October 26, 2021

Santa Ynez River Valley Basin Western Management Area GSA
P.O. BOX 719
Santa Ynez CA 93460

Submitted via web: https://portal.santaynezwater.org/comment/new?gsaKey=WMA

Re: Public Comment Letter for Santa Ynez River Valley Western Management Area Draft GSP

Dear Bill Buelow,

On behalf of the above-listed organizations, we appreciate the opportunity to comment on the Draft Groundwater Sustainability Plan (GSP) for the Santa Ynez River Valley Basin Western Management Area being prepared under the Sustainable Groundwater Management Act (SGMA). Our organizations are deeply engaged in and committed to the successful implementation of SGMA because we understand that groundwater is critical for the resilience of California's water portfolio, particularly in light of changing climate. Under the requirements of SGMA, Groundwater Sustainability Agencies (GSAs) must consider the interests of all beneficial uses and users of groundwater, such as domestic well owners, environmental users, surface water users, federal government, California Native American tribes and disadvantaged communities (Water Code 10723.2).

As stakeholder representatives for beneficial users of groundwater, our GSP review focuses on how well disadvantaged communities, drinking water users, tribes, climate change, and the environment were addressed in the GSP. While we appreciate that some basins have consulted us directly via focus groups, workshops, and working groups, we are providing public comment letters to all GSAs as a means to engage in the development of 2022 GSPs across the state. Recognizing that GSPs are complicated and resource intensive to develop, the intention of this letter is to provide constructive stakeholder feedback that can improve the GSP prior to submission to the State.

Based on our review, we have significant concerns regarding the treatment of key beneficial users in the Draft GSP and consider the GSP to be **insufficient** under SGMA. We highlight the following findings:

1. Beneficial uses and users **are not sufficiently** considered in GSP development.
    a. Human Right to Water considerations **are not sufficiently** incorporated.
    b. Public trust resources **are not sufficiently** considered.
    c. Impacts of Minimum Thresholds, Measurable Objectives and Undesirable Results on beneficial uses and users **are not sufficiently** analyzed.
2. Climate change **is not sufficiently** considered.

3. Data gaps **are not sufficiently** identified and the GSP **does not have a plan** to eliminate them.
4. Projects and Management Actions **do not sufficiently consider** potential impacts or benefits to beneficial uses and users.

Our specific comments related to the deficiencies of the Santa Ynez River Valley Basin Western Management Area Draft GSP along with recommendations on how to reconcile them, are provided in detail in **Attachment A.**

Please refer to the enclosed list of attachments for additional technical recommendations:

Attachment A	GSP Specific Comments
Attachment B	SGMA Tools to address DAC, drinking water, and environmental beneficial uses and users
Attachment C	Freshwater species located in the basin
Attachment D	The Nature Conservancy's "Identifying GDEs under SGMA: Best Practices for using the NC Dataset"

Thank you for fully considering our comments as you finalize your GSP.

Best Regards,

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Attachment A

Specific Comments on the Santa Ynez River Valley Basin
Western Management Area (WMA) Draft Groundwater Sustainability Plan

1. Consideration of Beneficial Uses and Users in GSP development

Consideration of beneficial uses and users in GSP development is contingent upon adequate identification and engagement of the appropriate stakeholders. The (A) identification, (B) engagement, and (C) consideration of disadvantaged communities, drinking water users, tribes,[1] groundwater dependent ecosystems, streams, wetlands, and freshwater species are essential for ensuring the GSP integrates existing state policies on the Human Right to Water and the Public Trust Doctrine.

A. Identification of Key Beneficial Uses and Users

Disadvantaged Communities and Drinking Water Users

The identification of Disadvantaged Communities (DACs) and drinking water users is **incomplete**. The GSP provides information on DACs, including identification by name and location on a map. While Figure 1d.6-2 identifies the population density of each identified DAC, the plan fails to clearly document the population of each DAC and the population dependent on groundwater as their source of drinking water in the Western Management Area (WMA).

While the plan provides a density map of domestic wells in the WMA, the GSP fails to provide depth of these wells (such as minimum well depth, average well depth, or depth range).

These missing elements are required for the GSA to fully understand the specific interests and water demands of these beneficial users, and to support the consideration of beneficial users in the development of sustainable management criteria and selection of projects and management actions.

RECOMMENDATIONS
• Provide the population of each identified DAC and identify the sources of drinking water for DAC members, including an estimate of how many people rely on groundwater (e.g., domestic wells, state small water systems, and public water systems). • Include a map showing domestic well locations and average well depth across the WMA.

[1] Our letter provides a review of the identification and consideration of federally recognized tribes (Data source: SGMA Data viewer) within the GSP from non-tribal members and NGOs. Based on the likely incomplete information available to our organizations for this review, we recommend that the GSA utilize the California Department of Water Resources' "Engagement with Tribal Governments" Guidance Document (https://water.ca.gov/Programs/Groundwater-Management/SGMA-Groundwater-Management/Best-Management-Practices-and-Guidance-Documents) to comprehensively address these important beneficial users in their GSP.

Interconnected Surface Waters
The identification of Interconnected Surface Waters (ISWs) is **insufficient**, due to lack of supporting information provided for the ISW analysis.

The ISW Section of the GSP (Section 2b.6-1) begins with the following statement (p. 2b-40): *"The portion of the Santa Ynez River between the Lompoc Narrows and the Pacific Ocean is identified as seasonally interconnected surface water because at times surface water in this reach is hydraulically connected to the underlying water table in the principal aquifer. The reach is considered seasonally interconnected because the Santa Ynez River is dry for significant periods of time during the year, and as a result is not "hydraulically connected" to the underlying water table."* Note the regulations [23 CCR §351(o)], which are cited in several places in the GSP, define ISW as "surface water that is hydraulically connected at any point by a continuous saturated zone to the underlying aquifer and the overlying surface water is not completely depleted". "At any point" has both a spatial and temporal component. Even short durations of interconnections of groundwater and surface water can be crucial for surface water flow and supporting environmental users of groundwater and surface water.

The GSP continues (p. 2b-40): *"In the WMA upstream of the Lompoc Narrows, as discussed in the HCM, the Santa Ynez River Alluvium is considered part of the underflow of the river, which is managed by the SWRCB."* The HCM section states (p. 2a-11): *"The subflow of the Santa Ynez River flowing through the Santa Ynez River alluvium upstream of the Lompoc Narrows is managed by SWRCB pursuant to WR 2019-0148 and other orders and decisions, and is also not a principal aquifer."* However, no further explanation or discussion is provided, such as citations from the SWRCB Order, a map showing the relevant section of the river, or cross-section of the river and shallow alluvium have been permitted, licensed and managed as "underflow" by the SWRCB. According to California's Electronic Water Rights Information Management System (eWRIMS), there are no water rights permits that fall under "underflow" within the WMA (Figure 1). While a few water rights may have "underflow" permits or licenses in the Central Management Area (5 active and 1 inactive) and Eastern Management Area (2 active and 7 inactive), the GSP has failed to substantiate the assertion that the WMA shallow aquifer - **in its entirety** - is classified and managed as "underflow" by the SWRCB. We are generally concerned that the GSP is grossly extrapolating the existence of "underflow" in the shallow alluvium across the entire basin from a limited number of "underflow" points of diversions within the basin (yet outside the WMA) that are actually managed by SWRCB. If the SWRCB is not managing the entire shallow aquifer as "underflow" and the beneficial users of groundwater and surface water reliant on it - this water is actually groundwater and is instead subject to SGMA regulations.

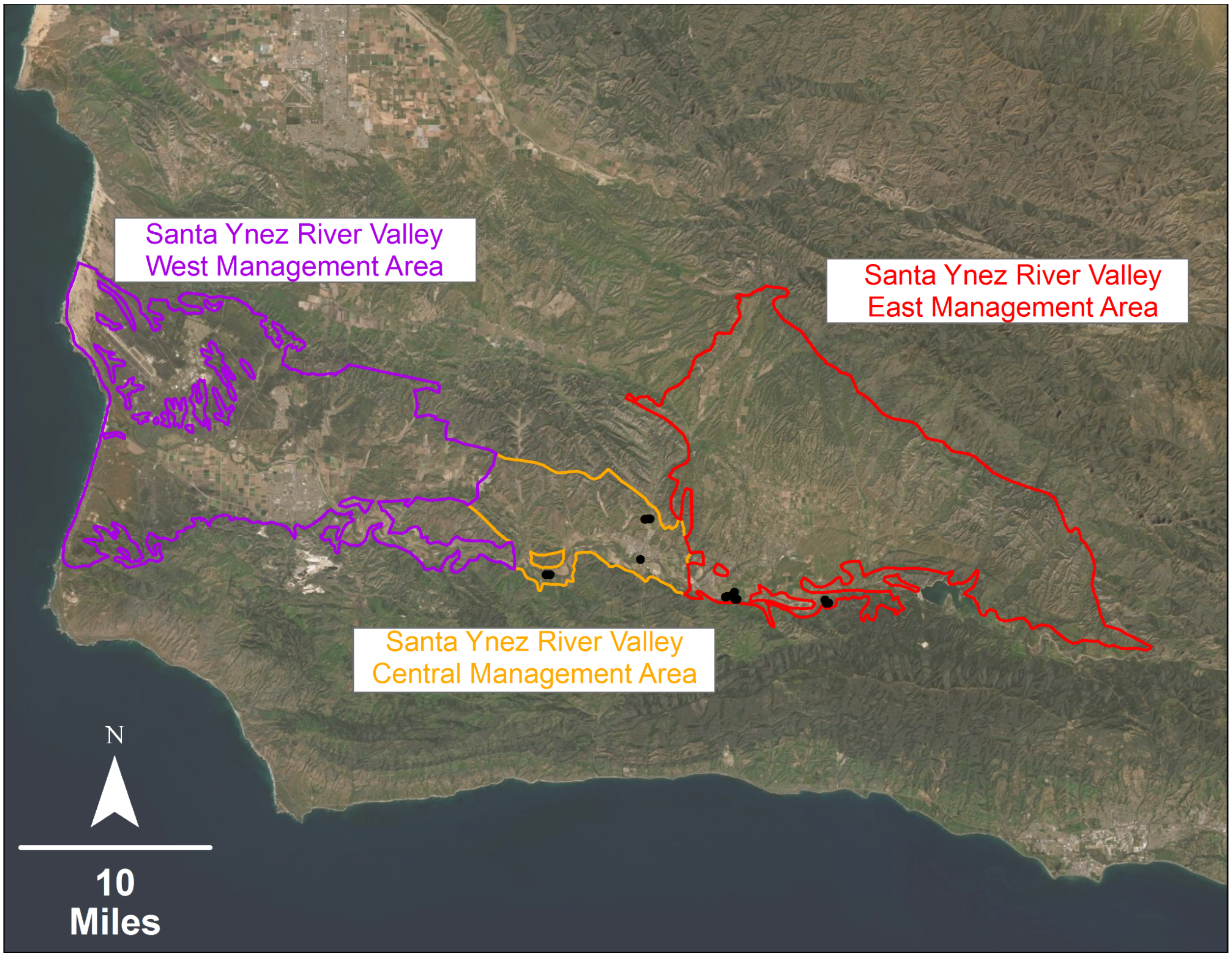

Figure 1. Points of Diversion (black circles) classified as “Santa Ynez River Underflow” within the Central Management Area (CMA; orange) and Eastern Management Area (EMA; red). No “underflow” points of diversion were located in the Western Management Area (WMA; purple). Data Source: eWRIMS.

The GSP continues further (p. 2b-43): *“All of the tributaries within the WMA (Figure 2b.6-1) are ephemeral. Several small streams flow year-round in canyons outside of the WMA and south of the Lompoc Plain (Bright et al. 1997). Once these flows reach the unconsolidated alluvial deposits within the boundary of the WMA, all of the flow infiltrates and recharges the groundwater. Thus, the perennial flows in these tributaries are not influenced by groundwater management actions in the WMA and would not be classified as having interconnected surface water under SGMA because they are disconnected from the water table in the primary aquifer and “completely depleted” as sources of groundwater recharge in the WMA.”* By disregarding ephemeral streams without modelling groundwater-surface water interactions or analyzing depth-to-groundwater data, the GSP disregards possible short durations of interconnections of groundwater and surface water that define interconnected surface water.

