

EKI TECHNICAL PRESENTATION: GSP DEVELOPMENT AND PRELIMINARY FINDINGS FOR THE BASIN SETTING

CASTAC BASIN GSA PUBLIC WORKSHOP #2

15 NOVEMBER 2019



OVERVIEW

1. Introduction
2. Brief review of the Sustainable Groundwater Management Act (SGMA) from the perspective of Castac Lake Basin
3. Status of the Castac Lake Basin's Groundwater Sustainability Plan (GSP)
 - a) Preliminary water budget
 - b) Development of sustainability management criteria
4. Next steps in GSP development
5. Q&A Session
6. Adjourn

Introduction: the Castac Groundwater Sustainability Agency (Castac GSA)

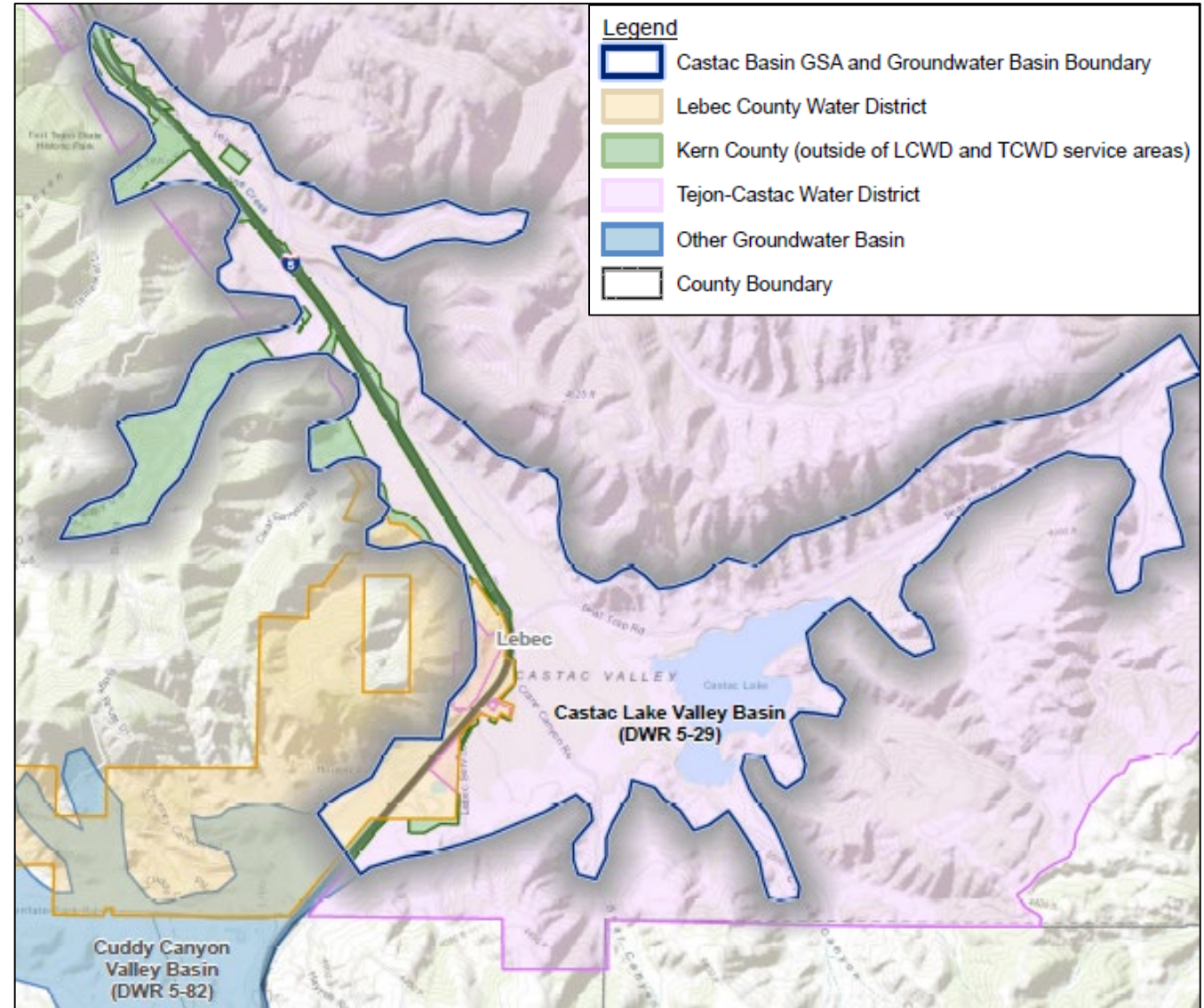
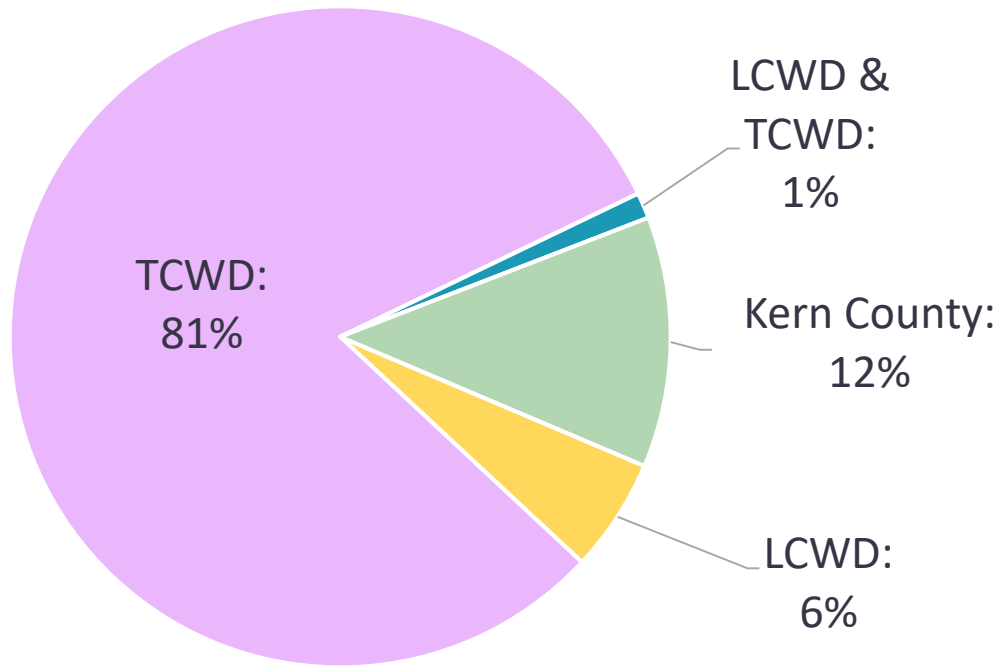
Castac Basin Groundwater Sustainability Agency (Castac Basin GSA)

