

Groundwater Dependent Ecosystems under the Sustainable Groundwater Management Act

Greater Ventura County GDE Webinar

June 19, 2020

OUR MISSION

To conserve the lands and waters
on which all life depends.

The Nature
Conservancy



Protecting nature. Preserving life.®

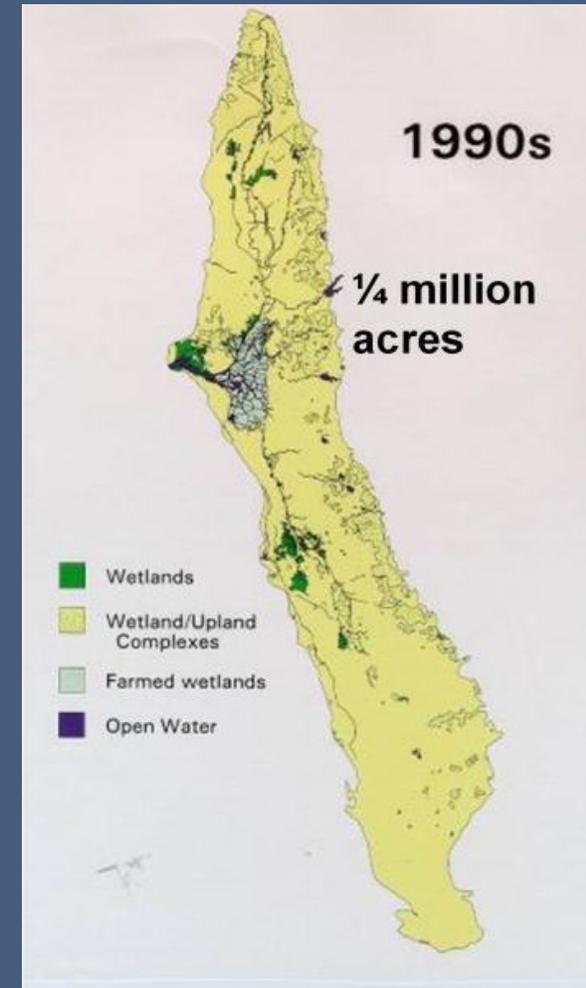
SANTA CLARA RIVER





95%

Wetland and River Habitat Gone



The Sustainable Groundwater Management Act



Groundwater Dependent Ecosystems

(a beneficial use of groundwater) **are a required element for GSPs**

- identify (map)
- describe potential effects due to groundwater conditions
- monitor impacts due to groundwater conditions

Lowering
GW Levels



Reduction
of Storage



Seawater
Intrusion



Degraded
Quality



Land
Subsidence



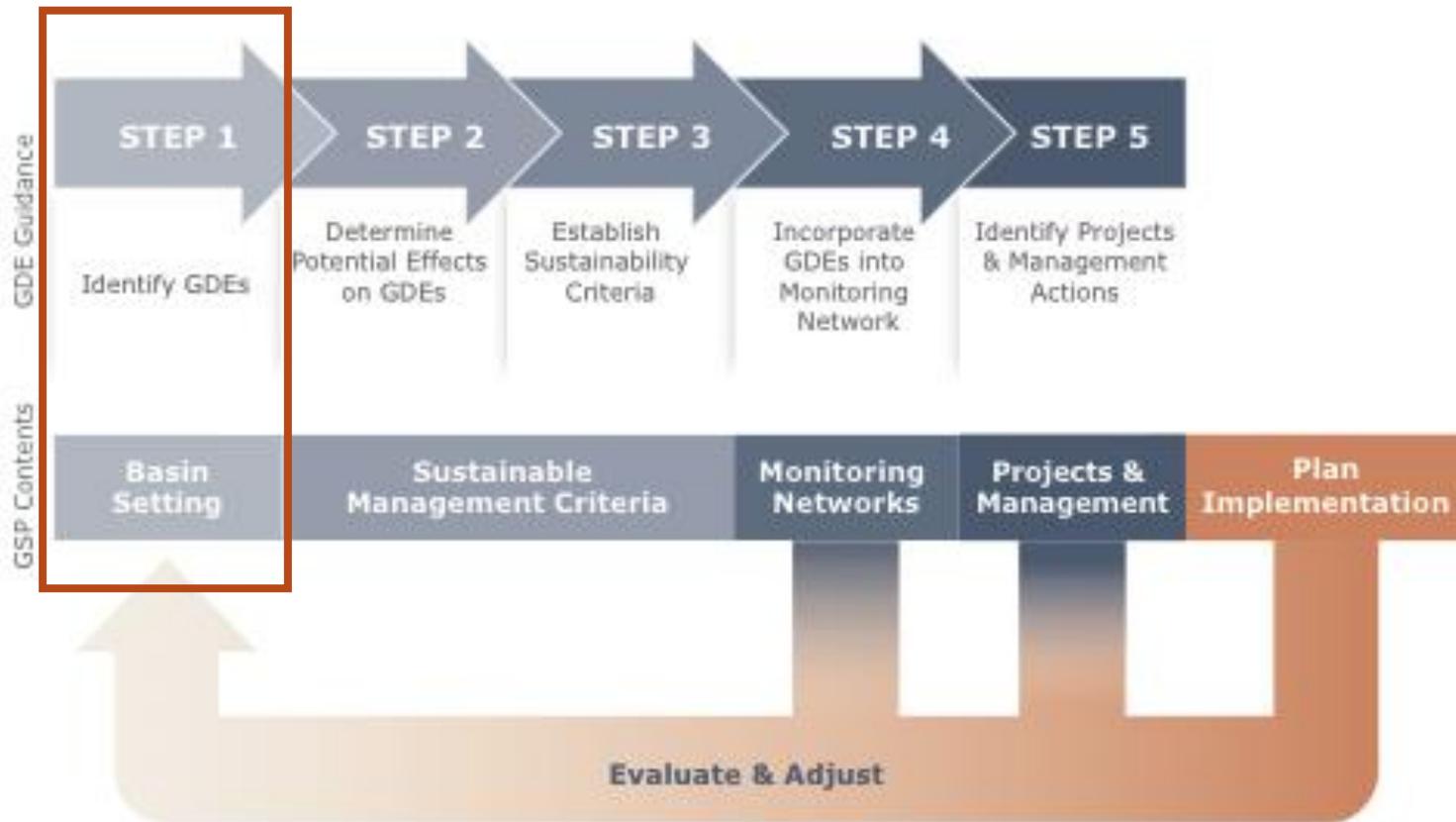
Surface Water
Depletion



GDE GUIDANCE DOCUMENT

Groundwater Dependent Ecosystems under the Sustainable Groundwater Management Act