The GSP does not provide a map or concluding statement regarding which reaches in the WMA are considered interconnected (gaining/losing) or disconnected.

RECOMMENDATIONS
● Provide a map showing all the stream reaches in the WMA, with reaches clearly labeled as interconnected (gaining/losing) or disconnected. Consider any segments with data gaps as potential ISWs and clearly mark them as such on maps provided in the GSP. ● Substantiate the assertion that the shallow aquifer - **in its entirety** - is classified and managed as "underflow" by the SWRCB. Discuss SWRCB Order WR 2019-0148 and explain how it relates to the definition of ISW in the WMA. Cite relevant sections of the order, maps, and cross-sections. ● Provide depth-to-groundwater contour maps using the best practices presented in Attachment D, to aid in the determination of ISWs. Specifically, ensure that the first step is contouring groundwater elevations, and then subtracting this layer from land surface elevations from a digital elevation model (DEM) to estimate depth to groundwater contours across the landscape. This will provide accurate contours of depth-to-groundwater along streams and other land surface depressions where GDEs are commonly found. ● Use seasonal data over multiple water year types to capture the variability in environmental conditions inherent in California's climate, when mapping ISWs. We recommend the 10-year pre-SGMA baseline period of 2005 to 2015. ● Reconcile ISW data gaps with specific measures (shallow monitoring wells, stream gauges, and nested/clustered wells) along surface water features in the Monitoring Network section of the GSP.

Groundwater Dependent Ecosystems

The identification of Groundwater Dependent Ecosystems (GDEs) is **insufficient**. The GSP took initial steps to identify and map GDEs using the Natural Communities Commonly Associated with Groundwater dataset (NC dataset). However, we found that some mapped features in the NC dataset were improperly disregarded, as described below.

- NC dataset polygons were incorrectly removed If depth to groundwater has historically exceeded the 30-foot depth identified by the Nature Conservancy as representative of groundwater conditions that may sustain common phreatophytes and wetland ecosystems. However, description of the groundwater data used for the 30-foot threshold analysis is not provided in the GSP text. If it is the fall 2019 and spring 2020 data described in Section 2b.1-2 (Groundwater Elevation Contour Maps), then this data does not provide sufficient seasonal and temporal variability and it is after the 2015 SGMA benchmark date
- NC dataset polygons were incorrectly removed from riparian areas of the Santa Ynez River if identified as being "underflow" and managed by the SWRCB. However, as stated above under the ISW section of this letter, the GSP has failed to substantiate the assertion that the shallow aquifer - **in its entirety** - is classified and managed as "underflow" by the SWRCB, nor has the GSP provided a sufficient explanation of how the SWRCB Order relates to groundwater management in the WMA.

RECOMMENDATIONS

- Use depth-to-groundwater data from multiple seasons and water year types (e.g., wet, dry, average, drought) to determine the range of depth to groundwater around NC dataset polygons. We recommend that a pre-SGMA baseline period (10 years from 2005 to 2015) be established to characterize groundwater conditions over multiple water year types. Refer to Attachment D of this letter for best practices for using local groundwater data to verify whether polygons in the NC Dataset are supported by groundwater in an aquifer.

- Refer to Attachment B for more information on TNC's plant rooting depth database. Deeper thresholds are necessary for plants that have reported maximum root depths that exceed the averaged 30-ft threshold, such as valley oak (*Quercus lobata*). We recommend that the reported max rooting depth for these deeper-rooted plants be used. For example, a depth-to-groundwater threshold of 80 feet should be used instead of the 30-ft threshold, when verifying whether valley oak polygons from the NC Dataset are connected to groundwater. It is important to re-emphasize that actual rooting depth data are limited and will depend on the plant species and site-specific conditions such as soil and aquifer types, and availability to other water sources.

- Provide depth-to-groundwater contour maps, noting the best practices presented in Attachment D. Specifically, ensure that the first step is contouring groundwater elevations, and then subtracting this layer from land surface elevations from a digital elevation model (DEM) to estimate depth-to-groundwater contours across the landscape.

- If insufficient data are available to describe groundwater conditions within or near polygons from the NC dataset, include those polygons as "Potential GDEs" in the GSP until data gaps are reconciled in the monitoring network.

- Show the extent of the shallow aquifer that is classified and managed as "underflow" by the SWRCB. For example, include a map and description of extraction points and whether they source "underflow" or "groundwater" from the shallow alluvium. Discuss SWRCB Order WR 2019-0148 and explain how it relates to SGMA and the definition of ISW in the WMA. Cite relevant sections of the order, maps, and cross-sections.

Native Vegetation and Managed Wetlands

Native vegetation and managed wetlands are water use sectors that are required to be included in the water budget.[2,3] The integration of native vegetation into the water budget is **sufficient**. We commend the GSA for including the groundwater demands of this ecosystem in the historical, current and projected water budgets. Managed wetlands are not mentioned in the GSP, so it is not known whether or not they are present in the WMA.

[2] "'Water use sector' refers to categories of water demand based on the general land uses to which the water is applied, including urban, industrial, agricultural, managed wetlands, managed recharge, and native vegetation." [23 CCR §351(al)]

[3] "The water budget shall quantify the following, either through direct measurements or estimates based on data: (3) Outflows from the groundwater system by water use sector, including evapotranspiration, groundwater extraction, groundwater discharge to surface water sources, and subsurface groundwater outflow." [23 CCR §354.18]

RECOMMENDATION
● State whether or not there are managed wetlands in the WMA. If there are, ensure that their groundwater demands are included as separate line items in the historical, current, and projected water budgets.

B. Engaging Stakeholders

Stakeholder Engagement during GSP development
Stakeholder engagement during GSP development is **insufficient**. SGMA's requirement for public notice and engagement of stakeholders is not fully met by the description in the Public Outreach and Engagement Plan (Appendix 1c-C).[4]

We note the following deficiencies with the overall stakeholder engagement process:

- The opportunities for public involvement and engagement are described in very general terms and include attending GSA meetings and workshops, reading electronic newsletters, providing input on the draft and final GSP, and a Citizen Advisory Group. There are no specific details provided regarding targeted outreach to DACs, domestic well owners, and environmental stakeholders.

- The Public Outreach and Engagement Plan states that the residents within the DAC are represented on the WMA GSA by the City of Lompoc. However, it does not give more information about how their interests were represented.

- The Public Outreach and Engagement Plan does not include specific plans for continual engagement during the GSP *implementation* phase with DACs, domestic well owners, and environmental stakeholders.

RECOMMENDATIONS
● Include a more detailed and robust Public Outreach and Engagement Plan that describes active and targeted outreach to engage DAC members, domestic well owners, and environmental stakeholders throughout the GSP development and implementation phases. Refer to Attachment B for specific recommendations on how to actively engage stakeholders during all phases of the GSP process. ● Include plans to directly engage the DAC population for inclusion on the GSA advisory committee instead of having DACs represented by the City of Lompoc.

[4] "A communication section of the Plan shall include a requirement that the GSP identify how it encourages the active involvement of diverse social, cultural, and economic elements of the population within the basin." [23 CCR §354.10(d)(3)]

- Utilize DWR's tribal engagement guidance to comprehensively address all tribes and tribal interests in the basin within the GSP.[5]

C. Considering Beneficial Uses and Users When Establishing Sustainable Management Criteria and Analyzing Impacts on Beneficial Uses and Users

The consideration of beneficial uses and users when establishing sustainable management criteria (SMC) is **insufficient**. The consideration of potential impacts on all beneficial users of groundwater in the basin are required when defining undesirable results and establishing minimum thresholds.[6,7,8]

Disadvantaged Communities and Drinking Water Users

For chronic lowering of groundwater levels, the GSP presents a well impact analysis to assess the potential impacts of water level decline on domestic wells (Appendix 3b-B), which was used to determine the lower and upper aquifer groundwater level minimum thresholds for the WMA. For the lower aquifer, the GSP states (p. 3b-26): *"The minimum threshold for chronic lowering of groundwater levels in the Lower Aquifer was chosen by the WMA GSA at 20 feet below 2020 groundwater levels. Groundwater elevations 20 feet below 2020 levels corresponds to the top of well screens in approximately 22% of municipal supply wells, 39% of domestic supply wells, and 30% of agricultural supply wells completed in the Lower Aquifer."* For the upper aquifer, the GSP states (p. 3b-27): *"The minimum threshold groundwater elevations for the Upper Aquifer were established 10-feet below the 2020 groundwater elevation. Groundwater elevations 10 feet below the 2020 levels correspond to the groundwater elevations at or below top of well screens in approximately 15% of municipal supply wells, 15% of domestic supply wells, and 10% of agricultural supply wells."* Despite this well impact analysis, the GSP does not sufficiently describe whether these minimum thresholds will avoid significant and unreasonable loss of drinking water, especially given the absence of a well mitigation plan in the GSP.

In addition, the GSP does not, sufficiently describe or analyze direct or indirect impacts on DACs when defining undesirable results, nor does it describe how groundwater level minimum thresholds will avoid significant and unreasonable impacts to DACs and domestic well users beyond 2015 and be consistent with California's Human Right to Water policy.[9]

For degraded water quality, the GSP identifies the constituents of concern (COCs) in the WMA as the following: boron, chloride, total dissolved solids (TDS), sulfate, sodium, and nitrate. The minimum threshold for nitrate is set to the maximum contaminant level (MCL) of 10 mg/L for nitrate as nitrogen. For the other COCs, the minimum threshold concentrations are established at the median Water Quality Objectives (WQOs) established from the Central Coastal Basin Water

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[5] Engagement with Tribal Governments Guidance Document. Available at: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Sustainable-Groundwater-Management/Best-Management-Practices-and-Guidance-Documents/Files/Guidance-Doc-for-SGM-Engagement-with-Tribal-Govt_ay_19.pdf

[6] "The description of undesirable results shall include [...] potential effects on the beneficial uses and users of groundwater, on land uses and property interests, and other potential effects that may occur or are occurring from undesirable results." [23 CCR §354.26(b)(3)]

[7] "The description of minimum thresholds shall include [...] how minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests." [23 CCR §354.28(b)(4)]

[8] "The description of minimum thresholds shall include [...] how state, federal, or local standards relate to the relevant sustainability indicator. If the minimum threshold differs from other regulatory standards, the agency shall explain the nature of and the basis for the difference." [23 CCR §354.28(b)(5)]

[9] California Water Code §106.3. Available at: https://leginfo.legislature.ca.gov/faces/codes_displaySection.xhtml?lawCode=WAT&sectionNum=106.3

Quality Control Plan (CCBWQCP). The GSP does not compare the WQOs with MCLs to ensure the most protective values are chosen as minimum thresholds.

The GSP only includes a very general discussion of impacts to drinking water users when defining undesirable results and evaluating the impacts of proposed minimum thresholds. The GSP does not, however, mention or discuss direct and indirect impacts on DACs when defining undesirable results for degraded water quality, nor does it evaluate the cumulative or indirect impacts of proposed minimum thresholds on DACs.

RECOMMENDATIONS

Chronic Lowering of Groundwater Levels

- Describe direct and indirect impacts on drinking water users and DACs when describing undesirable results and defining minimum thresholds for chronic lowering of groundwater levels.

Degraded Water Quality

- Describe direct and indirect impacts on drinking water users and DACs when defining undesirable results for degraded water quality. For specific guidance on how to consider these users, refer to "Guide to Protecting Water Quality Under the Sustainable Groundwater Management Act."[10]

- Evaluate the cumulative or indirect impacts of proposed minimum thresholds for degraded water quality on drinking water users and DACs.

- Provide a table in the GSP that compares WQOs to MCLs for all COCs. Ensure that the most protective value is chosen for the minimum threshold.

Groundwater Dependent Ecosystems and Interconnected Surface Waters

The GSP only considers GDEs with respect to the depletion of interconnected surface water sustainability indicator, but not the chronic lowering of groundwater levels sustainability indicator. No analysis or discussion is provided in the GSP that describes impacts on GDEs or establishes SMC for GDEs that are directly dependent on groundwater. This is problematic because without identifying potential impacts on GDEs, minimum thresholds may compromise these environmental beneficial users. Since GDEs may be present in areas of the WMA that are not adjacent to ISW (see our comments in the GDE section of this letter), they must be considered when developing SMC for chronic lowering of groundwater levels.