- Castac Lake Valley Groundwater Basin (Referenced by DWR as Basin 5-29)
- 3,643 acres
- Source of municipal and agricultural supply
- “Very Low” priority ranking for purposes of SGMA
- Not in critical overdraft



Castac Basin GSA Was Formed In 2018

Service Areas in the Castac Basin



STAKEHOLDER ENGAGEMENT

Landowner Data Requests (Surveys)

- Castac Basin GSA sent out about 200 Landowner Data Request Forms in January 2019
- We have received 6 responses as of November 2019
- Additional surveys forms are available:
 - On the table at tonight's meeting
 - At the Castac GSA website (<https://www.castacgsa.org>)

Castac Basin Groundwater Sustainability Agency
Stakeholder Survey

Questions:

1. Are you familiar with the Sustainable Groundwater Management Act (SGMA) regulations?
2. Are you currently engaged in activities or discussions regarding groundwater

Castac Basin Groundwater Sustainability Agency
Stakeholder Survey


The Castac Basin Groundwater Sustainability Agency (GSA) is conducting this survey to understand more about groundwater users (stakeholders) in the Castac Basin. Any answers provided to these questions will help support the development of a more accurate, fair, and useful Groundwater Sustainability Plan (GSP) for the Castac Basin.

Date: _____

Affiliated organization or business name (if applicable): _____

Contact information:
Name: _____
Email: _____
Phone Number: _____
Address: _____
Website: _____

Please mark the approximate location of your land, home, business, or well(s) with a dark-colored X on the map below of the Castac Basin:



Stakeholder Type (check all that apply):

<input type="checkbox"/> Agricultural Groundwater User	<input type="checkbox"/> Surface Water User
<input type="checkbox"/> Domestic Well Owner/User	<input type="checkbox"/> Federal Government
<input type="checkbox"/> Municipal Well Operator	<input type="checkbox"/> Native American Tribe
<input type="checkbox"/> Commercial/Industrial Groundwater User	<input type="checkbox"/> Disadvantaged Community Resident or Organization
<input type="checkbox"/> Public Water System	<input type="checkbox"/> City Resident
<input type="checkbox"/> Local Land Use Planning Agency	<input type="checkbox"/> Groundwater Monitoring Entity
<input type="checkbox"/> Environmental User	