GUIDANCE FOR PREPARING GROUNDWATER
SUSTAINABILITY PLANS



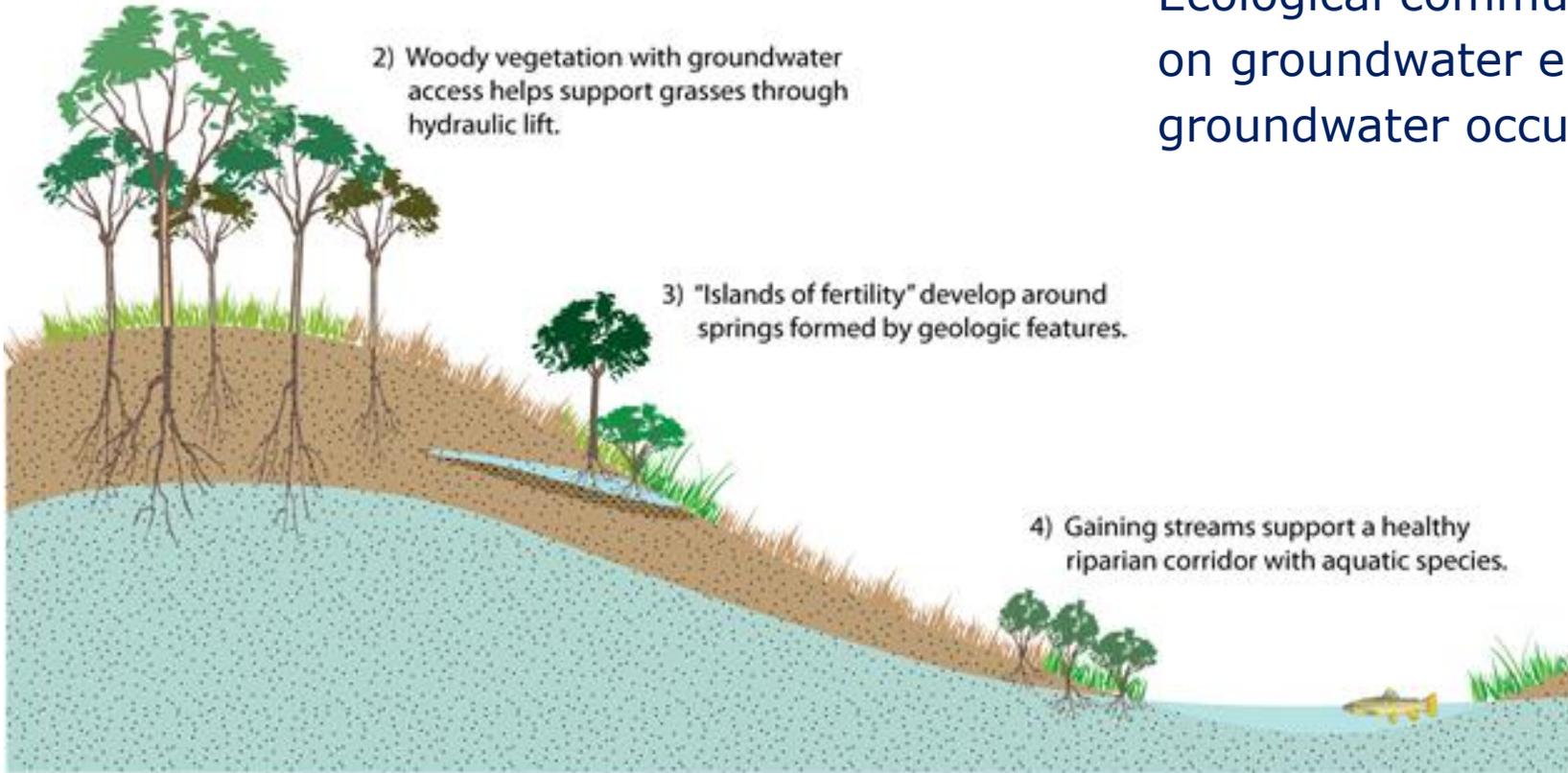
GROUNDWATER DEPENDENT ECOSYSTEMS (GDEs)

1) Deeply rooted vegetation thrives during long periods of low soil moisture while plants with shallow roots suffer water stress.

2) Woody vegetation with groundwater access helps support grasses through hydraulic lift.

3) "Islands of fertility" develop around springs formed by geologic features.

4) Gaining streams support a healthy riparian corridor with aquatic species.



Ecological communities or species that depend on groundwater emerging from aquifers or on groundwater occurring near the ground surface.

MAPPING GDEs

NC Dataset Viewer
CADWR Sustainable Groundwater Management

Search

NC Dataset

- NC Dataset Layers
 - Vegetation
 - Wetlands

NC Dataset Sources

- VegCAMP
- CALVEG
- FVEG
- NWI Riparian
- NWI Wetlands
- NHD Springs & Seeps

Reference Layers

- B118 Groundwater Basins
- B118 Groundwater Basins
- Crop Mapping 2014

NC Dataset Sources

Vegetation

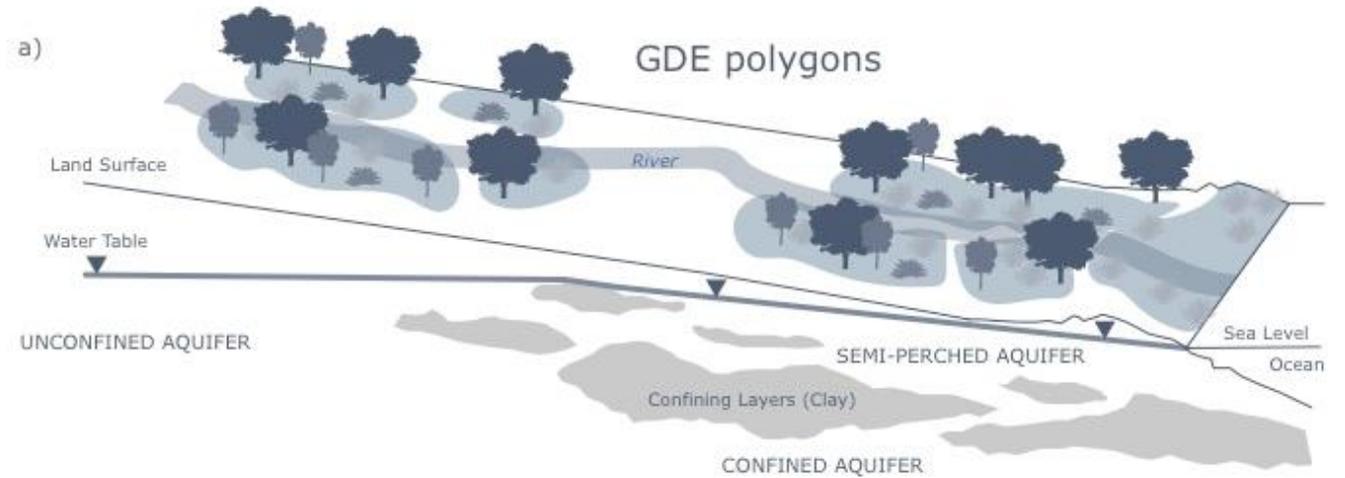
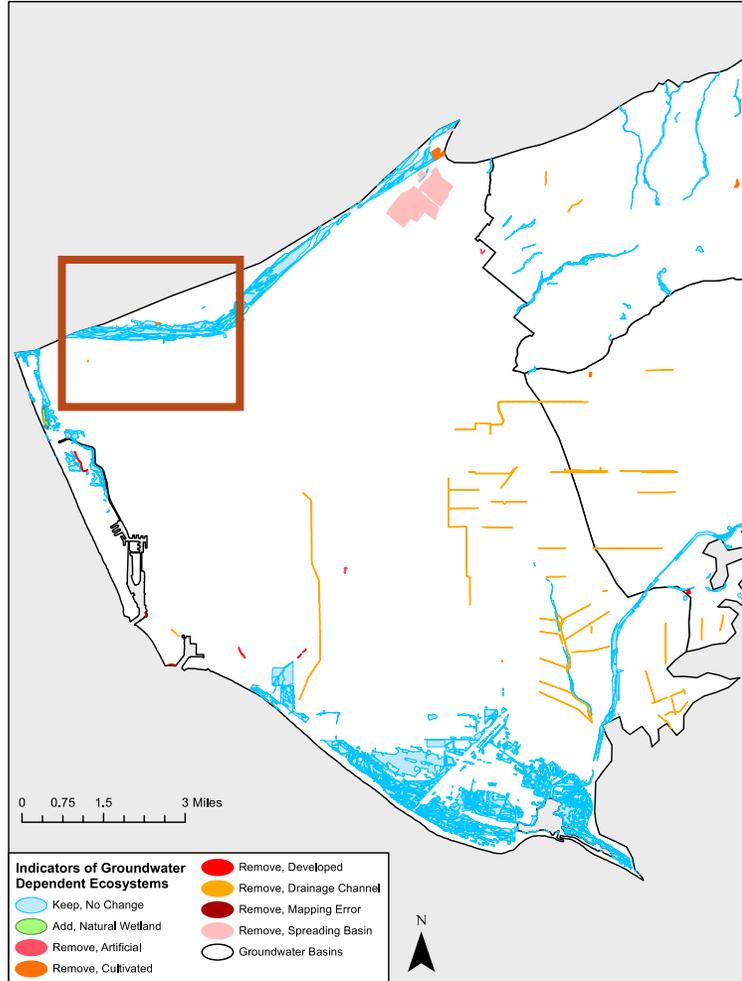
Click map to identify features