For depletions of interconnected surface water, the GSP does not describe undesirable results to beneficial users of surface water, other than to say (p. 3b-21): *"Surface water releases through the Cachuma Reservoir to the WMA are managed by SWRCB under Order WR 2019-0148. The lowering of groundwater levels below historical lows in the Upper Aquifer potentially impacts habitat and ecosystem health along the Santa Ynez River."*

The GSP continues (p. 3b-21): *"Using groundwater levels adjacent to the Santa Ynez River in the Upper Aquifer, undesirable results associated with a depletion of interconnected surface water and groundwater will be quantified by measuring groundwater elevations semi-annually at three representative monitoring points located adjacent to the Santa Ynez River (Figure 3b.2-6) and*

[10] Guide to Protecting Water Quality under the Sustainable Groundwater Management Act https://d3n8a8pro7vhmx.cloudfront.net/communitywatercenter/pages/293/attachments/original/1559328858/Guide_to_Protecting_Drinking_Water_Quality_Under_the_Sustainable_Groundwater_Management_Act.pdf?1559328858.

maintaining water levels above historical low groundwater levels." However, no analysis or discussion is presented to describe how the SMC will affect GDEs, or the impact of these minimum thresholds on GDEs in the WMA. Furthermore, the GSP makes no attempt to evaluate the impacts of the proposed minimum threshold on environmental beneficial users of surface water. The GSP does not explain how the chosen minimum thresholds and measurable objectives avoid significant and unreasonable effects on surface water beneficial users in the WMA, such as increased mortality and inability to perform key life processes (e.g., reproduction, migration).

RECOMMENDATIONS

- Define chronic lowering of groundwater SMC directly for environmental beneficial users of groundwater. When defining undesirable results for chronic lowering of groundwater levels, provide specifics on what biological responses (e.g., extent of habitat, growth, recruitment rates) would best characterize a significant and unreasonable impact on GDEs. Undesirable results to environmental users occur when 'significant and unreasonable' effects on beneficial users are caused by one of the sustainability indicators (i.e., chronic lowering of groundwater levels, degraded water quality, or depletion of interconnected surface water). Thus, potential impacts on environmental beneficial uses and users need to be considered when defining undesirable results in the WMA.[11] Defining undesirable results is the crucial first step before the minimum thresholds can be determined.[12]

- When defining undesirable results for depletion of interconnected surface water, include a description of potential impacts on instream habitats within ISWs when minimum thresholds in the WMA are reached.[13] The GSP should confirm that minimum thresholds for ISWs avoid adverse impacts on environmental beneficial users of interconnected surface waters as these environmental users could be left unprotected by the GSP. These recommendations apply especially to environmental beneficial users that are already protected under pre-existing state or federal law.[6,14]

- When establishing SMC for the basin, consider that the SGMA statute [Water Code §10727.4(l)] specifically calls out that GSPs shall include "impacts on groundwater dependent ecosystems".

[11] "The description of undesirable results shall include [...] potential effects on the beneficial uses and users of groundwater, on land uses and property interests, and other potential effects that may occur or are occurring from undesirable results". [23 CCR §354.26(b)(3)]
[12] The description of minimum thresholds shall include [...] how minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests." [23 CCR §354.28(b)(4)]
[13] "The minimum threshold for depletions of interconnected surface water shall be the rate or volume of surface water depletions caused by groundwater use that has adverse impacts on beneficial uses of the surface water and may lead to undesirable results." [23 CCR §354.28(c)(6)]
[14] Rohde MM, Seapy B, Rogers R, Castañeda X, editors. 2019. Critical Species LookBook: A compendium of California's threatened and endangered species for sustainable groundwater management. The Nature Conservancy, San Francisco, California. Available at: https://groundwaterresourcehub.org/public/uploads/pdfs/Critical_Species_LookBook_91819.pdf

2. Climate Change

The SGMA statute identifies climate change as a significant threat to groundwater resources and one that must be examined and incorporated in the GSPs. The GSP Regulations require integration of climate change into the projected water budget to ensure that projects and management actions sufficiently account for the range of potential climate futures.[15] The effects of climate change will intensify the impacts of water stress on GDEs, making available shallow groundwater resources especially critical to their survival. Condon *et al.* (2020) shows that GDEs are more likely to succumb to water stress and rely more on groundwater during times of drought.[16] When shallow groundwater is unavailable, riparian forests can die off and key life processes (e.g., migration and spawning) for aquatic organisms, such as steelhead, can be impeded.

The integration of climate change into the projected water budget is **insufficient**. The GSP incorporates climate change into the projected water budget using DWR change factors for 2030 and 2070. However, the plan does not consider multiple climate scenarios (e.g., the 2070 extremely wet and extremely dry climate scenarios) in the projected water budget. The GSP should clearly and transparently incorporate the extremely wet and dry scenarios provided by DWR into projected water budgets or select more appropriate extreme scenarios for the WMA. While these extreme scenarios may have a lower likelihood of occurring, their consequences could be significant and their inclusion can help identify important vulnerabilities in the basin's approach to groundwater management.

The GSP incorporates climate change into key inputs (e.g., precipitation and evapotranspiration) of the projected water budget. However, climate change was not incorporated into surface water flow inputs. Furthermore, the GSP does not provide a sustainable yield based on the projected water budget with climate change incorporated. If the water budgets are incomplete, including the omission of projected climate change impacts on surface water flow inputs, and sustainable yield is not calculated based on climate change projections, then there is increased uncertainty in virtually every subsequent calculation used to plan for projects, derive measurable objectives, and set minimum thresholds. Plans that do not adequately include climate change projections may underestimate future impacts on vulnerable beneficial users of groundwater such as ecosystems, DACs, and domestic well owners.

RECOMMENDATIONS

- Integrate climate change, including extremely wet and dry scenarios, into all elements of the projected water budget to form the basis for development of sustainable management criteria and projects and management actions.
- Incorporate climate change into surface water flow inputs for the projected water budget.
- Estimate sustainable yield based on the projected water budget with climate change incorporated.
- Incorporate climate change scenarios into projects and management actions.

[15] "Each Plan shall rely on the best available information and best available science to quantify the water budget for the basin in order to provide an understanding of historical and projected hydrology, water demand, water supply, land use, population, climate change, sea level rise, groundwater and surface water interaction, and subsurface groundwater flow." [23 CCR §354.18(e)]

[16] Condon et al. 2020. Evapotranspiration depletes groundwater under warming over the contiguous United States. Nature Communications. Available at: https://www.nature.com/articles/s41467-020-14688-0

3. Data Gaps

The consideration of beneficial users when establishing monitoring networks is **insufficient**, due to lack of specific plans to increase the Representative Monitoring Wells (RMWs) in the monitoring network that represent water quality conditions and shallow groundwater elevations around DACs, domestic wells, GDEs, and ISWs in the WMA.

Figure 3a.3-1 (WMA Monitoring Network and Representative Monitoring Wells for Groundwater Levels and Groundwater Storage) shows insufficient representation of DACs and domestic wells for groundwater elevation monitoring. Figure 3a.3-2 (WMA Monitoring Network and Representative Monitoring Wells for Water Quality) shows insufficient representation of DACs and domestic wells for groundwater quality monitoring. Beneficial users of groundwater may remain unprotected by the GSP without adequate monitoring and identification of data gaps in the shallow aquifer. The Plan therefore fails to meet SGMA's requirements for the monitoring network.[17]

Figure 3a.3-5 (WMA Monitoring Network and Representative Monitoring for Groundwater Dependent Ecosystems) shows that representative wells should be added along the length of the Santa Ynez River to adequately cover the area of mapped GDEs. Additionally, our comments above under the GDE section of this letter note that GDEs may have been improperly disregarded in portions of the WMA that are non-adjacent to the Santa Ynez River. These data gaps for GDEs were not described in the GSP.

RECOMMENDATIONS

- Provide maps that overlay current and proposed monitoring well locations with the locations of DACs, domestic wells, GDEs, and ISWs to clearly identify which beneficial users are not adequately being monitored spatially and at depth.
- Increase the number of RMWs in the shallow aquifer across the WMA as needed to adequately monitor all groundwater condition indicators across the WMA and at appropriate depths for *all* beneficial users. Prioritize proximity to DACs, domestic wells, GDEs, and ISWs when identifying new RMWs.
- Provide specific plans to fill data gaps in the monitoring network. Evaluate how the gathered data will be used to identify and map GDEs and ISWs, and identify DACs and shallow domestic well users that are vulnerable to undesirable results.
- Describe biological monitoring that can be used to assess the potential for significant and unreasonable impacts to GDEs or ISWs due to groundwater conditions in the WMA.

[17] "The monitoring network objectives shall be implemented to accomplish the following: [...] (2) Monitor impacts to the beneficial uses or users of groundwater." [23 CCR §354.34(b)(2)]

4. Addressing Beneficial Users in Projects and Management Actions

The consideration of beneficial users when developing projects and management actions is **insufficient**, due to the failure to completely identify benefits or impacts of identified projects and management actions, including water quality impacts, to key beneficial users of groundwater such as GDEs, aquatic habitats, surface water users, DACs, and drinking water users. Therefore, potential project and management actions may not protect these beneficial users. Groundwater sustainability under SGMA is defined not just by sustainable yield, but by the avoidance of undesirable results for *all* beneficial users.

The GSP lists a PMA entitled "Drought Mitigation by Pumping Optimization and Deepen Existing Wells" (p. 4a-39), but the GSP states that it is not a current commitment that the GSA plans to implement. We recommend including specific plans to implement a drinking water well impact mitigation program since the SMC section of the GSP outlines that a significant percentage of domestic wells will be impacted at minimum thresholds.

RECOMMENDATIONS

- For DACs and domestic well owners, include a drinking water well impact mitigation program to proactively monitor and protect drinking water wells through GSP implementation. Refer to Attachment B for specific recommendations on how to implement a drinking water well mitigation program.

- For DACs and domestic well owners, include a discussion of whether potential impacts to water quality from projects and management actions could occur and how the GSA plans to mitigate such impacts.

- The GSP discusses Project Management Action No. 4: Increase Stormwater Recharge. Note that recharge ponds, reservoirs, and facilities for managed aquifer recharge can be designed as multiple-benefit projects to include elements that act functionally as wetlands and provide a benefit for wildlife and aquatic species. For further guidance on how to integrate multi-benefit recharge projects into your GSP, refer to the "Multi-Benefit Recharge Project Methodology Guidance Document".[18]

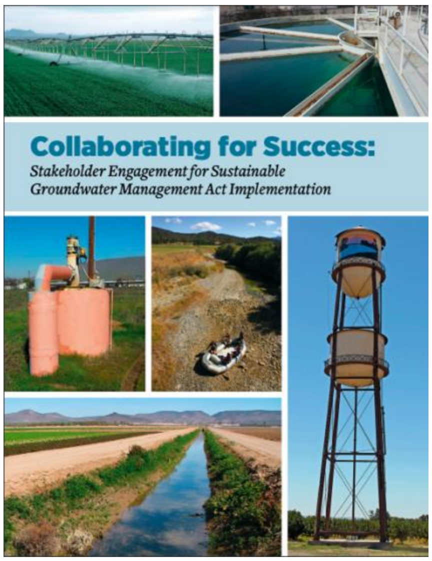
- Develop management actions that incorporate climate and water delivery uncertainties to address future water demand and prevent future undesirable results.

[18] The Nature Conservancy. 2021. Multi-Benefit Recharge Project Methodology for Inclusion in Groundwater Sustainability Plans. Sacramento. Available at: https://groundwaterresourcehub.org/sgma-tools/multi-benefit-recharge-project-methodology-guidance/

Attachment B

SGMA Tools to address DAC, drinking water, and environmental beneficial uses and users

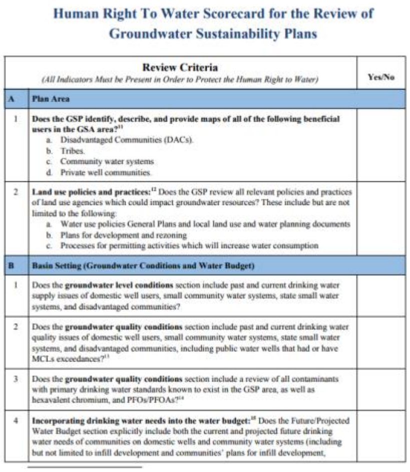
Stakeholder Engagement and Outreach



Clean Water Action, Community Water Center and Union of Concerned Scientists developed a guidance document called Collaborating for success: Stakeholder engagement for Sustainable Groundwater Management Act Implementation. It provides details on how to conduct targeted and broad outreach and engagement during Groundwater Sustainability Plan (GSP) development and implementation. Conducting a targeted outreach involves:

- Developing a robust Stakeholder Communication and Engagement plan that includes outreach at frequented locations (schools, farmers markets, religious settings, events) across the plan area to increase the involvement and participation of disadvantaged communities, drinking water users and the environmental stakeholders.
- Providing translation services during meetings and technical assistance to enable easy participation for non-English speaking stakeholders.
- GSP should adequately describe the process for requesting input from beneficial users and provide details on how input is incorporated into the GSP.