STAKEHOLDER ENGAGEMENT

Stakeholder Expressed Concerns So Far

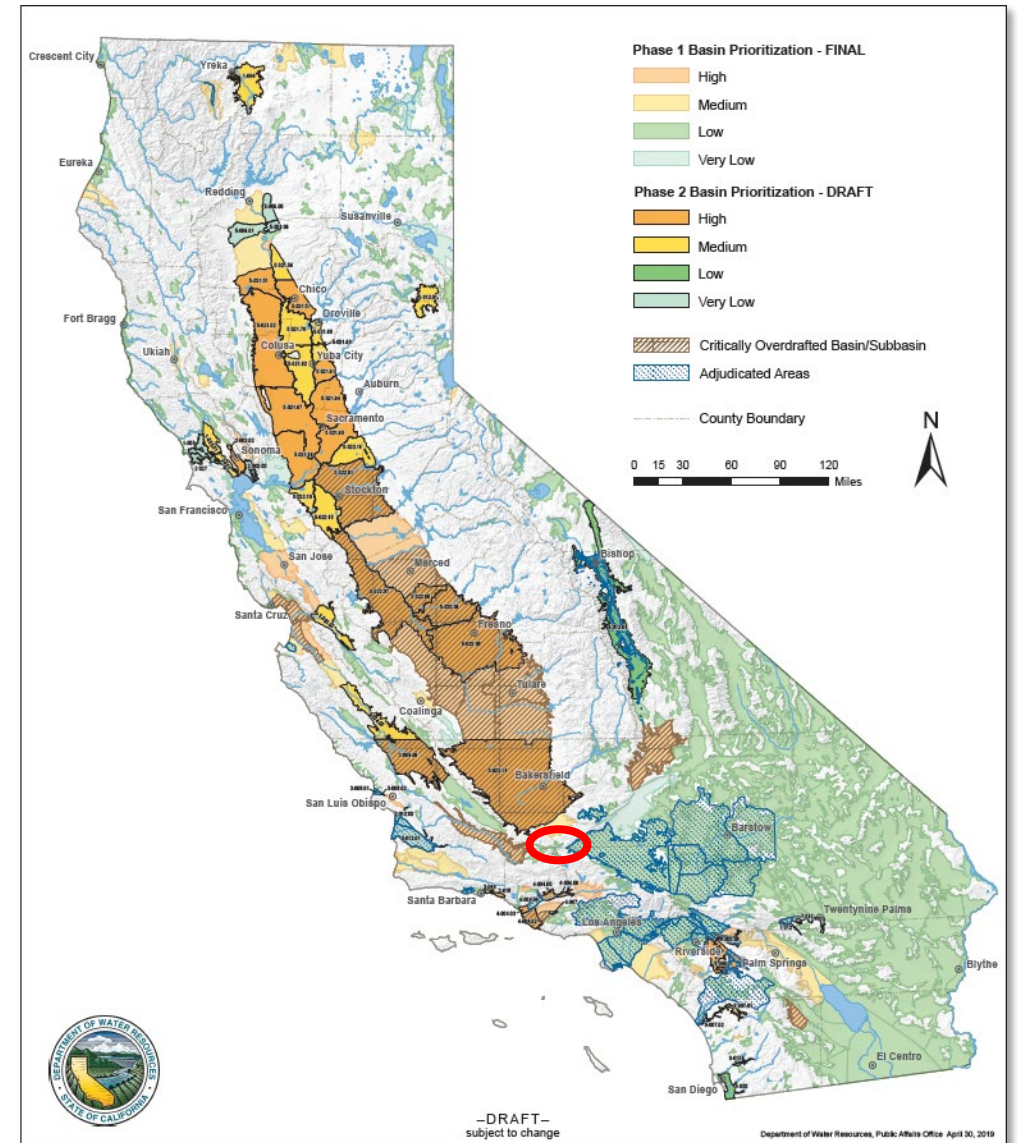
- *“My only concern would be that those corporations, organizations, water purveyors, water customers, and owners within the district be treated equitably with favor shown to no one particular interest over another.”*
- *“Overdevelopment in the mountain communities, with such a limited water resource”*
- *“Conservation/sustainability”*
- *“Trillions of gallons* of groundwater are being pumped”*

**This stakeholder’s estimate is approximately 3,000 x the estimated actual pumpage of 910 acre-feet*

The Sustainable Groundwater Management Act (SGMA) from the perspective of Castac Lake Basin

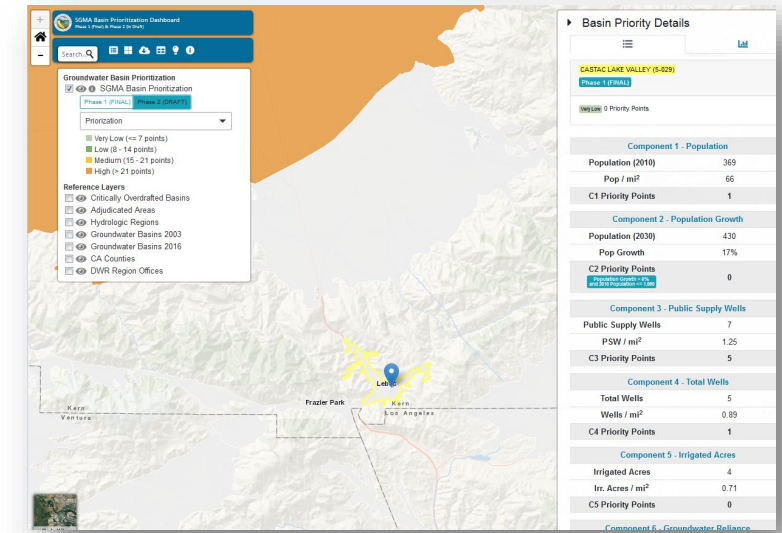
The California Sustainable Groundwater Management Act of 2014

- Commonly referred to as SGMA (“Sigma”)
- First comprehensive framework for groundwater management in California
- Preserves local control of groundwater in each basin
- Effective (with amendments) in January 2016



SGMA: Key Elements

- Basins are to be managed by *Groundwater Sustainability Agencies (GSAs)*
- GSAs are to be comprised of one or more local public agencies that have “water supply, water management or land use responsibilities within a groundwater basin”
- GSAs must develop *Groundwater Sustainability Plans (GSPs)*
 - by 2020 for basins classified⁽¹⁾ as *in critical overdraft*, or
 - by 2022 for non-critical overdraft basins ranked *high or medium priority*
- Castac Lake Basin is not in critical overdraft, and not ranked as high or medium priority by the Department of Water Resources (DWR)
- All basins must achieve “*sustainability*” within 20 years of GSP adoption



(1) Basins are classified by the California Department of Water Resources (DWR)
<https://gis.water.ca.gov/app/bp-dashboard/p2/>

SGMA: Sustainability Indicators

Any of the following effects caused by groundwater conditions occurring throughout the basin that, when significant and unreasonable, cause “undesirable results”⁽¹⁾:

*The Six
SGMA
“Sustainability
Indicators”*



1. Chronic Lowering of Groundwater Levels



2. Reduction of Groundwater Storage



3. Seawater Intrusion



4. Degraded Water Quality



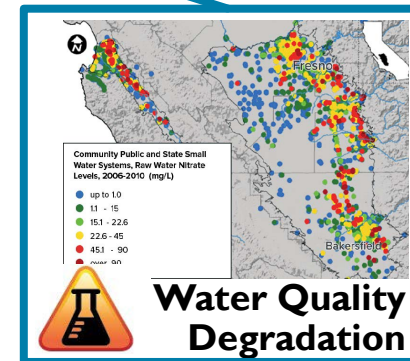
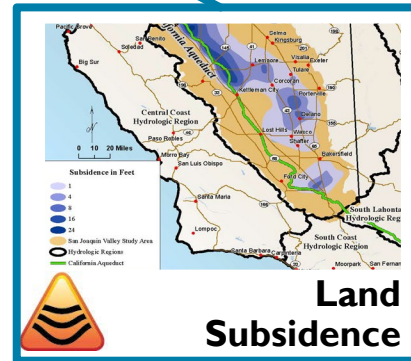
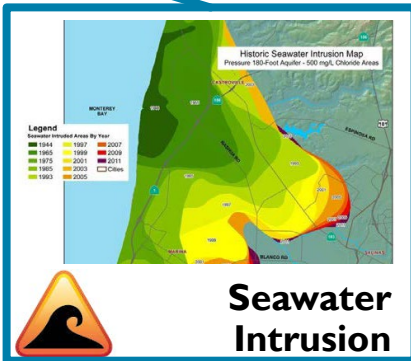
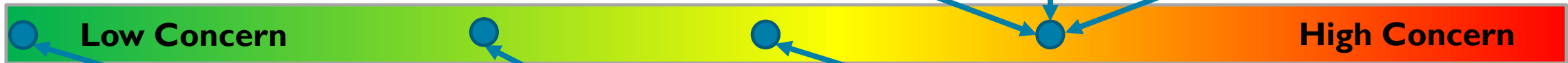
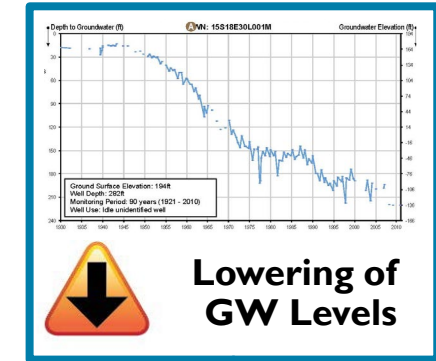
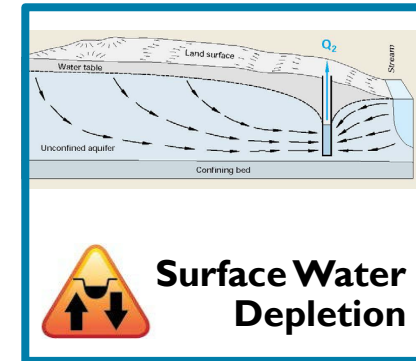
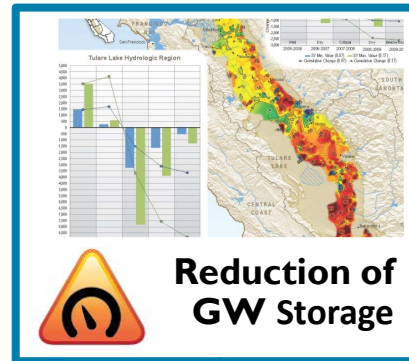
5. Land Subsidence



6. Depletions of Interconnected Surface Water

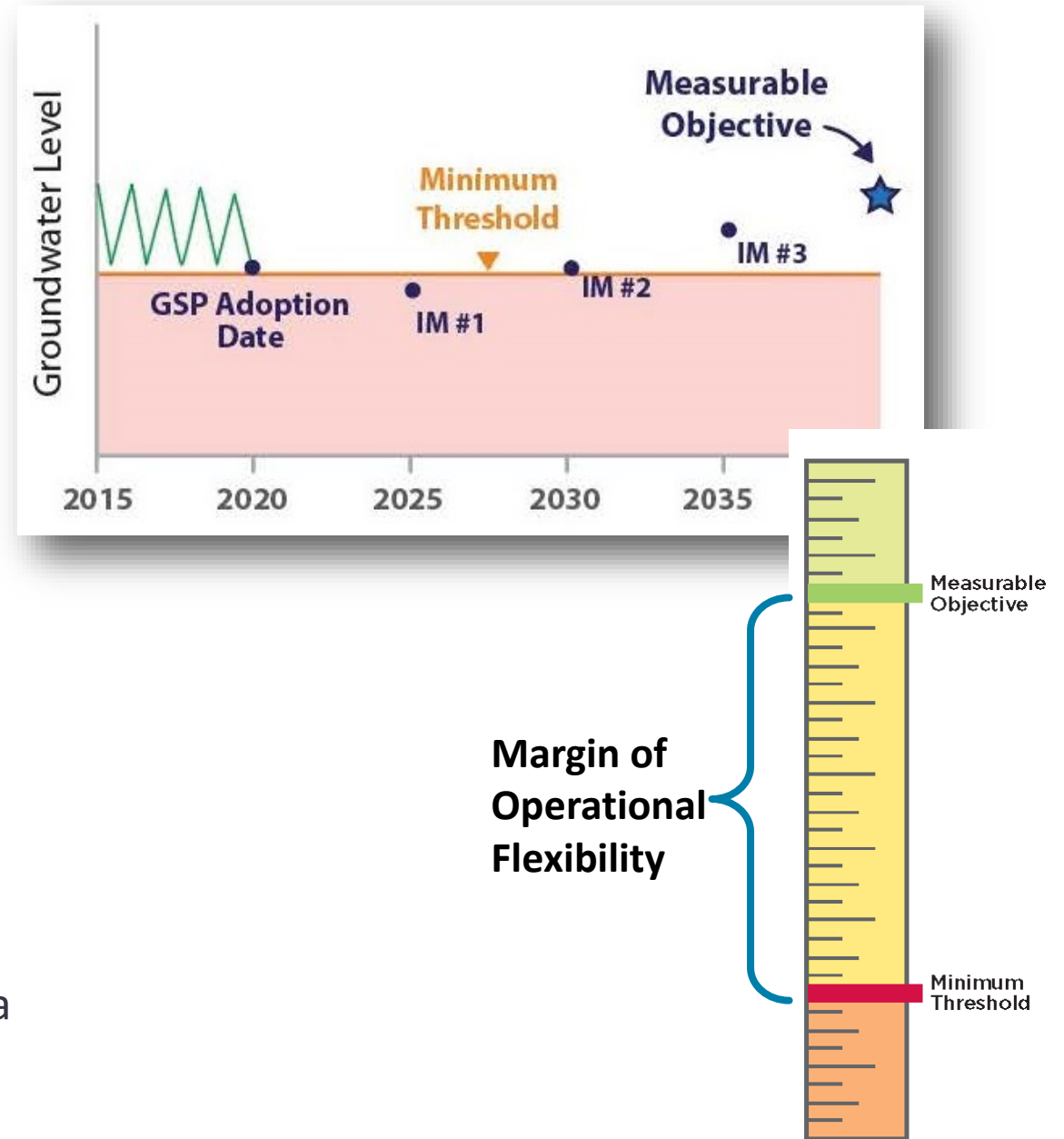
(All conditions are to be judged against 1 January 2015 baseline)

