius insolitus		Insects & other
Laccobius leechi		Insects & other
Laccobius mexicanus		Insects & other
Laccobius nevadensis		Insects & other
Laccobius occidentalis		Insects & other
Laccobius oregonensis		Insects & other
Laccobius pacificus		Insects & other
Laccobius piceus		Insects & other
Laccobius tridentipenis		Insects & other
Laccobius truncatipenis		Insects & other
Laccophilus biguttatus		Insects & other
Laccophilus fasciatus terminalis		Insects & other
Laccophilus horni		Insects & other
Laccophilus maculosus		Insects & other
Laccophilus maculosus decipiens		Insects & other
Laccophilus maculosus shermani		Insects & other
Laccophilus mexicanus atristernalis		Insects & other
Laccophilus mexicanus mexicanus		Insects & other
Laccophilus oscillator		Insects & other
Laccophilus pictus		Insects & other

Laccophilus quadrilineatus quadrilineatus		Insects & other
Laccophilus salvini		Insects & other
Laccophilus sonorensis		Insects & other
Laccophilus vacaensis		Insects & other
Laccornis pacificus		Insects & other
Lachlania saskatchewanensis		Insects & other
Ladona julia	Chalk-fronted Corporal	Insects & other
Lampetra ayersi	River lamprey	Fishes
Lampetra hubbsi	Kern brook lamprey	Fishes
Lampetra lethophaga	Pit-Klamath brook lamprey	Fishes
Lampetra richardsoni	Western brook lamprey	Fishes
Landoltia punctata	NA	Plants
Lanx alta	Highcap Lanx	Mollusks
Lanx hannai		Mollusks
Lanx klamathensis	Scale Lanx	Mollusks
Lanx patelloides	Kneecap Lanx	Mollusks
Lanx subrotundatus		Mollusks
Lara avara		Insects & other
Lara gehringi		Insects & other
Larsia decolorata		Insects & other
Larsia lyra		Insects & other
Larsia marginella		Insects & other
Larsia planensis		Insects & other
Larsia sequoiaensis		Insects & other
Larus livens	Yellow-footed Gull	Birds
Lasthenia burkei	Burke's Goldfields	Plants
Lasthenia conjugens	Contra Costa Goldfields	Plants
Lasthenia ferrisiae	Ferris' Goldfields	Plants
Lasthenia fremontii	Fremont's Goldfields	Plants
Lasthenia glabrata coulteri	Coulter's Goldfields	Plants
Laterallus jamaicensis coturniculus	California Black Rail	Birds
Lathyrus jepsonii	NA	Plants
Lathyrus palustris	Vetchling Peavine	Plants
Lauterborniella agrayloides		Insects & other
Lavinia exilicauda chi	Clear Lake hitch	Fishes
Lavinia exilicauda exilicauda	Sacramento hitch	Fishes
Lavinia exilicauda harengeus	Monterey hitch	Fishes
Lavinia mitrulus	Northern (Pit) roach	Fishes
Lavinia parvipinnus	Gualala roach	Fishes
Lavinia symmetricus navarroensis	Navarro roach	Fishes

Lavinia symmetricus ssp. 1	Russian River roach	Fishes
Lavinia symmetricus ssp. 2	Red Hills roach	Fishes
Lavinia symmetricus ssp. 3	Clear Lake roach	Fishes
Lavinia symmetricus ssp. 4	Tomales roach	Fishes
Lavinia symmetricus subditus	Monterey roach	Fishes
Lavinia symmetricus symmetricus	Central California roach	Fishes
Lednia sierra	A Stonefly	Insects & other
Leersia oryzoides	Rice Cutgrass	Plants
Legenere limosa	False Venus'-looking-glass	Plants
Lemna aequinoctialis	Lesser Duckweed	Plants
Lemna gibba	Inflated Duckweed	Plants
Lemna minor	Lesser Duckweed	Plants
Lemna minuta	Least Duckweed	Plants
Lemna trisulca	Star Duckweed	Plants
Lemna turionifera	Turion Duckweed	Plants
Lemna valdiviana	Pale Duckweed	Plants
Lenarchus brevipennis		Insects & other
Lenarchus gravidus	A Caddisfly	Insects & other
Lenarchus rho		Insects & other
Lenarchus rillus	A Caddisfly	Insects & other
Lenarchus vastus	A Caddisfly	Insects & other
Lepania cascada		Insects & other
Lepidium jaredii jaredii	Jared's Pepper-grass	Plants
Lepidium oxycarpum	Sharp-pod Pepper-grass	Plants
Lepidostoma acarolum		Insects & other
Lepidostoma apache		Insects & other
Lepidostoma apornum		Insects & other
Lepidostoma astaneum	A Caddisfly	Insects & other
Lepidostoma bakeri		Insects & other
Lepidostoma baxea	A Caddisfly	Insects & other
Lepidostoma canthum	A Caddisfly	Insects & other
Lepidostoma cascadense	A Caddisfly	Insects & other
Lepidostoma castalianum	A Caddisfly	Insects & other
Lepidostoma cinereum	A Caddisfly	Insects & other
Lepidostoma ermanae	Cold Spring Caddisfly	Insects & other
Lepidostoma errigenum	A Caddisfly	Insects & other
Lepidostoma hoodi		Insects & other
Lepidostoma jewetti	A Caddisfly	Insects & other
Lepidostoma knulli		Insects & other
Lepidostoma lacinatum		Insects & other