Wetlands

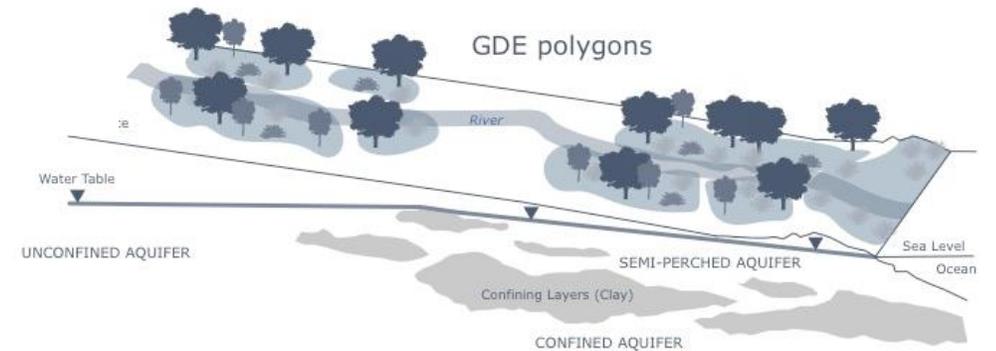
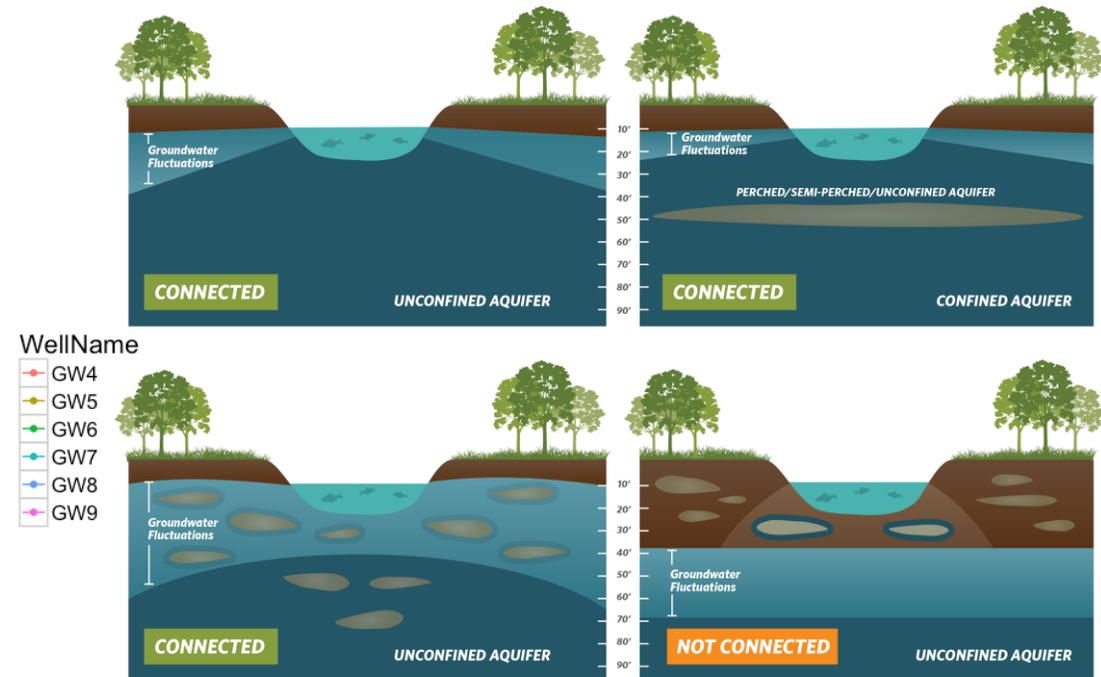
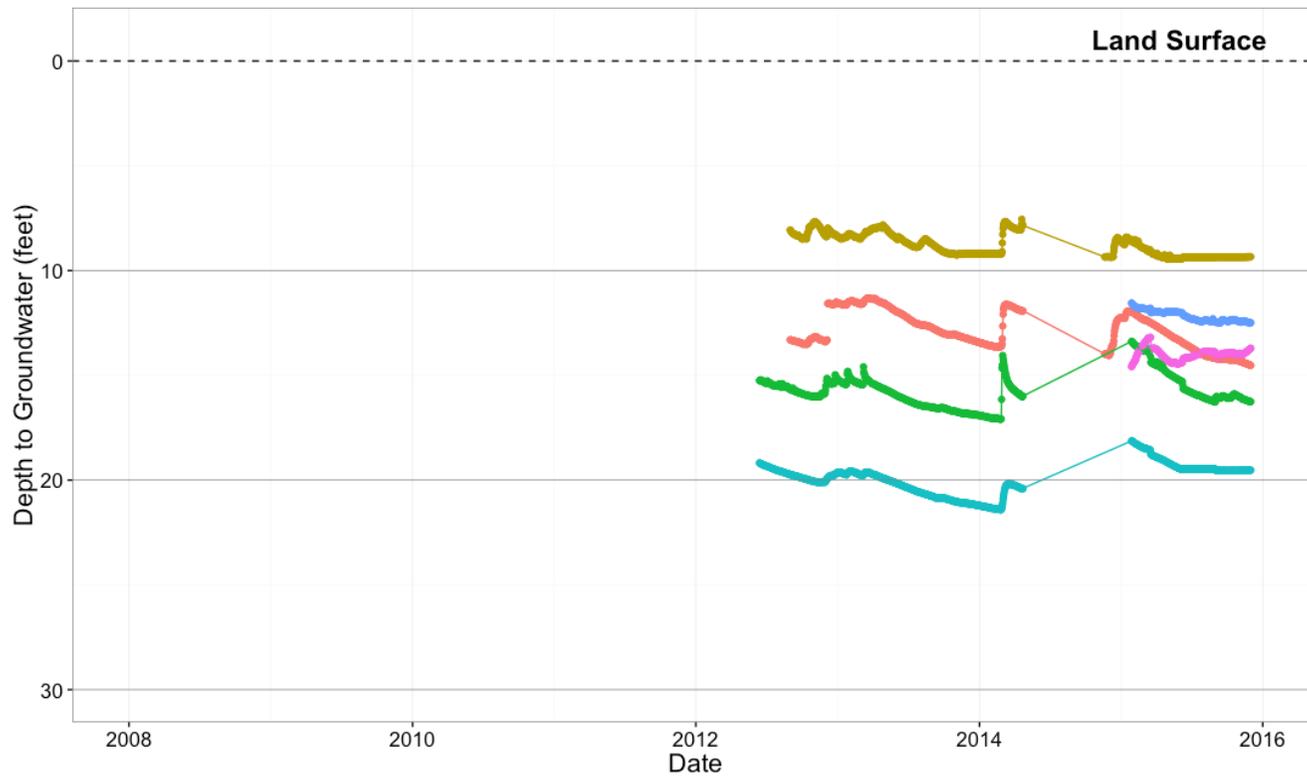
Click map to identify features