The Human Right to Water

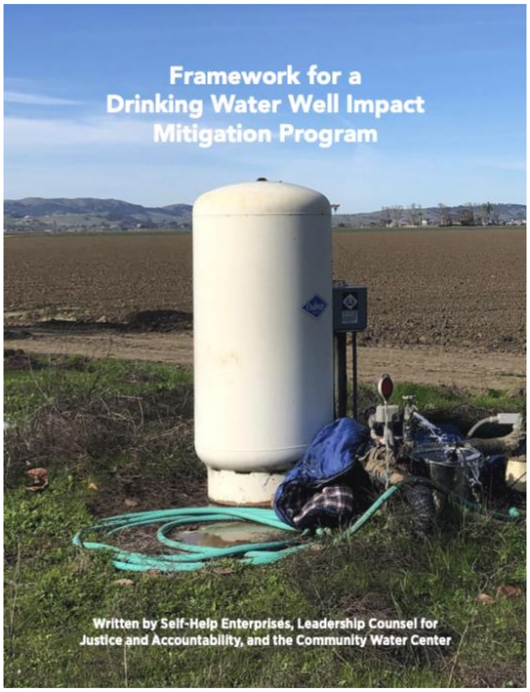


Human Right To Water Scorecard for the Review of Groundwater Sustainability Plans

	Review Criteria *(All Indicators Must be Present in Order to Protect the Human Right to Water)*	Yes/No
A	**Plan Area**	
1	**Does the GSP identify, describe, and provide maps of all of the following beneficial users in the GSA area?**[11] a. Disadvantaged Communities (DACs). b. Tribes. c. Community water systems d. Private well communities.	
2	**Land use policies and practices:**[12] Does the GSP review all relevant policies and practices of land use agencies which could impact groundwater resources? These include but are not limited to the following: a. Water use policies General Plans and local land use and water planning documents b. Plans for development and rezoning c. Processes for permitting activities which will increase water consumption	
B	**Basin Setting (Groundwater Conditions and Water Budget)**	
1	Does the **groundwater level conditions** section include past and current drinking water supply issues of domestic well users, small community water systems, state small water systems, and disadvantaged communities?	
2	Does the **groundwater quality conditions** section include past and current drinking water quality issues of domestic well users, small community water systems, state small water systems, and disadvantaged communities, including public water wells that had or have MCLs exceedances?[13]	
3	Does the **groundwater quality conditions** section include a review of all contaminants with primary drinking water standards known to exist in the GSP area, as well as hexavalent chromium, and PFOs/PFOAs?[14]	
4	**Incorporating drinking water needs into the water budget:**[15] Does the Future/Projected Water Budget section explicitly include both the current and projected future drinking water needs of communities on domestic wells and community water systems (including but not limited to infill development and communities' plans for infill development,	

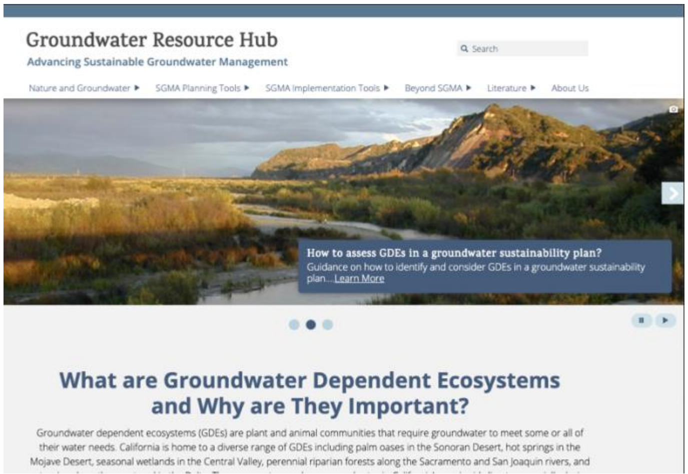
The Human Right to Water Scorecard was developed by Community Water Center, Leadership Counsel for Justice and Accountability and Self Help Enterprises to aid Groundwater Sustainability Agencies (GSAs) in prioritizing drinking water needs in SGMA. The scorecard identifies elements that must exist in GSPs to adequately protect the Human Right to Drinking water.

Drinking Water Well Impact Mitigation Framework



The Drinking Water Well Impact Mitigation Framework was developed by Community Water Center, Leadership Counsel for Justice and Accountability and Self Help Enterprises to aid GSAs in the development and implementation of their GSPs. The framework provides a clear roadmap for how a GSA can best structure its data gathering, monitoring network and management actions to proactively monitor and protect drinking water wells and mitigate impacts should they occur.

Groundwater Resource Hub



The Nature Conservancy has developed a suite of tools based on best available science to help GSAs, consultants, and stakeholders efficiently incorporate nature into GSPs. These tools and resources are available online at GroundwaterResourceHub.org. The Nature Conservancy's tools and resources are intended to reduce costs, shorten timelines, and increase benefits for both people and nature.

Rooting Depth Database

The Plant Rooting Depth Database provides information that can help assess whether groundwater-dependent vegetation are accessing groundwater. Actual rooting depths will depend on the plant species and site-specific conditions, such as soil type and availability of other water sources. Site-specific knowledge of depth to groundwater combined with rooting depths will help provide an understanding of the potential groundwater levels are needed to sustain GDEs.

How to use the database

The maximum rooting depth information in the Plant Rooting Depth Database is useful when verifying whether vegetation in the Natural Communities Commonly Associated with Groundwater (NC Dataset) are connected to groundwater. A 30 ft depth-to-groundwater threshold, which is based on averaged global rooting depth data for phreatophytes[1], is relevant for most plants identified in the NC Dataset since most plants have a max rooting depth of less than 30 feet. However, it is important to note that deeper thresholds are necessary for other plants that have reported maximum root depths that exceed the averaged 30 feet threshold, such as valley oak (*Quercus lobata*), Euphrates poplar (*Populus euphratica*), salt cedar (*Tamarix spp.*), and shadescale (*Atriplex confertifolia*). The Nature Conservancy advises that the reported max rooting depth for these deeper-rooted plants be used. For example, a depth-to groundwater threshold of 80 feet should be used instead of the 30 ft threshold, when verifying whether valley oak polygons from the NC Dataset are connected to groundwater. It is important to re-emphasize that actual rooting depth data are limited and will depend on the plant species and site-specific conditions such as soil and aquifer types, and availability to other water sources.

The Plant Rooting Depth Database is an Excel workbook composed of four worksheets:

1. California phreatophyte rooting depth data (included in the NC Dataset)
2. Global phreatophyte rooting depth data
3. Metadata
4. References

How the database was compiled

The Plant Rooting Depth Database is a compilation of rooting depth information for the groundwater-dependent plant species identified in the NC Dataset. Rooting depth data were compiled from published scientific literature and expert opinion through a crowdsourcing campaign. As more information becomes available, the database of rooting depths will be updated. Please Contact Us if you have additional rooting depth data for California phreatophytes.

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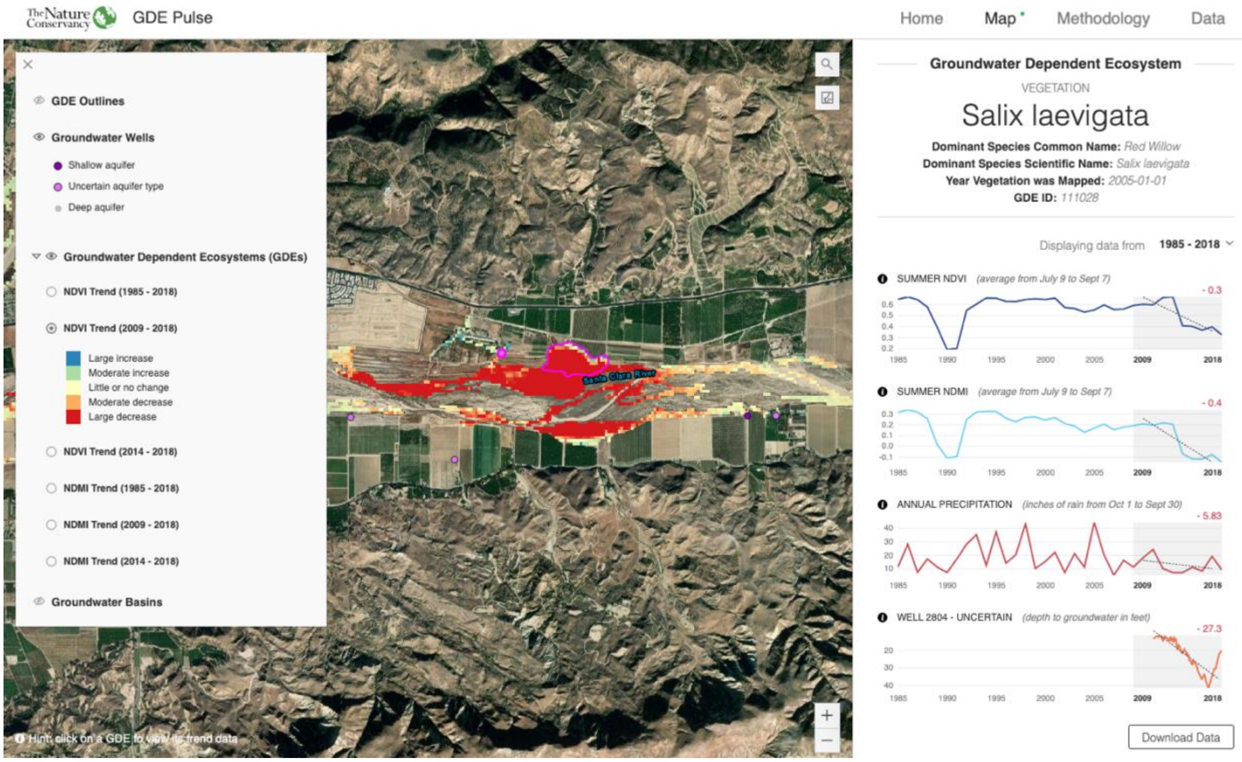
[1] Canadell, J., Jackson, R.B., Ehleringer, J.B. et al. 1996. Maximum rooting depth of vegetation types at the global scale. Oecologia 108, 583–595. https://doi.org/10.1007/BF00329030

GDE Pulse



[GDE Pulse](https://gde.codefornature.org) is a free online tool that allows Groundwater Sustainability Agencies to assess changes in groundwater dependent ecosystem (GDE) health using satellite, rainfall, and groundwater data. Remote sensing data from satellites has been used to monitor the health of vegetation all over the planet. GDE pulse has compiled 35 years of satellite imagery from NASA's Landsat mission for every polygon in the Natural Communities Commonly Associated with Groundwater Dataset. The following datasets are available for downloading:

Normalized Difference Vegetation Index (NDVI) is a satellite-derived index that represents the greenness of vegetation. Healthy green vegetation tends to have a higher NDVI, while dead leaves have a lower NDVI. We calculated the average NDVI during the driest part of the year (July - Sept) to estimate vegetation health when the plants are most likely dependent on groundwater.