Lepidostoma licolum	A Caddisfly	Insects & other
Lepidostoma lotor	A Caddisfly	Insects & other
Lepidostoma mexicanum		Insects & other
Lepidostoma ojanum	A Caddisfly	Insects & other
Lepidostoma ormeum		Insects & other
Lepidostoma pluviale	A Caddisfly	Insects & other
Lepidostoma podagrum	A Caddisfly	Insects & other
Lepidostoma quericinum		Insects & other
Lepidostoma rayneri	A Caddisfly	Insects & other
Lepidostoma recinum	A Caddisfly	Insects & other
Lepidostoma roafi	A Caddisfly	Insects & other
Lepidostoma stigma		Insects & other
Lepidostoma unicolor	A Caddisfly	Insects & other
Lepidostoma verodum	A Caddisfly	Insects & other
Lepidurus bilobatus		Crustaceans
Lepidurus cryptus	Cryptic Tadpole Shrimp	Crustaceans
Lepidurus lemmoni	Lynch Tadpole Shrimp	Crustaceans
Lepidurus packardi	Vernal Pool Tadpole Shrimp	Crustaceans
Leptestheria compleximanus	Spineynose Clam Shrimp	Crustaceans
Leptohyphes apache		Insects & other
Leptohyphes ferruginus		Insects & other
Leptohyphes lestes		Insects & other
Leptohyphes zalope		Insects & other
Leptophlebia cupida	A Mayfly	Insects & other
Leptophlebia pacifica	A Mayfly	Insects & other
Lestes alacer		Insects & other
Lestes congener	Spotted Spreadwing	Insects & other
Lestes disjunctus	Northern Spreadwing	Insects & other
Lestes dryas	Emerald Spreadwing	Insects & other
Lestes stultus	Black Spreadwing	Insects & other
Lestes unguiculatus	Lyre-tipped Spreadwing	Insects & other
Lethocerus americanus		Insects & other
Lethocerus angustipes		Insects & other
Lethocerus medius		Insects & other
Leucorrhinia glacialis	Crimson-ringed Whiteface	Insects & other
Leucorrhinia hudsonica	Hudsonian Whiteface	Insects & other
Leucorrhinia intacta	Dot-tailed Whiteface	Insects & other
Leucorrhinia proxima	Belted Whiteface	Insects & other
Leucothoe davisiae	Western Doghobble	Plants
Leucotrichia limpia		Insects & other
Leucotrichia pictipes	A Micro Caddisfly	Insects & other

Leucotrichia sarita		Insects & other
Leucrocuta jewetti		Insects & other
Lewisia cantelovii	Cantelow's Lewisia	Plants
Libellula comanche	Comanche Skimmer	Insects & other
Libellula composita	Bleached Skimmer	Insects & other
Libellula croceipennis	Neon Skimmer	Insects & other
Libellula forensis	Eight-spotted Skimmer	Insects & other
Libellula luctuosa	Widow Skimmer	Insects & other
Libellula nodisticta	Hoary Skimmer	Insects & other
Libellula pulchella	Twelve-spotted Skimmer	Insects & other
Libellula quadrimaculata	Four-spotted Skimmer	Insects & other
Libellula saturata	Flame Skimmer	Insects & other
Lichminus tenuicornis		Insects & other
Ligidium kofoidi	A Cave Obligate Isopod	Crustaceans
Lilaeopsis masonii	Mason's Lilaeopsis	Plants
Lilaeopsis occidentalis	Western Lilaeopsis	Plants
Lilium kelleyanum	Kelley's Lily	Plants
Lilium pardalinum pardalinum	Leopard Lily	Plants
Lilium pardalinum pitkinense	Pitkin Marsh Lily	Plants
Lilium pardalinum shastense	Leopard Lily	Plants
Lilium pardalinum vollmeri	Vollmer's Lily	Plants
Lilium pardalinum wigginsii	Wiggin's Lily	Plants
Lilium parryi	Lemon Lily	Plants
Lilium parvum	Small Tiger Lily	Plants
Limnanthes alba alba	White Meadowfoam	Plants
Limnanthes alba parishii	NA	Plants
Limnanthes alba versicolor	White Meadowfoam	Plants
Limnanthes bakeri	Baker's Meadowfoam	Plants
Limnanthes douglasii douglasii	Douglas' Meadowfoam	Plants
Limnanthes douglasii nivea	Douglas' Meadowfoam	Plants
Limnanthes douglasii rosea	Douglas' Meadowfoam	Plants
Limnanthes douglasii striata		Plants
Limnanthes douglasii sulphurea	Pt. Reyes Meadowfoam	Plants
Limnanthes floccosa bellingeriana	Bellinger's Meadowfoam	Plants
Limnanthes floccosa californica	Shippee Meadowfoam	Plants
Limnanthes floccosa floccosa	Woolly Meadowfoam	Plants
Limnanthes montana	Mountain Meadowfoam	Plants
Limnanthes vinculans	Sebastopol Meadowfoam	Plants
Limnebius alutaceous		Insects & other
Limnebius arenicolus		Insects & other