Leaflet | Powered by Esri | CADWR, CDFW, TNG, Esri, HERE, Garmin, NOAA, USGS, FAO, NPS, EPA, USGS TNM - National Hydrography Dataset. Data refreshed July, 2018., California Department of Water Resources, U.S. Fish and Wildlife Service, National Standards and Support Team, wetlands, tea...

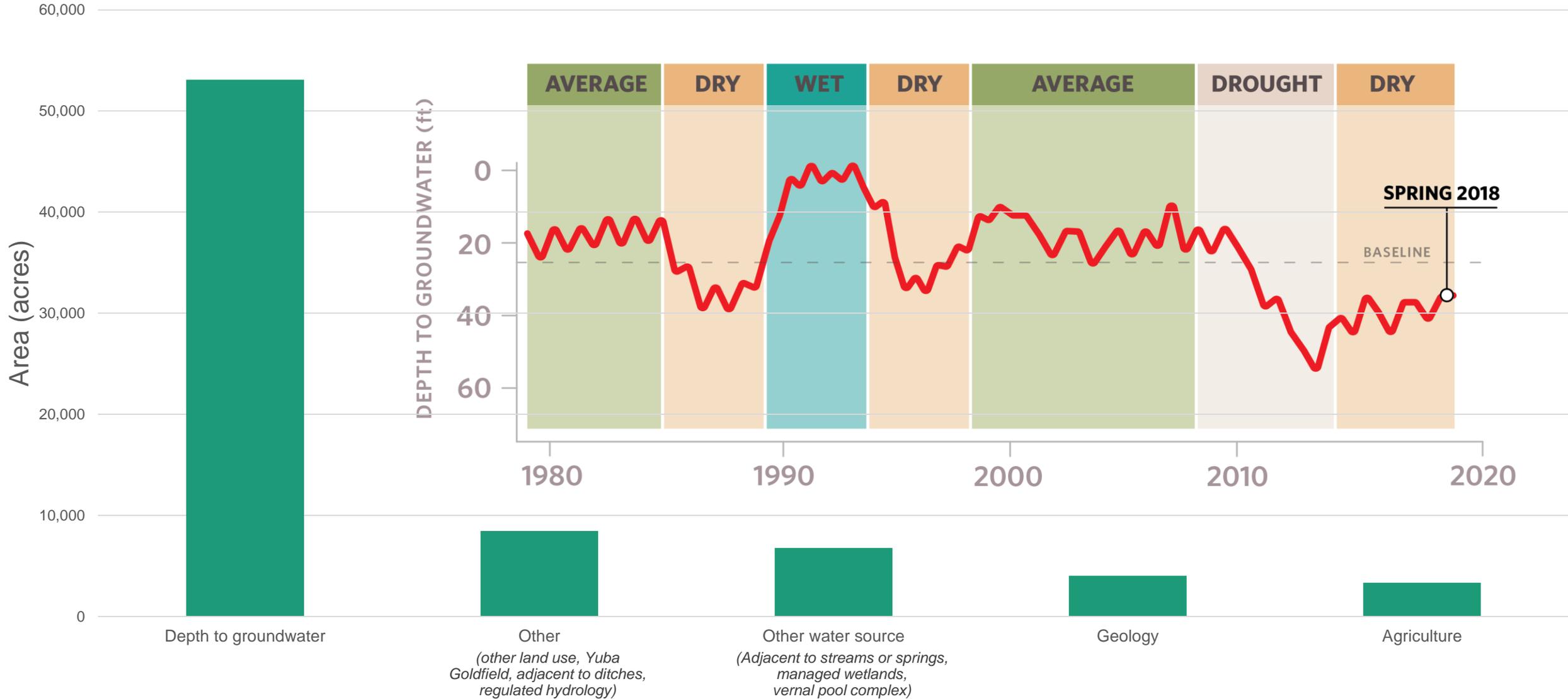
Example 1: Santa Clara GDE (Semi-Perched Aquifer)



Example 1: Santa Clara GDE (Semi-Perched Aquifer)