Assessment Of Groundwater Conditions: Sustainability Indicators of Potential Concern in Castac Basin



SGMA: Sustainability Criteria⁽¹⁾

- **Sustainability indicators (SIs)** are the six effects that, when significant and unreasonable, become undesirable results
- **Minimum thresholds (MTs)** are the quantitative values representing groundwater conditions at a representative monitoring site that, when exceeded, may cause an undesirable result(s)
- **Measurable Objectives (MOs)** are quantitative goals that reflect the basin's desired groundwater conditions and allow the GSA to achieve the sustainability goal within 20 years
- **Interim Milestones (IMs)** are target values representing measurable groundwater conditions, in increments of five years, set by an Agency as part of a Plan

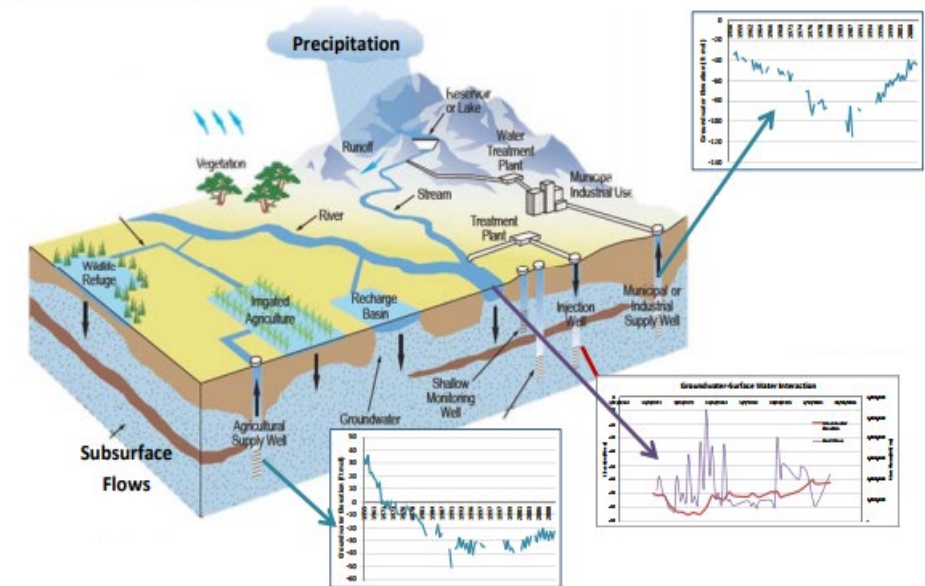


(1) DWR, 2017. Draft Sustainable Management Criteria BMP.

**Status of the Castac Lake Basin's
Groundwater Sustainability Plan (GSP):
Preliminary Water Budget**

GSP DEVELOPMENT UPDATE: Key SGMA requirements

- ✓ ■ Notice and Communication (SCEP)
- ✓ ■ Data Management System (DMS)
- ✓ ■ Description of Plan Area
- ✓ ■ Hydrogeological Conceptual Model (HCM)
- ✓ ■ Groundwater Conditions Assessment
- ➡ ■ Water Budget
- ➡ ■ Monitoring Network
- ➡ ■ Sustainable Management Criteria (SMCs)
- ➡ ■ Projects & Management Actions (P&MAs)