Limnebius leechi		Insects & other
Limnebius piceus		Insects & other
Limnebius sinuatus		Insects & other
Limnephilus abbreviatus		Insects & other
Limnephilus acnestus	A Caddisfly	Insects & other
Limnephilus acula	A Caddisfly	Insects & other
Limnephilus alconura	Klamath Limnephilan Caddisfly	Insects & other
Limnephilus apache		Insects & other
Limnephilus aretto	A Caddisfly	Insects & other
Limnephilus arizona		Insects & other
Limnephilus assimilis	A Caddisfly	Insects & other
Limnephilus atercus	Fort Dick Limnephilus Caddisfly	Insects & other
Limnephilus bucketti	A Caddisfly	Insects & other
Limnephilus canadensis		Insects & other
Limnephilus catula	A Caddisfly	Insects & other
Limnephilus coloradensis	A Caddisfly	Insects & other
Limnephilus concolor	A Caddisfly	Insects & other
Limnephilus diversus		Insects & other
Limnephilus ectus		Insects & other
Limnephilus elongatus		Insects & other
Limnephilus externus	A Caddisfly	Insects & other
Limnephilus fagus		Insects & other
Limnephilus frijole	A Caddisfly	Insects & other
Limnephilus granti		Insects & other
Limnephilus hyalinus		Insects & other
Limnephilus insularis		Insects & other
Limnephilus kalama		Insects & other
Limnephilus kennicotti		Insects & other
Limnephilus lithus		Insects & other
Limnephilus lopho		Insects & other
Limnephilus lunonus		Insects & other
Limnephilus moestus		Insects & other
Limnephilus morrisoni	A Caddisfly	Insects & other
Limnephilus neoacula		Insects & other
Limnephilus nogus	A Caddisfly	Insects & other
Limnephilus occidentalis	A Caddisfly	Insects & other
Limnephilus peltus	A Caddisfly	Insects & other
Limnephilus productus	A Caddisfly	Insects & other
Limnephilus rothi		Insects & other
Limnephilus santanus		Insects & other
Limnephilus secludens	A Caddisfly	Insects & other

Limnephilus sericeus		Insects & other
Limnephilus sierrata	A Caddisfly	Insects & other
Limnephilus silviae		Insects & other
Limnephilus sitchensis		Insects & other
Limnephilus spinatus	A Caddisfly	Insects & other
Limnephilus tulatus		Insects & other
Limnichites foraminosus		Insects & other
Limnichites nebulosus		Insects & other
Limnichites perforatus		Insects & other
Limnichoderus lutrochinus		Insects & other
Limnichoderus naviculatus		Insects & other
Limnobium spongia	NA	Plants
Limnochares anomala		Insects & other
Limnocoris moapensis		Insects & other
Limnodromus scolopaceus	Long-billed Dowitcher	Birds
Limnophyes asquamatus		Insects & other
Limnophyes doughmani		Insects & other
Limnophyes hamiltoni		Insects & other
Limnophyes natalensis		Insects & other
Limnophyes pilicistulus		Insects & other
Limnoporus notabilis		Insects & other
Limonium californicum	California Sea-lavender	Plants
Limosella acaulis	Southern Mudwort	Plants
Limosella aquatica	Northern Mudwort	Plants
Limosella australis	NA	Plants
Linderiella occidentalis	California Fairy Shrimp	Crustaceans
Linderiella santarosae	Santa Rosa Plateau Fairy Shrimp	Crustaceans
Lindernia dubia	Yellowseed False Pimpernel	Plants
Liodessus obscurellus		Insects & other
Liodessus saratogae		Insects & other
Lipocarpha micrantha	Dwarf Bulrush	Plants
Lithobates pipiens	Northern Leopard Frog	Herps
Lithobates yavapaiensis	Yavapai Leopard Frog	Herps
Lobelia cardinalis cardinalis	NA	Plants
Lobelia cardinalis pseudosplendens		Plants
Lobelia dunnii serrata	Dunn's Lobelia	Plants
Lontra canadensis canadensis	North American River Otter	Mammals
Lontra canadensis sonora	Southwestern River Otter	Mammals
Lophodytes cucullatus	Hooded Merganser	Birds
Ludwigia grandiflora	NA	Plants