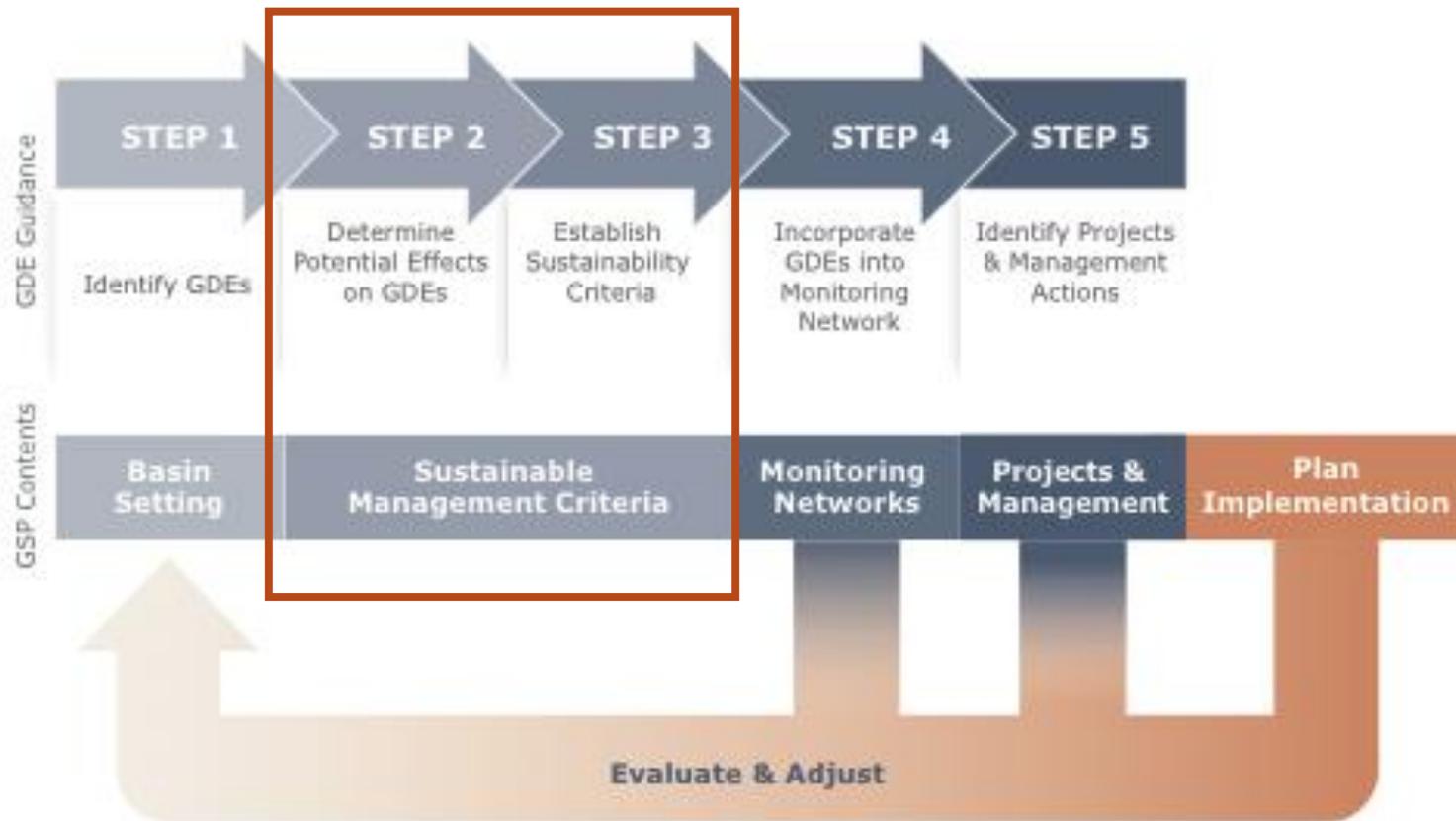
Area Removed by Reason



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Potential Groundwater Impacts on GDEs