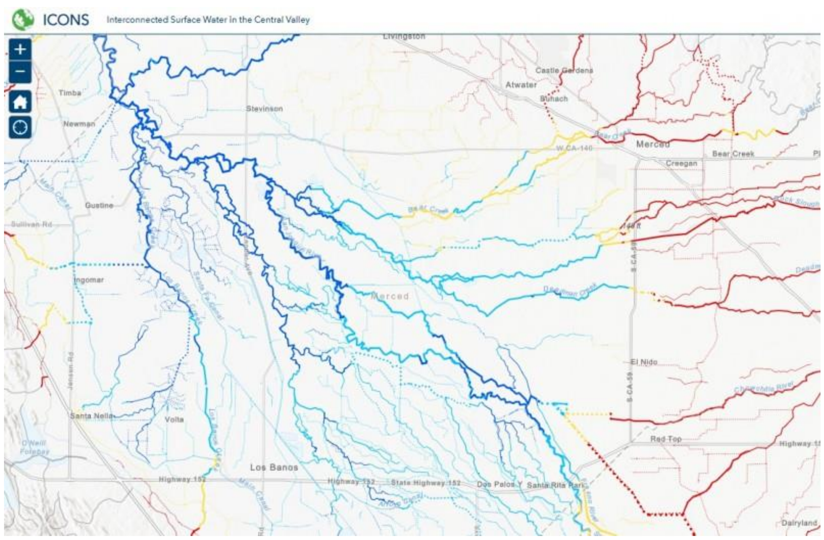
Normalized Difference Moisture Index (NDMI) is a satellite-derived index that represents water content in vegetation. NDMI is derived from the Near-Infrared (NIR) and Short-Wave Infrared (SWIR) channels. Vegetation with adequate access to water tends to have higher NDMI, while vegetation that is water stressed tends to have lower NDMI. We calculated the average NDVI during the driest part of the year (July–September) to estimate vegetation health when the plants are most likely dependent on groundwater.

Annual Precipitation is the total precipitation for the water year (October 1st – September 30th) from the PRISM dataset. The amount of local precipitation can affect vegetation with more precipitation generally leading to higher NDVI and NDMI.

Depth to Groundwater measurements provide an indication of the groundwater levels and changes over time for the surrounding area. We used groundwater well measurements from nearby (<1km) wells to estimate the depth to groundwater below the GDE based on the average elevation of the GDE (using a digital elevation model) minus the measured groundwater surface elevation.

ICONOS Mapper

Interconnected Surface Water in the Central Valley



ICONS maps the likely presence of interconnected surface water (ISW) in the Central Valley using depth to groundwater data. Using data from 2011-2018, the ISW dataset represents the likely connection between surface water and groundwater for rivers and streams in California's Central Valley. It includes information on the mean, maximum, and minimum depth to groundwater for each stream segment over the years with available data, as well as the likely presence of ISW based on the minimum depth to groundwater. The Nature Conservancy developed this database, with guidance and input from expert academics, consultants, and state agencies.

We developed this dataset using groundwater elevation data available online from the California Department of Water Resources (DWR). DWR only provides this data for the Central Valley. For GSAs outside of the valley, who have groundwater well measurements, we recommend following our methods to determine likely ISW in your region. The Nature Conservancy's ISW dataset should be used as a first step in reviewing ISW and should be supplemented with local or more recent groundwater depth data.

Attachment C

Freshwater Species Located in the Santa Ynez River Valley Subbasin

To assist in identifying the beneficial users of surface water necessary to assess the undesirable result "depletion of interconnected surface waters", Attachment C provides a list of freshwater species located in the Santa Ynez River Valley Subbasin. To produce the freshwater species list, we used ArcGIS to select features within the California Freshwater Species Database version 2.0.9 within the basin 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 methods used to compile the California Freshwater Species Database can be found in Howard et al. 2015[1]. 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[2] as well as on The Nature Conservancy's science website[3].

Scientific Name	Common Name	Legal Protected Status		
		Federal	State	Other
BIRDS				
Vireo bellii pusillus	Least Bell's Vireo	Endangered	Endangered	
Actitis macularius	Spotted Sandpiper			
Aechmophorus clarkii	Clark's Grebe			
Aechmophorus occidentalis	Western Grebe			
Agelaius tricolor	Tricolored Blackbird	Bird of Conservation Concern	Special Concern	BSSC - First priority
Aix sponsa	Wood Duck			
Anas acuta	Northern Pintail			
Anas americana	American Wigeon			
Anas clypeata	Northern Shoveler			
Anas crecca	Green-winged Teal			
Anas cyanoptera	Cinnamon Teal			
Anas discors	Blue-winged Teal			
Anas platyrhynchos	Mallard			
Anas strepera	Gadwall			
Anser albifrons	Greater White-fronted Goose			
Ardea alba	Great Egret			
Ardea herodias	Great Blue Heron			
Aythya affinis	Lesser Scaup			
Aythya americana	Redhead		Special Concern	BSSC - Third priority

[1] Howard, J.K. et al. 2015. Patterns of Freshwater Species Richness, Endemism, and Vulnerability in California. PLoSONE, 11(7). Available at: https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0130710

[2] California Department of Fish and Wildlife BIOS: https://www.wildlife.ca.gov/data/BIOS

[3] Science for Conservation: https://www.scienceforconservation.org/products/california-freshwater-species-database

Aythya collaris	Ring-necked Duck			
Aythya marila	Greater Scaup			
Aythya valisineria	Canvasback		Special	
Botaurus lentiginosus	American Bittern			
Bucephala albeola	Bufflehead			
Bucephala clangula	Common Goldeneye			
Butorides virescens	Green Heron			
Calidris alpina	Dunlin			
Calidris mauri	Western Sandpiper			
Calidris minutilla	Least Sandpiper			
Chen caerulescens	Snow Goose			
Chen rossii	Ross's Goose			
Chlidonias niger	Black Tern		Special Concern	BSSC - Second priority
Chroicocephalus philadelphia	Bonaparte's Gull			
Cistothorus palustris palustris	Marsh Wren			
Cygnus columbianus	Tundra Swan			
Egretta thula	Snowy Egret			
Empidonax traillii	Willow Flycatcher	Bird of Conservation Concern	Endangered	
Fulica americana	American Coot			
Gallinago delicata	Wilson's Snipe			
Gelochelidon nilotica vanrossemi	Gull-billed Tern	Bird of Conservation Concern	Special Concern	BSSC - Third priority
Haliaeetus leucocephalus	Bald Eagle	Bird of Conservation Concern	Endangered	
Himantopus mexicanus	Black-necked Stilt			
Icteria virens	Yellow-breasted Chat		Special Concern	BSSC - Third priority
Laterallus jamaicensis coturniculus	California Black Rail	Bird of Conservation Concern	Threatened	
Limnodromus scolopaceus	Long-billed Dowitcher			
Lophodytes cucullatus	Hooded Merganser			
Megaceryle alcyon	Belted Kingfisher			
Mergus merganser	Common Merganser			
Mergus serrator	Red-breasted Merganser			
Numenius americanus	Long-billed Curlew			

Numenius phaeopus	Whimbrel			
Nycticorax nycticorax	Black-crowned Night-Heron			
Oreothlypis luciae	Lucy's Warbler		Special Concern	BSSC - Third priority
Oxyura jamaicensis	Ruddy Duck			
Pelecanus erythrorhynchos	American White Pelican		Special Concern	BSSC - First priority
Phalacrocorax auritus	Double-crested Cormorant			
Phalaropus tricolor	Wilson's Phalarope			
Piranga rubra	Summer Tanager		Special Concern	BSSC - First priority
Plegadis chihi	White-faced Ibis		Watch list	
Pluvialis squatarola	Black-bellied Plover			
Podiceps nigricollis	Eared Grebe			
Podilymbus podiceps	Pied-billed Grebe			
Porzana carolina	Sora			
Rallus limicola	Virginia Rail			
Recurvirostra americana	American Avocet			
Riparia riparia	Bank Swallow		Threatened	
Rynchops niger	Black Skimmer			
Setophaga petechia	Yellow Warbler			BSSC - Second priority
Tachycineta bicolor	Tree Swallow			
Tringa melanoleuca	Greater Yellowlegs			
Tringa semipalmata	Willet			
Tringa solitaria	Solitary Sandpiper			
Xanthocephalus xanthocephalus	Yellow-headed Blackbird		Special Concern	BSSC - Third priority
CRUSTACEANS				
Branchinecta lynchi	Vernal Pool Fairy Shrimp	Threatened	Special	IUCN - Vulnerable
Americorophium spinicorne				Not on any status lists
Cyprididae fam.	Cyprididae fam.			
Gammarus spp.	Gammarus spp.			
Hyalella spp.	Hyalella spp.			
Neomysis mercedis				Not on any status lists
Ramellogammarus spp.	Ramellogammarus spp.			
FISH				
Eucyclogobius newberryi	Tidewater goby	Endangered	Special Concern	Vulnerable - Moyle 2013
Gasterosteus aculeatus williamsoni	Unarmored threespine stickleback	Endangered	Endangered	Endangered - Moyle 2013

Oncorhynchus mykiss irideus	Coastal rainbow trout			Least Concern - Moyle 2013
Oncorhynchus mykiss - Southern CA	Southern California steelhead	Endangered	Special Concern	Endangered - Moyle 2013
HERPS				
Actinemys marmorata marmorata	Western Pond Turtle		Special Concern	ARSSC
Ambystoma californiense californiense	California Tiger Salamander	Threatened	Threatened	ARSSC
Anaxyrus boreas boreas	Boreal Toad			
Pseudacris cadaverina	California Treefrog			ARSSC
Rana boylii	Foothill Yellow-legged Frog	Under Review in the Candidate or Petition Process	Special Concern	ARSSC
Rana draytonii	California Red-legged Frog	Threatened	Special Concern	ARSSC
Spea hammondii	Western Spadefoot	Under Review in the Candidate or Petition Process	Special Concern	ARSSC
Taricha torosa	Coast Range Newt		Special Concern	ARSSC
Thamnophis hammondii hammondii	Two-striped Gartersnake		Special Concern	ARSSC
Thamnophis sirtalis sirtalis	Common Gartersnake			
Anaxyrus boreas halophilus	California Toad			ARSSC
Pseudacris regilla	Northern Pacific Chorus Frog			
Thamnophis atratus atratus	Santa Cruz Gartersnake			Not on any status lists
Thamnophis elegans elegans	Mountain Gartersnake			Not on any status lists
Thamnophis elegans terrestris	Coast Gartersnake			Not on any status lists
Thamnophis sirtalis infernalis	California Red-sided Gartersnake			Not on any status lists
INSECTS & OTHER INVERTS				
Acentrella spp.	Acentrella spp.			
Acilius abbreviatus				Not on any status lists
Agabinus glabrellus				Not on any status lists
Agabus disintegratus				Not on any status lists
Agabus lutosus				Not on any status lists
Agabus spp.	Agabus spp.			
Agapetus spp.	Agapetus spp.			

Ambrysus spp.	Ambrysus spp.			
Anacaena signaticollis				Not on any status lists
Anax junius	Common Green Darner			
Anax spp.	Anax spp.			
Anisitsiellidae fam.	Anisitsiellidae fam.			
Apedilum spp.	Apedilum spp.			
Archilestes grandis	Great Spreadwing			
Argia spp.	Argia spp.			
Argia vivida	Vivid Dancer			
Baetidae fam.	Baetidae fam.			
Baetis adonis	A Mayfly			
Baetis spp.	Baetis spp.			
Belostomatidae fam.	Belostomatidae fam.			
Berosus infuscatus				Not on any status lists
Berosus punctatissimus				Not on any status lists
Caenis bajaensis	A Mayfly			
Caenis spp.	Caenis spp.			
Callibaetis spp.	Callibaetis spp.			
Caudatella spp.	Caudatella spp.			
Centroptilum spp.	Centroptilum spp.			
Chaetarthria magna				Not on any status lists
Chaetarthria punctulata				Not on any status lists
Cheumatopsyche spp.	Cheumatopsyche spp.			
Chironomidae fam.	Chironomidae fam.			
Chironomus anonymus				Not on any status lists
Chironomus spp.	Chironomus spp.			
Coenagrionidae fam.	Coenagrionidae fam.			
Colymbetes strigatus				Not on any status lists
Copelatus glyphicus				Not on any status lists
Cordulegaster dorsalis	Pacific Spiketail			
Corisella spp.	Corisella spp.			
Corixidae fam.	Corixidae fam.			
Cricotopus annulator				Not on any status lists
Cricotopus spp.	Cricotopus spp.			
Cybister ellipticus				Not on any status lists
Cymbiodyta columbiana				Not on any status lists

Cymbiodyta dorsalis				Not on any status lists
Cymbiodyta pacifica				Not on any status lists
Dicrotendipes adnilus				Not on any status lists
Dicrotendipes spp.	Dicrotendipes spp.			
Dytiscidae fam.	Dytiscidae fam.			
Dytiscus marginicollis				Not on any status lists
Enallagma cyathigerum				Not on any status lists
Enallagma praevarum	Arroyo Bluet			
Enallagma spp.	Enallagma spp.			
Enochrus californicus				Not on any status lists
Enochrus carinatus				Not on any status lists
Enochrus cristatus				Not on any status lists
Enochrus cuspidatus				Not on any status lists
Enochrus piceus				Not on any status lists
Enochrus pygmaeus				Not on any status lists
Ephydridae fam.	Ephydridae fam.			
Eubrianax edwardsii				Not on any status lists
Eukiefferiella spp.	Eukiefferiella spp.			
Fallceon quilleri	A Mayfly			
Fallceon spp.	Fallceon spp.			
Helichus spp.	Helichus spp.			
Helichus suturalis				Not on any status lists
Hetaerina americana	American Rubyspot			
Heterocerus mexicanus				Not on any status lists
Hydrobius fuscipes				Not on any status lists
Hydrophilidae fam.	Hydrophilidae fam.			
Hydrophilus triangularis				Not on any status lists
Hydropsyche spp.	Hydropsyche spp.			
Hydropsychidae fam.	Hydropsychidae fam.			
Hydroptila spp.	Hydroptila spp.			
Hydroptilidae fam.	Hydroptilidae fam.			
Ischnura perparva	Western Forktail			
Labrundinia spp.	Labrundinia spp.			
Laccobius spp.	Laccobius spp.			