Ludwigia hexapetala	NA	Plants
Ludwigia palustris	Marsh Seedbox	Plants
Ludwigia peploides montevidensis	NA	Plants
Ludwigia peploides peploides	NA	Plants
Ludwigia repens	Creeping Seedbox	Plants
Lupinus polyphyllus burkei		Plants
Lupinus polyphyllus pallidipes	Largeleaf Lupine	Plants
Lupinus polyphyllus polyphyllus	Bigleaf Lupine	Plants
Lutrochus arizonensis		Insects & other
Lycastoides alticola		Insects & other
Lycopodiella inundata	NA	Plants
Lycopus americanus	American Bugleweed	Plants
Lycopus uniflorus uniflorus	Northern Bugleweed	Plants
Lymnaea stagnalis	Swamp Lymnaea	Mollusks
Lynceus brachyurus	Holarctic Clam Shrimp	Crustaceans
Lynceus brevifrons		Crustaceans
Lysichiton americanus	Yellow Skunk-cabbage	Plants
Lysimachia thyrsiflora	Water Loosestrife	Plants
Lythrum californicum	California Loosestrife	Plants
Lythrum portula	NA	Plants
Maccaffertium terminatum	A Mayfly	Insects & other
Macrelmis moestus		Insects & other
Macrodiplax balteata	Marl Pennant	Insects & other
Macromia magnifica	Western River Cruiser	Insects & other
Macrothemis inacuta		Insects & other
Macrovelia hornii		Insects & other
Malenka bifurcata		Insects & other
Malenka biloba	Two-lobed Forestfly	Insects & other
Malenka californica	California Forestfly	Insects & other
Malenka coloradensis		Insects & other
Malenka cornuta	Horned Forestfly	Insects & other
Malenka depressa	Bluntlobe Forestfly	Insects & other
Malenka flexura		Insects & other
Malenka marionae	Sagehen Forestfly	Insects & other
Malenka murvoshi		Insects & other
Malenka perplexa		Insects & other
Malenka tina		Insects & other
Margaritifera falcata	Western Pearlshell	Mollusks
Marilia flexuosa	A Caddisfly	Insects & other
Marilia nobsca		Insects & other

Marsilea oligospora	NA	Plants
Marsilea vestita vestita	NA	Plants
Martarega mexicana		Insects & other
Maruina lanceolata		Insects & other
Matriella teresa	A Mayfly	Insects & other
Mayatrichia acuna		Insects & other
Mayatrichia ayama		Insects & other
Mayatrichia ponta		Insects & other
Megaceryle alcyon	Belted Kingfisher	Birds
Megaleuctra complicata		Insects & other
Megaleuctra kincaidi		Insects & other
Megaleuctra sierra	Sierra Needlefly	Insects & other
Megarcys signata		Insects & other
Megarcys subtruncata		Insects & other
Megarcys yosemite	Yosemite Springfly	Insects & other
Menetus opercularis	Button Sprite	Mollusks
Menyanthes trifoliata	Bog Buckbean	Plants
Mergus merganser	Common Merganser	Birds
Mergus serrator	Red-breasted Merganser	Birds
Meringodixa chalonensis		Insects & other
Meropelopia flavifrons		Insects & other
Merragata hebroides		Insects & other
Mesocapnia arizonensis		Insects & other
Mesocapnia autumna		Insects & other
Mesocapnia bakeri	Pomona Snowfly	Insects & other
Mesocapnia bulbosa	Bulbous Snowfly	Insects & other
Mesocapnia frisoni		Insects & other
Mesocapnia lapwae		Insects & other
Mesocapnia oenone		Insects & other
Mesocapnia porrecta	Stretched Snowfly	Insects & other
Mesocapnia projecta	Spined Snowfly	Insects & other
Mesocapnia werneri	Sabino Snowfly	Insects & other
Mesocapnia yoloensis	Yolo Snowfly	Insects & other
Mesovelia amoena		Insects & other
Mesovelia mulsanti		Insects & other
Metacnephia coloradensis		Insects & other
Metacnephia jeanae		Insects & other
Metacnephia villosa		Insects & other
Metrichia arizonensis		Insects & other
Metrichia nigritta		Insects & other
Metriocnemus edwardsi		Insects & other