LITTLE TO NO
IMPACT

Healthy Ecosystem



SHORT-TERM
ADVERSE IMPACTS

Water Stress



PROLONGED
ADVERSE IMPACTS

Reduced Growth
Reduced Reproduction
Habitat Loss



SEVERE
ADVERSE IMPACTS

Ecosystem Collapse

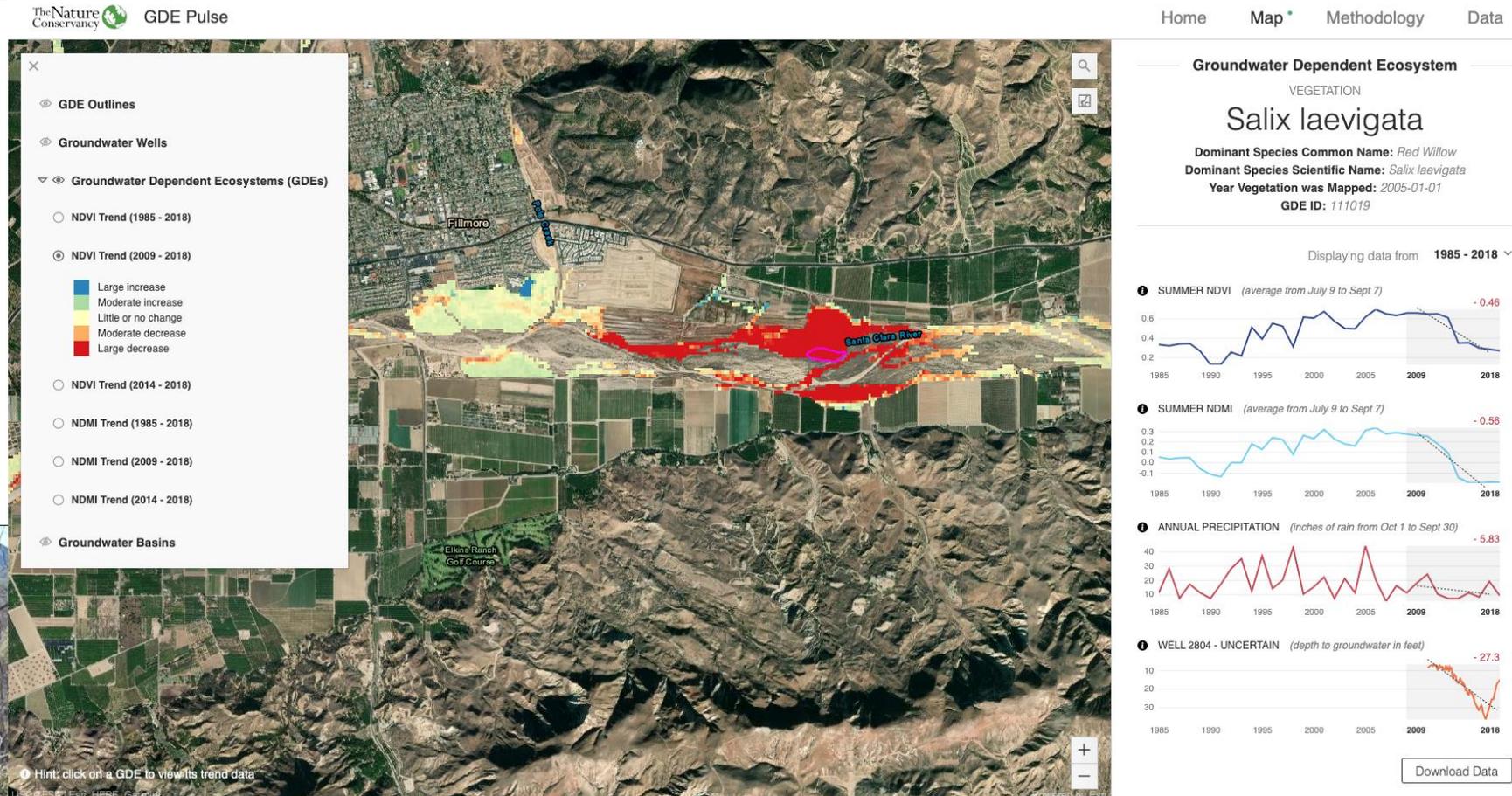
OPTIMAL

GROUNDWATER CONDITIONS

POOR

Consider impacts to GDEs when establishing SMC

Santa Clara River
GDE
Piru
Filmore
GW_{normal}
GW_{drought}



<http://GDE.CodeForNature.org>

Critical Species LookBook

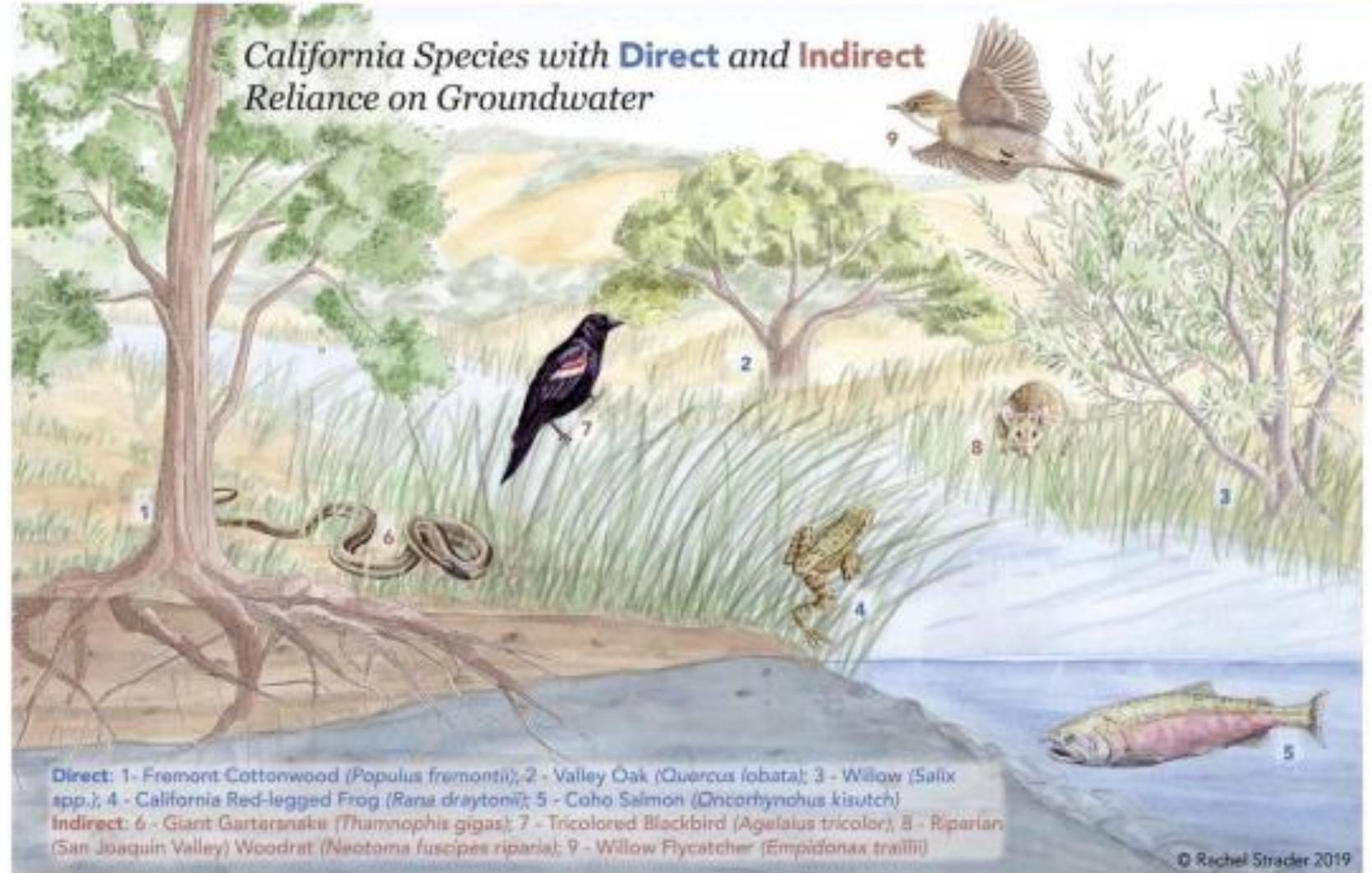
Critical Species LookBook

A compendium of California's threatened and endangered species for sustainable groundwater management

August 2019



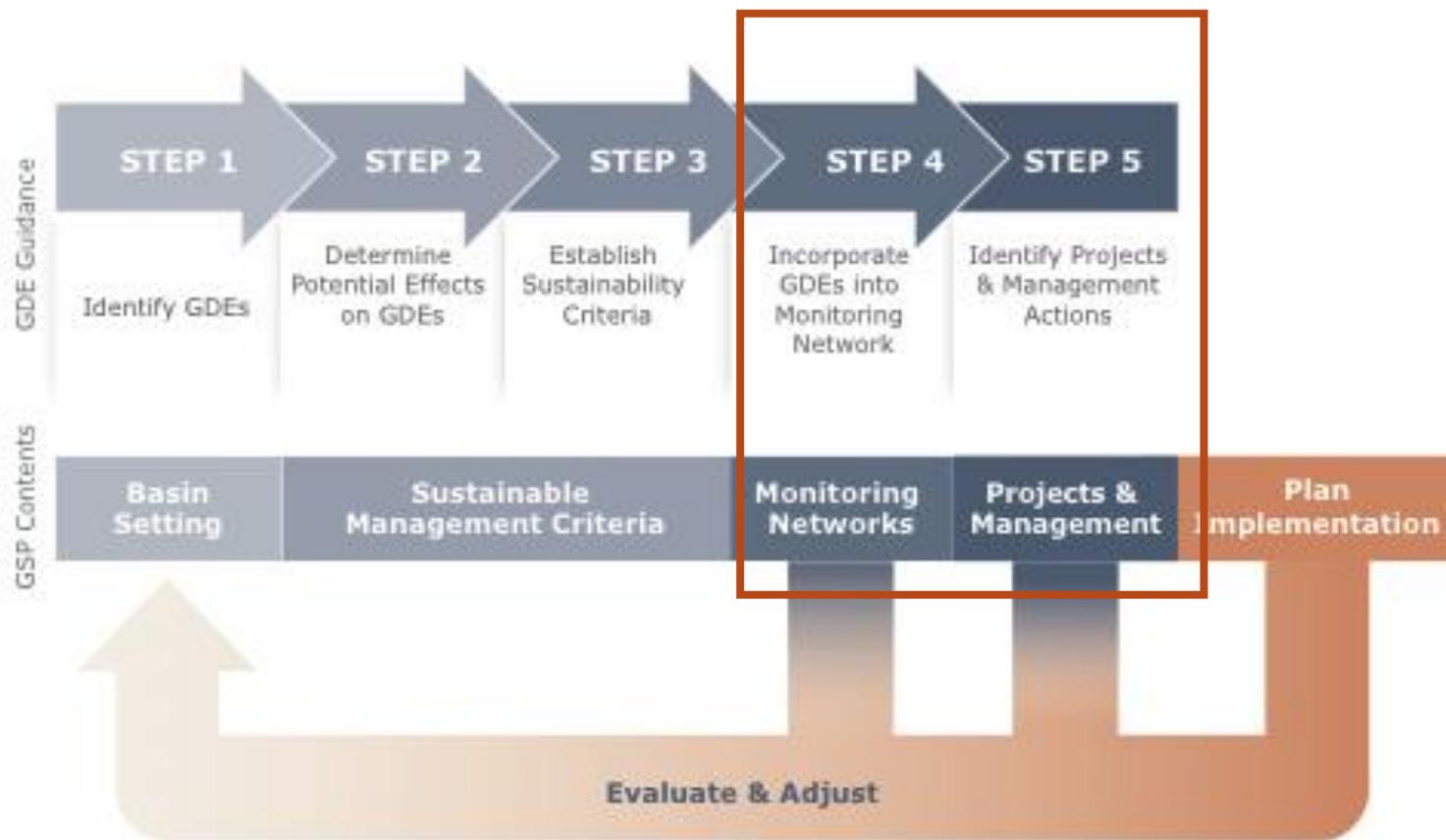
Audubon California Department of Fish and Wildlife The Nature Conservancy NOAA FISHERIES UC DAVIS