Laccophilus maculosus				Not on any status lists
Lauterborniella spp.	Lauterborniella spp.			
Libellula saturata	Flame Skimmer			
Limnophyes asquamatus				Not on any status lists
Limnophyes spp.	Limnophyes spp.			
Liodessus obscurellus				Not on any status lists
Microcylloepus spp.	Microcylloepus spp.			
Micropsectra nigripila				Not on any status lists
Micropsectra spp.	Micropsectra spp.			
Nectopsyche spp.	Nectopsyche spp.			
Neoclypeodytes pictodes				Not on any status lists
Neoclypeodytes plicipennis				Not on any status lists
Ochthebius apache				Not on any status lists
Ochthebius discretus				Not on any status lists
Ochthebius puncticollis				Not on any status lists
Ochthebius spp.	Ochthebius spp.			
Optioservus spp.	Optioservus spp.			
Orthocladius appersoni				Not on any status lists
Orthocladius spp.	Orthocladius spp.			
Oxyethira spp.	Oxyethira spp.			
Parametriocnemus spp.	Parametriocnemus spp.			
Paraphaenocladius spp.	Paraphaenocladius spp.			
Paratanytarsus spp.	Paratanytarsus spp.			
Peltodytes callosus				Not on any status lists
Peltodytes spp.	Peltodytes spp.			
Pentaneura spp.	Pentaneura spp.			
Plathemis lydia	Common Whitetail			
Procloeon venosum	A Mayfly			
Pseudochironomus spp.	Pseudochironomus spp.			
Pseudosmittia forcipata				Not on any status lists
Pseudosmittia spp.	Pseudosmittia spp.			
Psychodidae fam.	Psychodidae fam.			
Rhantus anisonychus				Not on any status lists
Rhantus gutticollis				Not on any status lists

Rhantus wallisi				Not on any status lists
Rheotanytarsus spp.	Rheotanytarsus spp.			
Rhionaeschna multicolor	Blue-eyed Darner			
Serratella micheneri	A Mayfly			
Sigara spp.	Sigara spp.			
Simulium spp.	Simulium spp.			
Sperchon spp.	Sperchon spp.			
Sperchontidae fam.	Sperchontidae fam.			
Stictotarsus griseostriatus				Not on any status lists
Stictotarsus spp.	Stictotarsus spp.			
Stictotarsus striatellus				Not on any status lists
Sympetrum illotum	Cardinal Meadowhawk			
Tanytarsus spp.	Tanytarsus spp.			
Tramea lacerata	Black Saddlebags			
Trichocorixa arizonensis				Not on any status lists
Trichocorixa spp.	Trichocorixa spp.			
Tricorythodes spp.	Tricorythodes spp.			
Tropisternus californicus				Not on any status lists
Tropisternus spp.	Tropisternus spp.			
Uvarus subtilis				Not on any status lists
Zaitzevia parvula				Not on any status lists
MAMMALS				
Castor canadensis	American Beaver			Not on any status lists
MOLLUSKS				
Gyraulus vermicularis	Pacific Coast Gyraulus			CS
Physa acuta	Pewter Physa			Not on any status lists
Physa spp.	Physa spp.			
Physella virgata	Protean Physa			CS
Planorbella trivolvis	Marsh Rams-horn			CS
Planorbidae fam.	Planorbidae fam.			
Sphaerium occidentale				Not on any status lists
Sphaerium spp.	Sphaerium spp.			
Vorticifex spp.	Vorticifex spp.			
PLANTS				
Lasthenia glabrata coulteri	Coulter's Goldfields		Special	CRPR - 1B.1
Alnus rhombifolia	White Alder			

Alopecurus carolinianus	Tufted Foxtail			
Alopecurus saccatus	Pacific Foxtail			
Anemopsis californica	Yerba Mansa			
Arundo donax	NA			
Azolla filiculoides	NA			
Baccharis glutinosa	NA			Not on any status lists
Berula erecta	Wild Parsnip			
Bolboschoenus maritimus paludosus	NA			Not on any status lists
Callitriche marginata	Winged Water-starwort			
Carex harfordii	Harford's Sedge			
Carex pellita	Woolly Sedge			
Carex senta	Western Rough Sedge			
Ceratophyllum demersum	Common Hornwort			
Cotula coronopifolia	NA			
Crassula aquatica	Water Pygmyweed			
Downingia cuspidata	Toothed Calicoflower			
Elatine brachysperma	Shortseed Waterwort			
Elatine californica	California Waterwort			
Eleocharis macrostachya	Creeping Spikerush			
Eleocharis montevidensis	Sand Spikerush			
Eleocharis parishii	Parish's Spikerush			
Epilobium campestre	NA			Not on any status lists
Euthamia occidentalis	Western Fragrant Goldenrod			
Helenium puberulum	Rosilla			
Hypericum anagalloides	Tinker's-penny			
Isoetes howellii	NA			
Isolepis cernua	Low Bulrush			
Jaumea carnosa	Fleshy Jaumea			
Juncus effusus effusus	NA			
Juncus falcatus falcatus	Sickle-leaf Rush			
Juncus phaeocephalus phaeocephalus	Brown-head Rush			
Juncus textilis	Basket Rush			

Juncus xiphioides	Iris-leaf Rush			
Lemna minuta	Least Duckweed			
Mimulus guttatus	Common Large Monkeyflower			
Muhlenbergia utilis	Aparejo Grass			
Nasturtium gambelii	NA	Endangered	Threatened	CRPR - 1B.1
Oenanthe sarmentosa	Water-parsley			
Persicaria lapathifolia				Not on any status lists
Phacelia distans	NA			
Plagiobothrys acanthocarpus	Adobe Popcorn-flower			
Plagiobothrys undulatus	NA			Not on any status lists
Plantago elongata elongata	Slender Plantain			
Platanus racemosa	California Sycamore			
Populus trichocarpa	NA			Not on any status lists
Psilocarphus brevissimus brevissimus	Dwarf Woolly-heads			
Psilocarphus tenellus	NA			
Rumex conglomeratus	NA			
Rumex fueginus				Not on any status lists
Rumex salicifolius salicifolius	Willow Dock			
Salix laevigata	Polished Willow			
Salix lasiandra lasiandra				Not on any status lists
Salix lasiolepis lasiolepis	Arroyo Willow			
Samolus parviflorus	NA			Not on any status lists
Schoenoplectus acutus occidentalis	Hardstem Bulrush			
Schoenoplectus californicus	California Bulrush			
Schoenoplectus pungens pungens	NA			
Scirpus microcarpus	Small-fruit Bulrush			
Sinapis alba	NA			
Sparganium eurycarpum eurycarpum				
Stachys chamissonis chamissonis	Coast Hedge-nettle			
Stachys pycnantha	Short-spike Hedge-nettle			

Stuckenia pectinata				Not on any status lists
Triglochin scilloides	NA			Not on any status lists
Typha domingensis	Southern Cattail			
Typha latifolia	Broadleaf Cattail			
Veronica anagallis-aquatica	NA			
Veronica peregrina	NA			
Wolffiella lingulata	Tongue Bogmat			
Zannichellia palustris	Horned Pondweed			

Attachment D

July 2019

IDENTIFYING GDEs UNDER SGMA

Best Practices for using the NC Dataset

The Sustainable Groundwater Management Act (SGMA) requires that groundwater dependent ecosystems (GDEs) be identified in Groundwater Sustainability Plans (GSPs). As a starting point, the Department of Water Resources (DWR) is providing the Natural Communities Commonly Associated with Groundwater Dataset (NC Dataset) online[1] to help Groundwater Sustainability Agencies (GSAs), consultants, and stakeholders identify GDEs within individual groundwater basins. To apply information from the NC Dataset to local areas, GSAs should combine it with the best available science on local hydrology, geology, and groundwater levels to verify whether polygons in the NC dataset are likely supported by groundwater in an aquifer (Figure 1)[2]. This document highlights six best practices for using local groundwater data to confirm whether mapped features in the NC dataset are supported by groundwater.

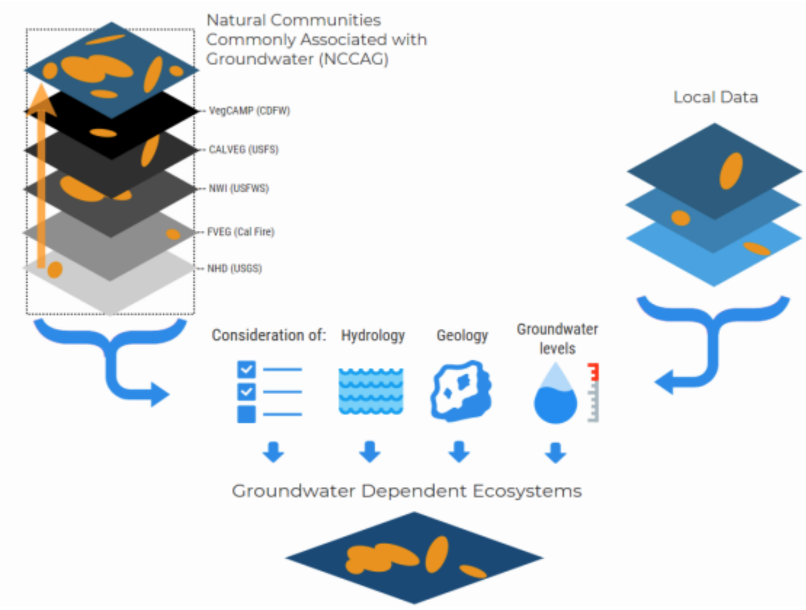


Figure 1. Considerations for GDE identification.
Source: DWR[2]

[1] NC Dataset Online Viewer: https://gis.water.ca.gov/app/NCDatasetViewer/
[2] California Department of Water Resources (DWR). 2018. Summary of the "Natural Communities Commonly Associated with Groundwater" Dataset and Online Web Viewer. Available at: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Data-and-Tools/Files/Statewide-Reports/Natural-Communities-Dataset-Summary-Document.pdf

The NC Dataset identifies vegetation and wetland features that are good indicators of a GDE. The dataset is comprised of 48 publicly available state and federal datasets that map vegetation, wetlands, springs, and seeps commonly associated with groundwater in California[3]. It was developed through a collaboration between DWR, the Department of Fish and Wildlife, and The Nature Conservancy (TNC). TNC has also provided detailed guidance on identifying GDEs from the NC dataset[4] on the Groundwater Resource Hub[5], a website dedicated to GDEs.