Metriocnemus stevensi		Insects & other
Metriocnemus yaquina		Insects & other
Metrobates denticornis		Insects & other
Metrobates trux		Insects & other
Micracanthia fennica		Insects & other
Micracanthia humilis		Insects & other
Micracanthia quadrimaculata		Insects & other
Micracanthia schuhi		Insects & other
Micracanthia utahensis		Insects & other
Micranthes aprica		Plants
Micranthes marshallii	NA	Plants
Micranthes odontoloma		Plants
Micranthes oregana	NA	Plants
Micrasema arizonica		Insects & other
Micrasema bactro	A Caddisfly	Insects & other
Micrasema dimicki		Insects & other
Micrasema diteris	A Caddisfly	Insects & other
Micrasema onisca	A Caddisfly	Insects & other
Micrasema oregona		Insects & other
Microchironomus nigrovittatus		Insects & other
Microcylloepus formicoideus	Furnace Creek Riffle Beetle	Insects & other
Microcylloepus moapus		Insects & other
Microcylloepus similis		Insects & other
Microcylloepus thermarum		Insects & other
Micromenetus dilatatus	Bugle Sprite	Mollusks
Micropsectra nigripila		Insects & other
Micropsectra polita		Insects & other
Microtendipes caducus		Insects & other
Microtendipes pedellus		Insects & other
Microvelia beameri		Insects & other
Microvelia buenoi		Insects & other
Microvelia californiensis		Insects & other
Microvelia cerifera		Insects & other
Microvelia fasculifera		Insects & other
Microvelia gerhardi		Insects & other
Microvelia glabrosulcata		Insects & other
Microvelia hinei		Insects & other
Microvelia paludicola		Insects & other
Microvelia pulchella		Insects & other
Microvelia rasilis		Insects & other
Microvelia rufescens		Insects & other

Microvelia signata		Insects & other
Microvelia torquata		Insects & other
Mideopsis pumila		Insects & other
Mimulus alsinoides	Chickweed Monkeyflower	Plants
Mimulus angustatus	Narrowleaf Pansy Monkeyflower	Plants
Mimulus breviflorus	Short-flower Monkeyflower	Plants
Mimulus cardinalis	Scarlet Monkeyflower	Plants
Mimulus dentatus	Tooth-leaf Monkeyflower	Plants
Mimulus evanescens	Disappearing Monkeyflower	Plants
Mimulus glaucescens	Shield-bract Monkeyflower	Plants
Mimulus guttatus	Common Large Monkeyflower	Plants
Mimulus laciniatus	Cutleaf Monkeyflower	Plants
Mimulus latidens	Broad-tooth Monkeyflower	Plants
Mimulus lewisii	Lewis' Monkeyflower	Plants
Mimulus nudatus	Bare Monkeyflower	Plants
Mimulus parishii	Parish's Monkeyflower	Plants
Mimulus pilosus		Plants
Mimulus primuloides linearifolius	Primrose Monkeyflower	Plants
Mimulus primuloides primuloides	Primrose Monkeyflower	Plants
Mimulus pulchellus	Pansy Monkeyflower	Plants
Mimulus ringens	Square-stem Monkeyflower	Plants
Mimulus tilingii tilingii	Subalpine Monkeyflower	Plants
Mimulus tricolor	Tricolor Monkeyflower	Plants
Mitellastra caulescens		Plants
Momonia projecta		Insects & other
Monopelopia tenuicalcar		Insects & other
Montia chamissoi	Chamisso's Miner's-lettuce	Plants
Montia fontana fontana	Fountain Miner's-lettuce	Plants
Montia howellii	Howell's Miner's-lettuce	Plants
Moribaetis mimbresaurus		Insects & other
Morphocorixa lundbladi		Insects & other
Moselia infuscata	Hairy Needlefly	Insects & other
Moselyana comosa		Insects & other
Muhlenbergia utilis	Aparejo Grass	Plants
Musulium partumeium		Mollusks
Musulium secuirs		Mollusks
Mycteria americana	Wood Stork	Birds
Mylopharodon conocephalus	Hardhead	Fishes
Myosotis laxa	Small Forget-me-not	Plants
Myosotis scorpioides	NA	Plants