* 23-CCR Sections 352.6 , 354.8-20;
www.water.ca.gov/groundwater/sgm/gsp.cfm

GSP DEVELOPMENT UPDATE: Water Budget

Regulation Requirements

- Historical [**1998-2018**] water budget information shall be used to evaluate availability or reliability of past surface water supply deliveries and aquifer response to water supply and demand trends relative to water year type. §354.18.(c)(2)
- Current [**2018**] water budget information shall quantify current inflows and outflows for the basin using the most recent hydrology, water supply, water demand, and land use information §354.18.(c)(1)
- Projected [**50-year 2020-2070**] water budgets shall be used to estimate future baseline conditions of supply, demand, and aquifer response to Plan implementations, and to identify the uncertainties of these projected water budget components... §354.18.(c)(3)

GSP DEVELOPMENT UPDATE: Water Budget Approaches

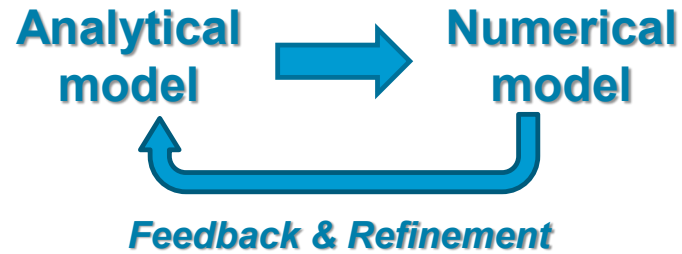
Historical & Current Analytical (Spreadsheet) Approach:

- Developed historical annual average water budget (1998-2018)
- Land-use data: 2016-2018 period
- Water usage and climate data: 21-year period (1998-2018)

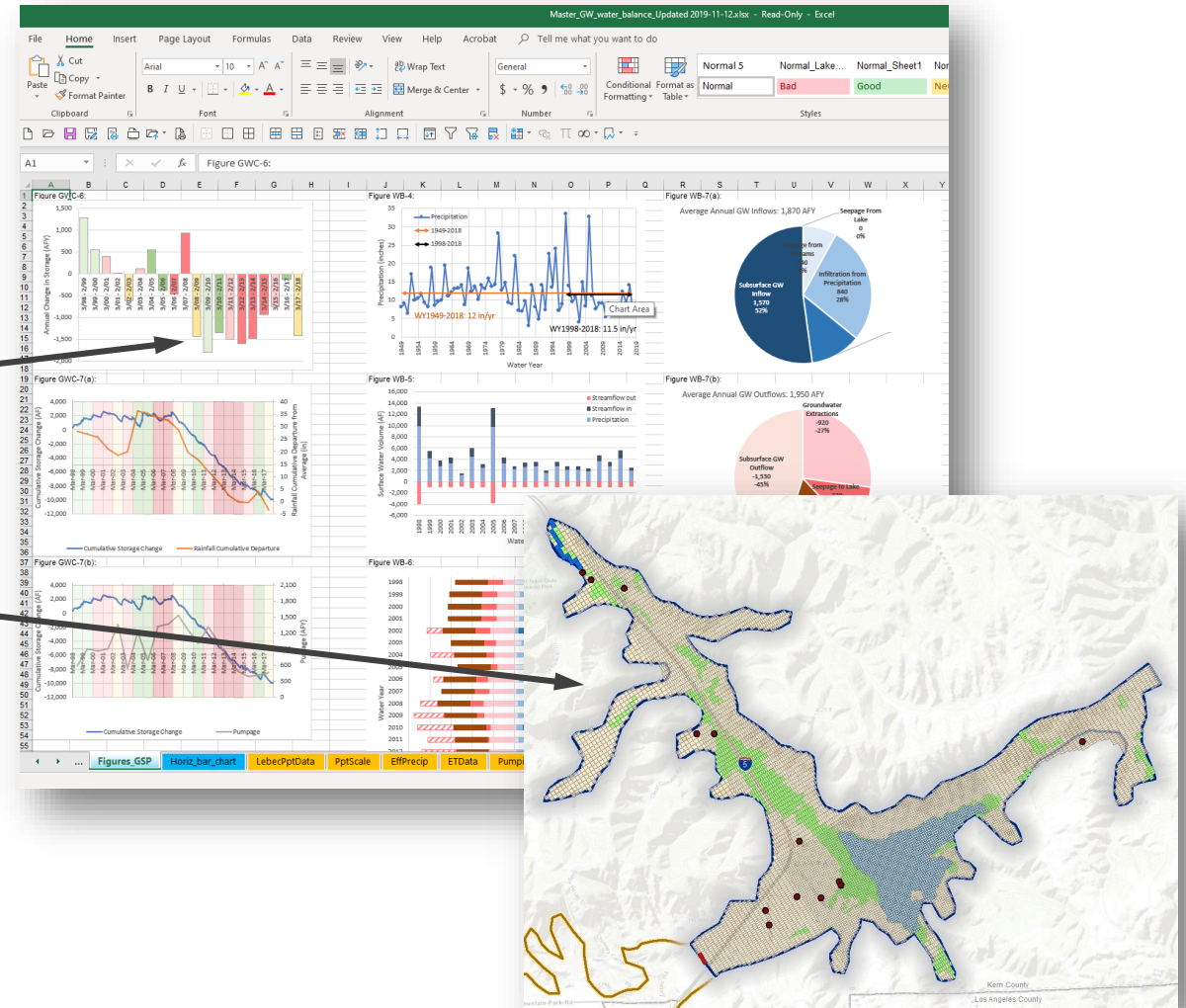
Projected (Future) Numerical Groundwater Flow Model Approach:

- Quantifies 50-year projected future water budgets and conditions
- Includes potential effects of climate change
- Uses U.S. Geological Survey MODFLOW software
- 3-D model provides increased reliability and better simulation of spatial variability to evaluate groundwater management criteria and potential actions