BEST PRACTICE #1. Establishing a Connection to Groundwater

Groundwater basins can be comprised of one continuous aquifer (Figure 2a) or multiple aquifers stacked on top of each other (Figure 2b). In unconfined aquifers (Figure 2a), using the depth-to-groundwater and the rooting depth of the vegetation is a reasonable method to infer groundwater dependence for GDEs. If groundwater is well below the rooting (and capillary) zone of the plants and any wetland features, the ecosystem is considered disconnected and groundwater management is not likely to affect the ecosystem (Figure 2d). However, it is important to consider local conditions (e.g., soil type, groundwater flow gradients, and aquifer parameters) and to review groundwater depth data from multiple seasons and water year types (wet and dry) because intermittent periods of high groundwater levels can replenish perched clay lenses that serve as the water source for GDEs (Figure 2c). Maintaining these natural groundwater fluctuations are important to sustaining GDE health.

Basins with a stacked series of aquifers (Figure 2b) may have varying levels of pumping across aquifers in the basin, depending on the production capacity or water quality associated with each aquifer. If pumping is concentrated in deeper aquifers, SGMA still requires GSAs to sustainably manage groundwater resources in shallow aquifers, such as perched aquifers, that support springs, surface water, domestic wells, and GDEs (Figure 2). This is because vertical groundwater gradients across aquifers may result in pumping from deeper aquifers to cause adverse impacts onto beneficial users reliant on shallow aquifers or interconnected surface water. The goal of SGMA is to sustainably manage groundwater resources for current and future social, economic, and environmental benefits. While groundwater pumping may not be currently occurring in a shallower aquifer, use of this water may become more appealing and economically viable in future years as pumping restrictions are placed on the deeper production aquifers in the basin to meet the sustainable yield and criteria. Thus, identifying GDEs in the basin should done irrespective to the amount of current pumping occurring in a particular aquifer, so that future impacts on GDEs due to new production can be avoided. A good rule of thumb to follow is: *if groundwater can be pumped from a well - it's an aquifer*.

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[3] For more details on the mapping methods, refer to: Klausmeyer, K., J. Howard, T. Keeler-Wolf, K. Davis-Fadtke, R. Hull, A. Lyons. 2018. Mapping Indicators of Groundwater Dependent Ecosystems in California: Methods Report. San Francisco, California. Available at: https://groundwaterresourcehub.org/public/uploads/pdfs/iGDE_data_paper_20180423.pdf
[4] "Groundwater Dependent Ecosystems under the Sustainable Groundwater Management Act: Guidance for Preparing Groundwater Sustainability Plans" is available at: https://groundwaterresourcehub.org/gde-tools/gsp-guidance-document/
[5] The Groundwater Resource Hub: www.GroundwaterResourceHub.org

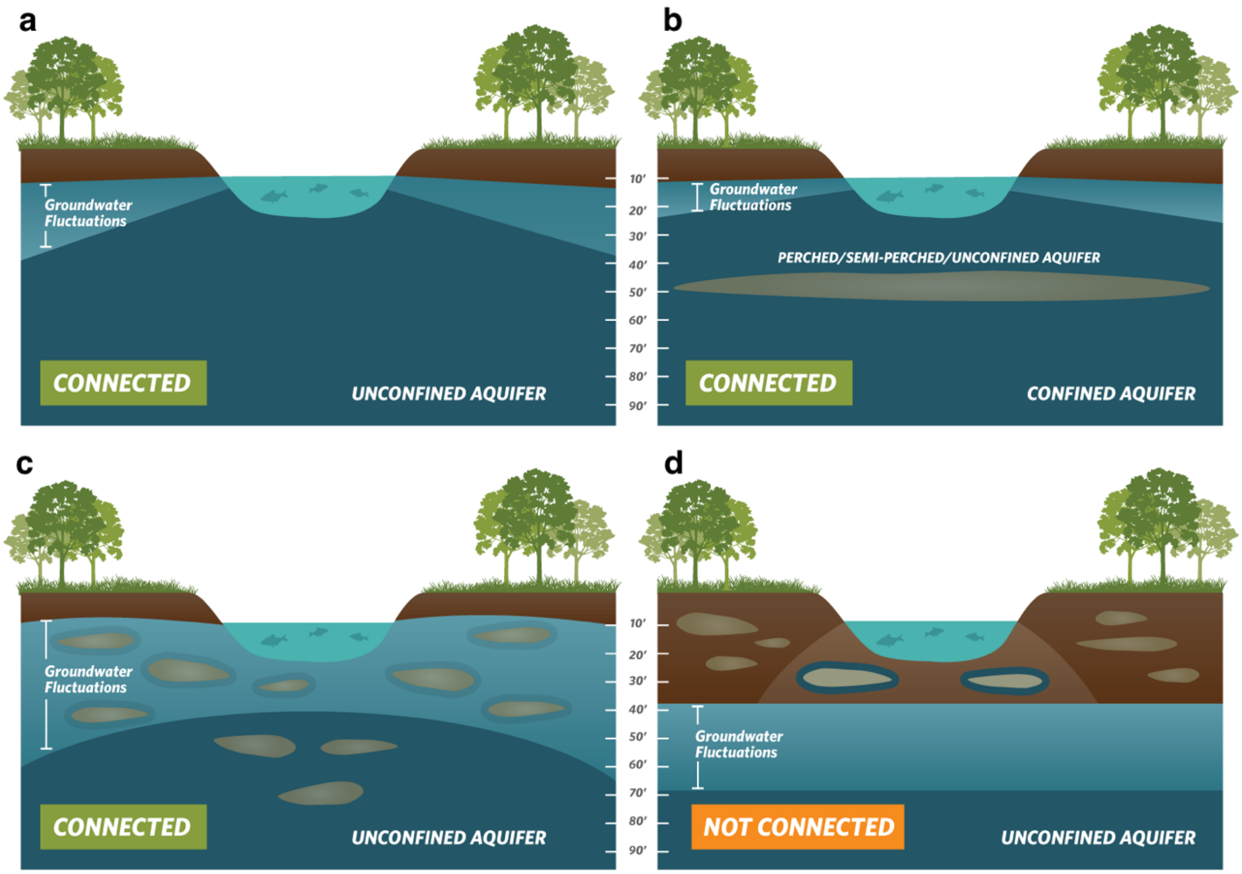

Figure 2. Confirming whether an ecosystem is connected to groundwater. Top: (a) Under the ecosystem is an unconfined aquifer with depth-to-groundwater fluctuating seasonally and interannually within 30 feet from land surface. **(b)** Depth-to-groundwater in the shallow aquifer is connected to overlying ecosystem. Pumping predominately occurs in the confined aquifer, but pumping is possible in the shallow aquifer. **Bottom: (c)** Depth-to-groundwater fluctuations are seasonally and interannually large, however, clay layers in the near surface prolong the ecosystem's connection to groundwater. **(d)** Groundwater is disconnected from surface water, and any water in the vadose (unsaturated) zone is due to direct recharge from precipitation and indirect recharge under the surface water feature. These areas are not connected to groundwater and typically support species that do not require access to groundwater to survive.

BEST PRACTICE #2. Characterize Seasonal and Interannual Groundwater Conditions

SGMA requires GSAs to describe current and historical groundwater conditions when identifying GDEs [23 CCR §354.16(g)]. Relying solely on the SGMA benchmark date (January 1, 2015) or any other single point in time to characterize groundwater conditions (e.g., depth-to-groundwater) is inadequate because managing groundwater conditions with data from one time point fails to capture the seasonal and interannual variability typical of California's climate. DWR's Best Management Practices document on water budgets[6] recommends using 10 years of water supply and water budget information to describe how historical conditions have impacted the operation of the basin within sustainable yield, implying that a baseline[7] could be determined based on data between 2005 and 2015. Using this or a similar time period, depending on data availability, is recommended for determining the depth-to-groundwater.

GDEs depend on groundwater levels being close enough to the land surface to interconnect with surface water systems or plant rooting networks. The most practical approach[8] for a GSA to assess whether polygons in the NC dataset are connected to groundwater is to rely on groundwater elevation data. As detailed in TNC's GDE guidance document[4], one of the key factors to consider when mapping GDEs is to contour depth-to-groundwater in the aquifer that is supporting the ecosystem (see Best Practice #5).

Groundwater levels fluctuate over time and space due to California's Mediterranean climate (dry summers and wet winters), climate change (flood and drought years), and subsurface heterogeneity in the subsurface (Figure 3). Many of California's GDEs have adapted to dealing with intermittent periods of water stress, however if these groundwater conditions are prolonged, adverse impacts to GDEs can result. While depth-to-groundwater levels within 30 feet[4] of the land surface are generally accepted as being a proxy for confirming that polygons in the NC dataset are supported by groundwater, it is highly advised that fluctuations in the groundwater regime be characterized to understand the seasonal and interannual groundwater variability in GDEs. Utilizing groundwater data from one point in time can misrepresent groundwater levels required by GDEs, and inadvertently result in adverse impacts to the GDEs. Time series data on groundwater elevations and depths are available on the SGMA Data Viewer[9]. However, if insufficient data are available to describe groundwater conditions within or near polygons from the NC dataset, include those polygons in the GSP until data gaps are reconciled in the monitoring network (see Best Practice #6).

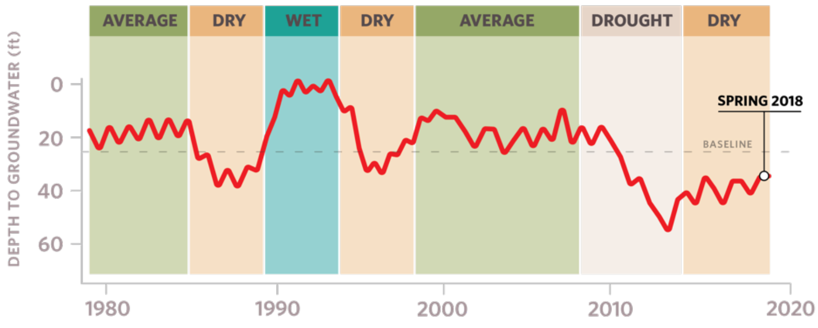

Figure 3. Example seasonality and interannual variability in depth-to-groundwater over time. Selecting one point in time, such as Spring 2018, to characterize groundwater conditions in GDEs fails to capture what groundwater conditions are necessary to maintain the ecosystem status into the future so adverse impacts are avoided.

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[6] DWR. 2016. Water Budget Best Management Practice. Available at: https://water.ca.gov/LegacyFiles/groundwater/sgm/pdfs/BMP_Water_Budget_Final_2016-12-23.pdf

[7] Baseline is defined under the GSP regulations as "historic information used to project future conditions for hydrology, water demand, and availability of surface water and to evaluate potential sustainable management practices of a basin." [23 CCR §351(e)]

[8] Groundwater reliance can also be confirmed via stable isotope analysis and geophysical surveys. For more information see The GDE Assessment Toolbox (Appendix IV, GDE Guidance Document for GSPs[4]).

[9] SGMA Data Viewer: https://sgma.water.ca.gov/webgis/?appid=SGMADataViewer

BEST PRACTICE #3. Ecosystems Often Rely on Both Groundwater and Surface Water

GDEs are plants and animals that rely on groundwater for all or some of its water needs, and thus can be supported by multiple water sources. The presence of non-groundwater sources (e.g., surface water, soil moisture in the vadose zone, applied water, treated wastewater effluent, urban stormwater, irrigated return flow) within and around a GDE does not preclude the possibility that it is supported by groundwater, too. SGMA defines GDEs as "ecological communities and species that depend on groundwater emerging from aquifers or on groundwater occurring near the ground surface" [23 CCR §351(m)]. Hence, depth-to-groundwater data should be used to identify whether NC polygons are supported by groundwater and should be considered GDEs. In addition, SGMA requires that significant and undesirable adverse impacts to beneficial users of surface water be avoided. Beneficial users of surface water include environmental users such as plants or animals[10], which therefore must be considered when developing minimum thresholds for depletions of interconnected surface water.

GSAs are only responsible for impacts to GDEs resulting from groundwater conditions in the basin, so if adverse impacts to GDEs result from the diversion of applied water, treated wastewater, or irrigation return flow away from the GDE, then those impacts will be evaluated by other permitting requirements (e.g., CEQA) and may not be the responsibility of the GSA. However, if adverse impacts occur to the GDE due to changing groundwater conditions resulting from pumping or groundwater management activities, then the GSA would be responsible (Figure 4).