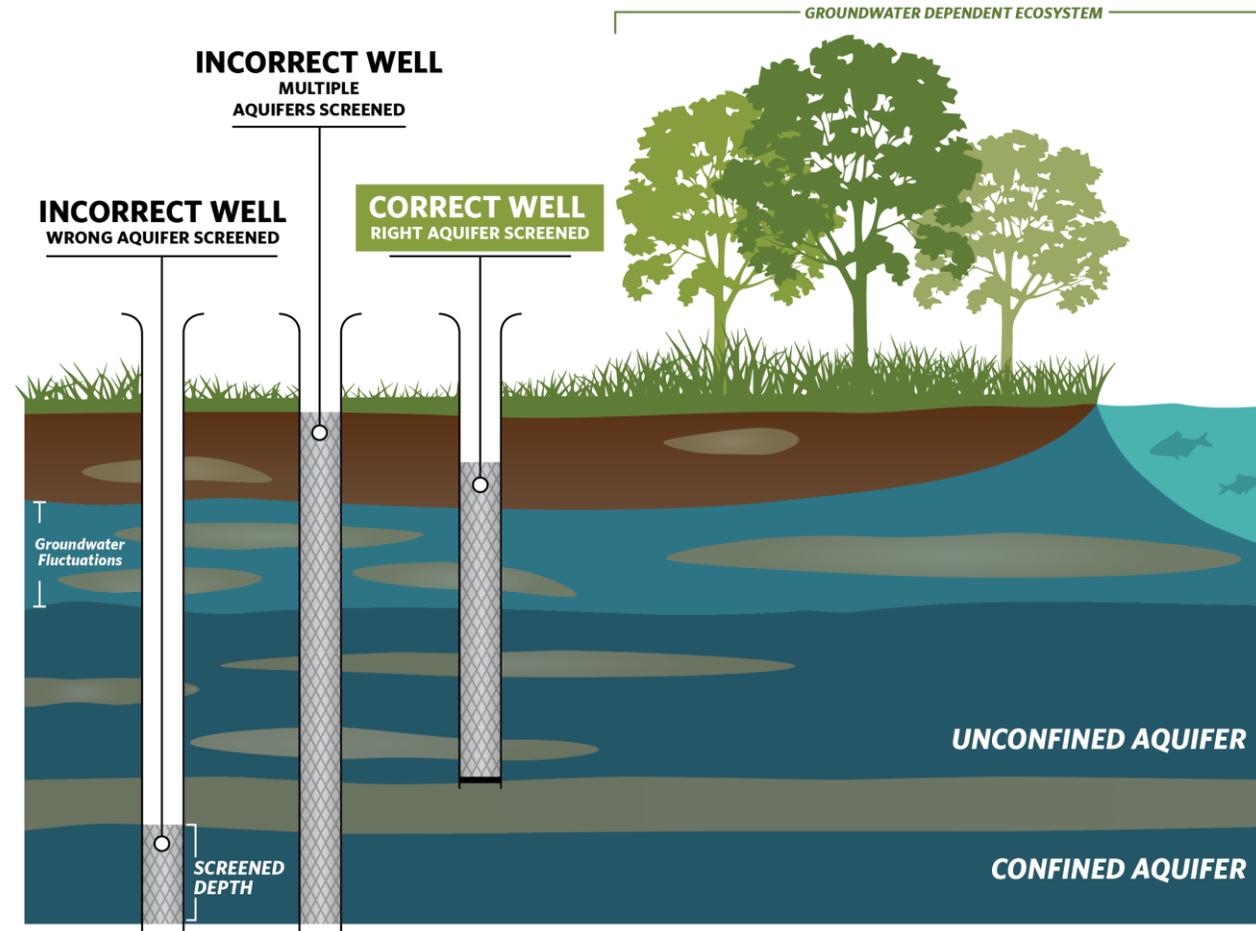
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A need for more shallow groundwater monitoring



GDE Checklist

Environmental User Checklist



The Nature Conservancy is neither dispensing legal advice nor warranting any outcome that could result from the use of this checklist. Following this checklist does not guarantee approval of a GSP or compliance with SGMA, both of which will be determined by DWR and the State Water Resources Control Board.

GSP Plan Element*		GDE Inclusion in GSPs: Identification and Consideration Elements	Check Box
Admin Info	2.1.5 Notice & Communication 23 CCR §354.10	Description of the types of environmental beneficial uses of groundwater that exist within GDEs and a description of how environmental stakeholders were engaged throughout the development of the GSP.	
	2.2.1 Hydrogeologic Conceptual Model 23 CCR §354.14	<p>Basin Bottom Boundary: Is the bottom of the basin defined as at least as deep as the deepest groundwater extractions?</p> <p>Principal aquifers and aquitards: Are shallow aquifers adequately described, so that interconnections with surface water and vertical groundwater gradients with other aquifers can be characterized?</p> <p>Interconnected surface waters: Interconnected surface water maps for the basin with gaining and losing reaches defined (included as a figure in GSP & submitted as a shapefile on SGMA Portal). Estimates of current and historical surface water depletions for interconnected surface waters quantified and described by reach, season, and water year type.</p> <p>Basin GDE map included (as figure in text & submitted as a shapefile on SGMA Portal). Basin GDE map denotes which polygons were kept, removed, and added from NC Dataset (Worksheet 1, can be attached in GSP section 6.0). The basin's GDE shapefile, which is submitted via the SGMA Portal, includes two new fields in its attribute table denoting: 1) which polygons were kept/removed/added, and 2) the change reason (e.g., why polygons were removed). GDEs polygons are consolidated into larger units and named for easier identification throughout GSP.</p> <p>If NC Dataset was used:</p> <p>If NC Dataset was not used: Description of why NC dataset was not used, and how an alternative dataset and/or mapping approach used is best available information.</p>	
Basin Setting	2.2.2 Current & Historical Groundwater Conditions 23 CCR §354.16	Description of GDEs included:	
		Historical and current groundwater conditions described in each GDE unit.	
		Ecological condition described in each GDE unit.	
		Each GDE unit has been characterized as having high, moderate, or low ecological value.	