Water Budget Quantification is an Iterative Process

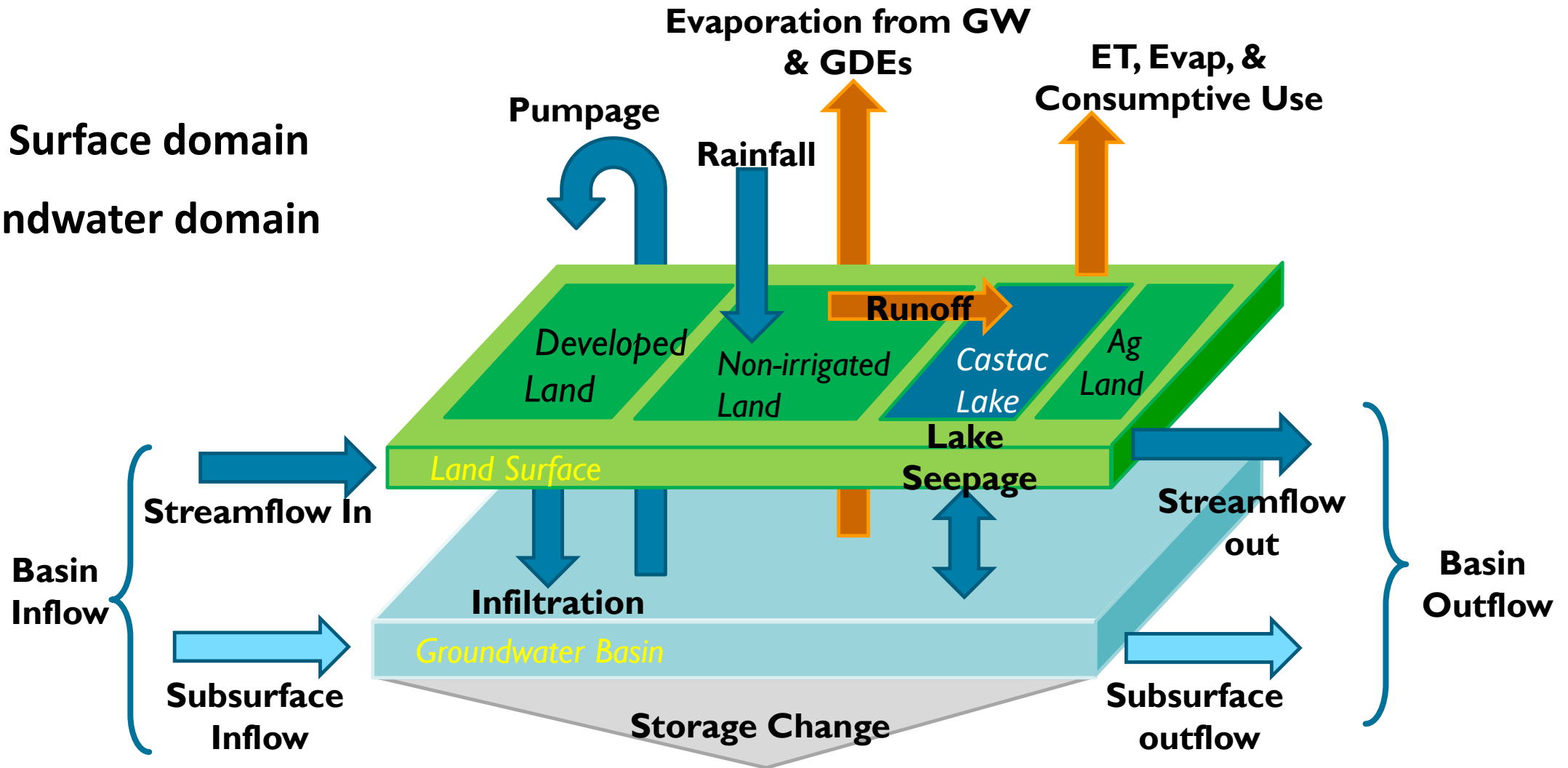


- Analytical (spreadsheet) water budget calculations provide initial input data for numerical modeling
- Numerical (MODFLOW) model results then can be used to refine the analytical water budget
- *Example:* The numerical model is better-suited to model evaporation from shallow groundwater & GDEs



GSP DEVELOPMENT UPDATE: Analytical (Spreadsheet) Water Budget

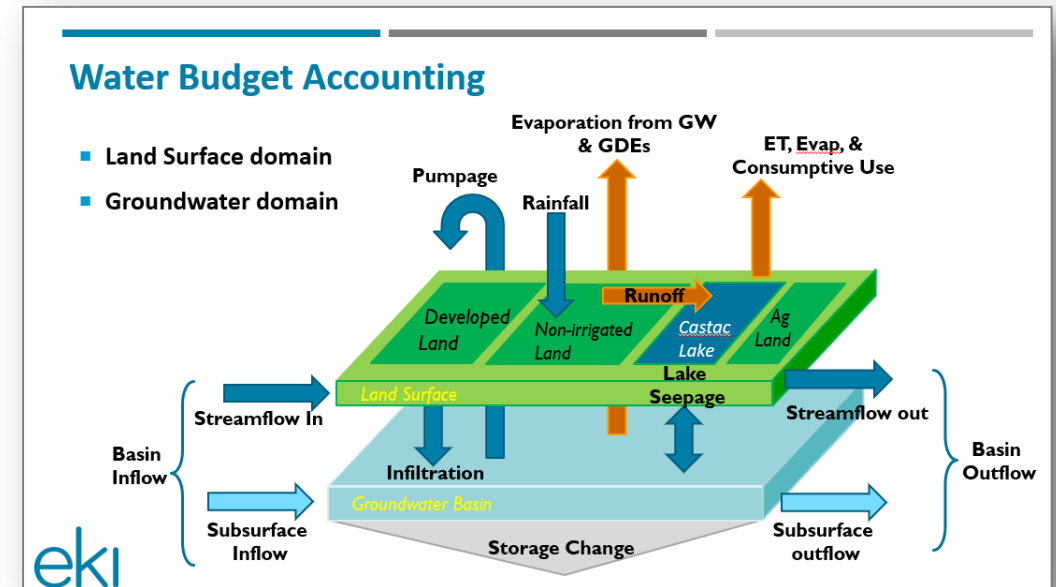
- Land Surface domain
- Groundwater domain