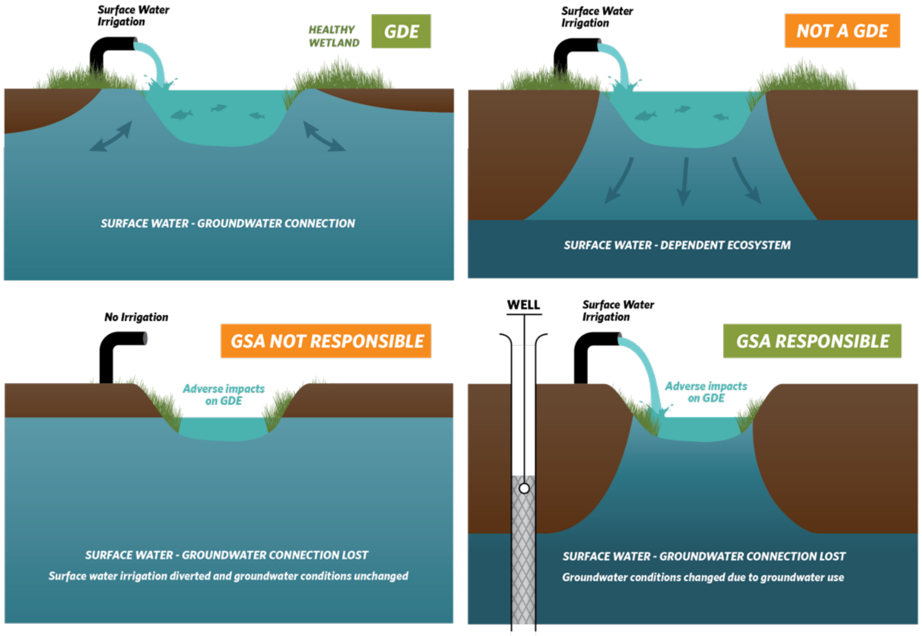

Figure 4. Ecosystems often depend on multiple sources of water. Top: (Left) Surface water and groundwater are interconnected, meaning that the GDE is supported by both groundwater and surface water. **(Right)** Ecosystems that are only reliant on non-groundwater sources are not groundwater-dependent. **Bottom: (Left)** An ecosystem that was once dependent on an interconnected surface water, but loses access to groundwater solely due to surface water diversions may not be the GSA's responsibility. **(Right)** Groundwater dependent ecosystems once dependent on an interconnected surface water system, but loses that access due to groundwater pumping is the GSA's responsibility.

[10] For a list of environmental beneficial users of surface water by basin, visit: https://groundwaterresourcehub.org/gde-tools/environmental-surface-water-beneficiaries/

BEST PRACTICE #4. Select Representative Groundwater Wells

Identifying GDEs in a basin requires that groundwater conditions are characterized to confirm whether polygons in the NC dataset are supported by the underlying aquifer. To do this, proximate groundwater wells should be identified to characterize groundwater conditions (Figure 5). When selecting representative wells, it is particularly important to consider the subsurface heterogeneity around NC polygons, especially near surface water features where groundwater and surface water interactions occur around heterogeneous stratigraphic units or aquitards formed by fluvial deposits. The following selection criteria can help ensure groundwater levels are representative of conditions within the GDE area:

- Choose wells that are within 5 kilometers (3.1 miles) of each NC Dataset polygons because they are more likely to reflect the local conditions relevant to the ecosystem. If there are no wells within 5km of the center of a NC dataset polygon, then there is insufficient information to remove the polygon based on groundwater depth. Instead, it should be retained as a potential GDE until there are sufficient data to determine whether or not the NC Dataset polygon is supported by groundwater.

- Choose wells that are screened within the surficial unconfined aquifer and capable of measuring the true water table.

- Avoid relying on wells that have insufficient information on the screened well depth interval for excluding GDEs because they could be providing data on the wrong aquifer. This type of well data should not be used to remove any NC polygons.

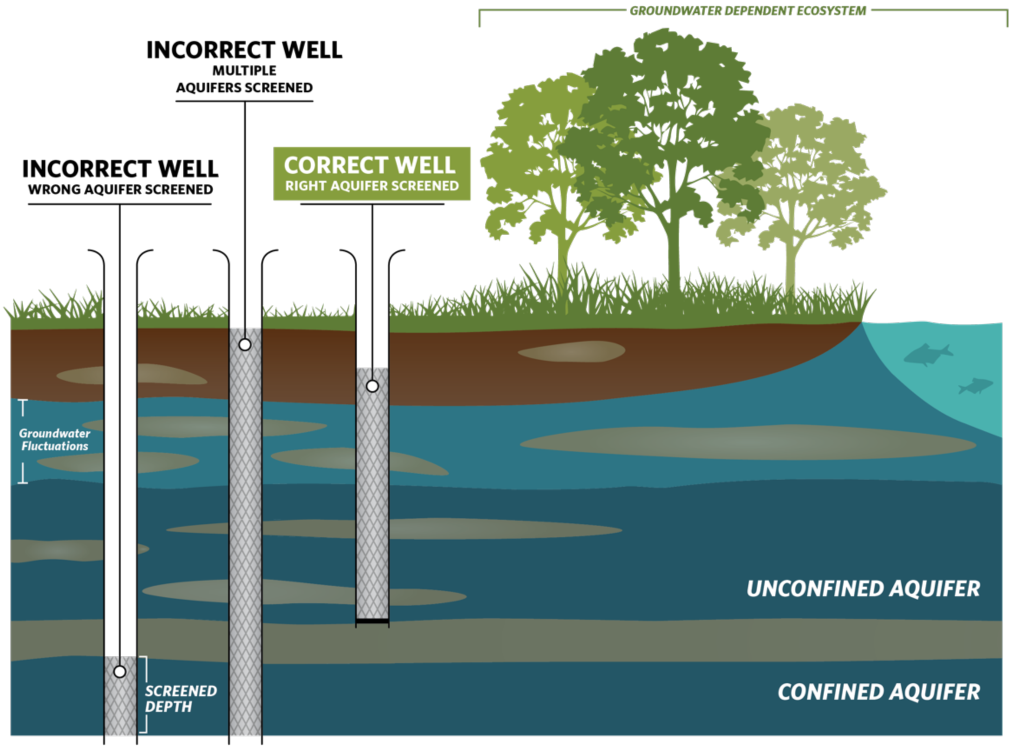

Figure 5. Selecting representative wells to characterize groundwater conditions near GDEs.

BEST PRACTICE #5. Contouring Groundwater Elevations

The common practice to contour depth-to-groundwater over a large area by interpolating measurements at monitoring wells is unsuitable for assessing whether an ecosystem is supported by groundwater. This practice causes errors when the land surface contains features like stream and wetland depressions because it assumes the land surface is constant across the landscape and depth-to-groundwater is constant below these low-lying areas (Figure 6a). A more accurate approach is to interpolate **groundwater elevations** at monitoring wells to get groundwater elevation contours across the landscape. This layer can then be subtracted from land surface elevations from a Digital Elevation Model (DEM)[11] to estimate depth-to-groundwater contours across the landscape (Figure b; Figure 7). This will provide a much more accurate contours of depth-to-groundwater along streams and other land surface depressions where GDEs are commonly found.

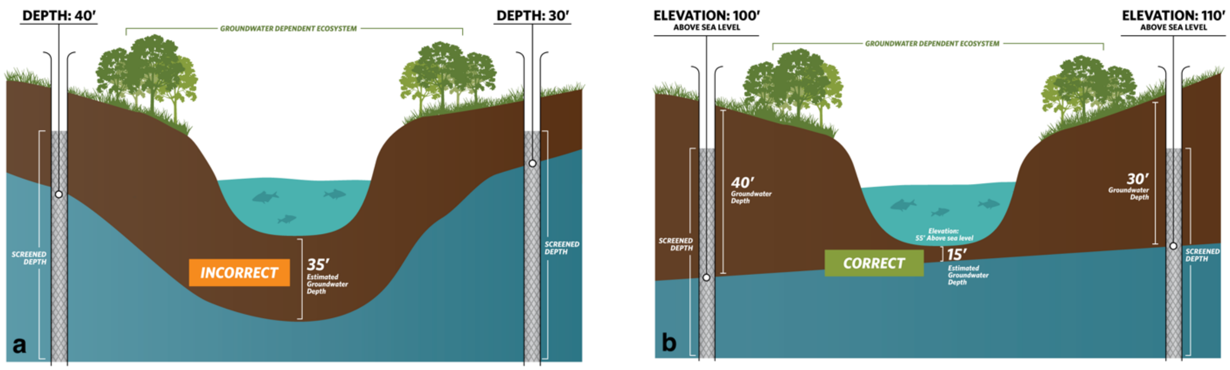

Figure 6. Contouring depth-to-groundwater around surface water features and GDEs. (a) Groundwater level interpolation using depth-to-groundwater data from monitoring wells. **(b)** Groundwater level interpolation using groundwater elevation data from monitoring wells and DEM data.

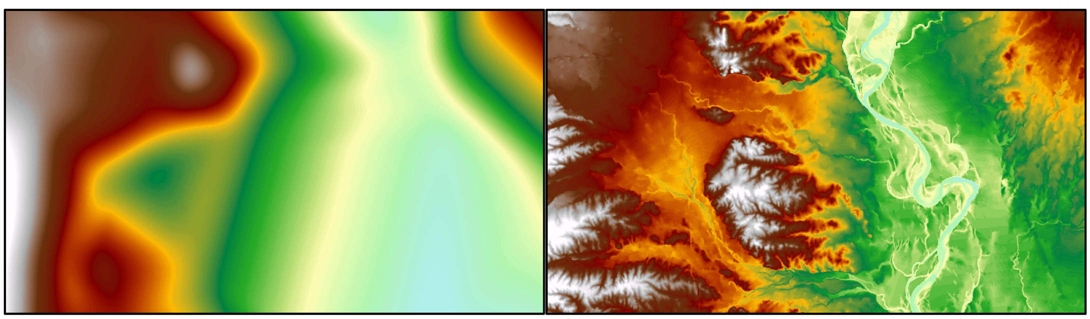

Figure 7. Depth-to-groundwater contours in Northern California. (Left) Contours were interpolated using depth-to-groundwater measurements determined at each well. **(Right)** Contours were determined by interpolating groundwater elevation measurements at each well and superimposing ground surface elevation from DEM spatial data to generate depth-to-groundwater contours. The image on the right shows a more accurate depth-to-groundwater estimate because it takes the local topography and elevation changes into account.

[11] USGS Digital Elevation Model data products are described at: https://www.usgs.gov/core-science-systems/ngp/3dep/about-3dep-products-services and can be downloaded at: https://iewer.nationalmap.gov/basic/

BEST PRACTICE #6. Best Available Science

Adaptive management is embedded within SGMA and provides a process to work toward sustainability over time by beginning with the best available information to make initial decisions, monitoring the results of those decisions, and using the data collected through monitoring programs to revise decisions in the future. In many situations, the hydrologic connection of NC dataset polygons will not initially be clearly understood if site-specific groundwater monitoring data are not available. If sufficient data are not available in time for the 2020/2022 plan, **The Nature Conservancy strongly advises that questionable polygons from the NC dataset be included in the GSP until data gaps are reconciled in the monitoring network.** Erring on the side of caution will help minimize inadvertent impacts to GDEs as a result of groundwater use and management actions during SGMA implementation.

KEY DEFINITIONS

Groundwater basin is an aquifer or stacked series of aquifers with reasonably well-defined boundaries in a lateral direction, based on features that significantly impede groundwater flow, and a definable bottom. *23 CCR §341(g)(1)*

Groundwater dependent ecosystem (GDE) are ecological communities or species that depend on groundwater emerging from aquifers or on groundwater occurring near the ground surface. *23 CCR §351(m)*

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

Principal aquifers are aquifers or aquifer systems that store, transmit, and yield significant or economic quantities of groundwater to wells, springs, or surface water systems. *23 CCR §351(aa)*

ABOUT US

The Nature Conservancy is a science-based nonprofit organization whose mission is *to conserve the lands and waters on which all life depends*. To support successful SGMA implementation that meets the future needs of people, the economy, and the environment, TNC has developed tools and resources (www.groundwaterresourcehub.org) intended to reduce costs, shorten timelines, and increase benefits for both people and nature.