Last Modified: May 6, 2019

Considering Nature under SGMA | A Checklist for GSPs



Sustainable Management Criteria	2.2.3 Water Budget 23 CCR §354.18	Inventory of species, habitats, and protected lands for each GDE unit with ecological importance (Worksheet 2, can be attached in GSP section 6.0). Groundwater inputs and outputs (e.g., evapotranspiration) of native vegetation and managed wetlands are included in the basin's historical and current water budget. Potential impacts to groundwater conditions due to land use changes, climate change, and population growth to GDEs and aquatic ecosystems are considered in the projected water budget.	
	3.1 Sustainability Goal 23 CCR §354.24	Environmental stakeholders/representatives were consulted. Sustainability goal mentions GDEs or species and habitats that are of particular concern or interest.	
	3.2 Measurable Objectives 23 CCR §354.30	Description of how GDEs were considered and whether the measurable objectives and interim milestones will help achieve the sustainability goal as it pertains to the environment. Sustainability goal mentions whether the intention is to address pre-SGMA impacts, maintain or improve conditions within GDEs or species and habitats that are of particular concern or interest.	
	3.3 Minimum Thresholds 23 CCR §354.28	Description of how GDEs and environmental uses of surface water were considered when setting minimum thresholds for relevant sustainability indicators: Will adverse impacts to GDEs and/or aquatic ecosystems dependent on interconnected surface waters (beneficial user of surface water) be avoided with the selected minimum thresholds? Are there any differences between the selected minimum threshold and state, federal, or local standards relevant to the species or habitats residing in GDEs or aquatic ecosystems dependent on interconnected surface waters?	
	3.4 Undesirable Results 23 CCR §354.26	For GDEs, hydrological data are compiled and synthesized for each GDE unit: Hydrological datasets are plotted and provided for each GDE unit (Worksheet 3, can be attached in GSP Section 6.0). Baseline period in the hydrologic data is defined. GDE unit is classified as having high, moderate, or low susceptibility to changes in groundwater. Cause-and-effect relationships between groundwater changes and GDEs are explored.	
		For GDEs, biological data are compiled and synthesized for each GDE unit: Biological datasets are plotted and provided for each GDE unit. Data gaps/insufficiencies are described. Plans to reconcile data gaps in the monitoring network are stated.	
		For GDEs, hydrological data are available within/nearby the GDE	
		For GDEs, biological data are available within/nearby the GDE	
		For GDEs, hydrological data are not available within/nearby the GDE	
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	For GDEs, biological data are not available within/nearby the GDE		

2

Considering Nature under SGMA | A Checklist for GSPs



Sustainable Management Criteria	3.5 Monitoring Network 23 CCR §354.34	Description of potential effects on GDEs, land uses and property interests:	
		Cause-and-effect relationships between GDE and groundwater conditions are described.	
		Impacts to GDEs that are considered to be "significant and unreasonable" are described.	
		Known hydrological thresholds or triggers (e.g., instream flow criteria, groundwater depths, water quality parameters) for relevant species or ecological communities are reported.	
		Land uses include and consider recreational uses (e.g., fishing/hunting, hiking, boating).	
		Property interests include and consider privately and publicly protected conservation lands and opens spaces, including wildlife refuges, parks, and natural preserves.	
Projects & Mgmt Actions	4.0. Projects & Mgmt Actions to Achieve Sustainability Goal 23 CCR §354.44	Description of whether hydrological data are spatially and temporally sufficient to monitor groundwater conditions for each GDE unit.	
		Description of how hydrological data gaps and insufficiencies will be reconciled in the monitoring network.	
Projects & Mgmt Actions	4.0. Projects & Mgmt Actions to Achieve Sustainability Goal 23 CCR §354.44	Description of how impacts to GDEs and environmental surface water users, as detected by biological responses, will be monitored and which monitoring methods will be used in conjunction with hydrologic data to evaluate cause-and-effect relationships with groundwater conditions.	
		Description of how GDEs will benefit from relevant project or management actions.	
Projects & Mgmt Actions	4.0. Projects & Mgmt Actions to Achieve Sustainability Goal 23 CCR §354.44	Description of how projects and management actions will be evaluated to assess whether adverse impacts to the GDE will be mitigated or prevented.	
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* In reference to DWR's GSP annotated outline guidance document, available at: https://water.ca.gov/LegacyFiles/groundwater/sgm/pdfs/GD_GSP_Outline_Final_2016-12-23.pdf

GDE TOOLS

Groundwater Resource Hub
Advancing Sustainable Groundwater Management for Nature

What are GDEs? ▶ SGMA Tools ▼ Groundwater Markets Case Studies ▶ Additional Resources ▶ About Us

- Mapping Indicators of GDEs
- GDE Guidance Document for GSPs
- GDE Rooting Depth Database
- GDE Checklist for GSPs
- Arundo ET Literature Review
- Environmental Surface Water Beneficial Users
- GDE Pulse
- GSP Comments
- The Critical Species LookBook

How to assess GDEs in a groundwater sustainability plan? Guidance on how to identify and consider GDEs in a groundwater sustainability plan...[Learn More](#)

What are Groundwater Dependent Ecosystems and Why are They Important?

Groundwater dependent ecosystems (GDEs) are plant and animal communities that require groundwater to meet some or all of their water needs. California is home to a diverse range of GDEs including palm oases in the Sonoran Desert, hot springs in the Mojave Desert, seasonal wetlands in the Central Valley, perennial riparian forests along the Sacramento and San Joaquin rivers, and estuaries along the coast and in the Delta. These ecosystems rely on groundwater in California's semi-arid climate, especially during dry summers and periods of drought. GDEs provide important benefits to California including habitat for animals, water supply, water purification, flood mitigation, erosion control, recreational opportunities and general enjoyment of California's natural

www.GroundwaterResourceHub.org

A large flock of birds is captured in flight across a vast, open field during a golden sunset. The birds are silhouetted against the bright, low sun, creating a dense pattern of dark shapes against the glowing sky. The foreground shows a flat, possibly snow-covered or frozen field, with the warm light of the setting sun reflecting off its surface. In the distance, a line of trees and low hills is visible under the soft, hazy light of dusk.

Thank You!

Melissa M. Rohde

melissa.rohde@tnc.org