Historical Water Budget Accounting

Historical Average Water Years 1999-2018 – Groundwater Zone Budget

Component	Historical Average Estimated Range (AFY)*
Infiltration	1,080 to 1,220
Pumpage	-910
Basin Inflow	2,370 to 2,380
Basin Outflow	-2,070 to -2,690
Evaporation from Shallow Groundwater & GDEs	-490 to -610
Lake Seepage	-330 to -580
Storage Change	-570 to -740



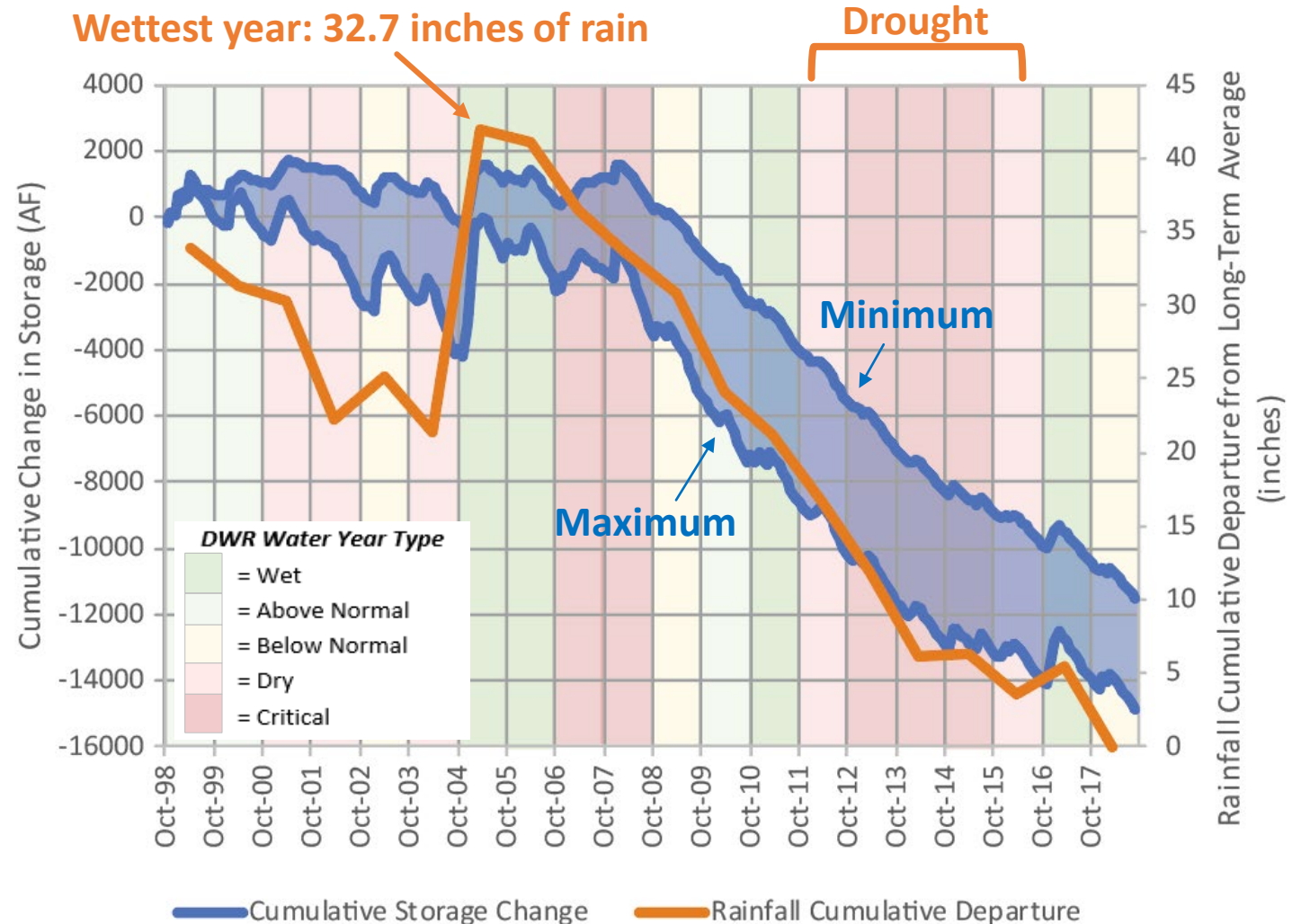
*rounded to the nearest 10 acre-feet per year

GSP DEVELOPMENT UPDATE: Water Budget

Historical Change in Groundwater Storage

Groundwater Storage Change, Water Years 1999 - 2018

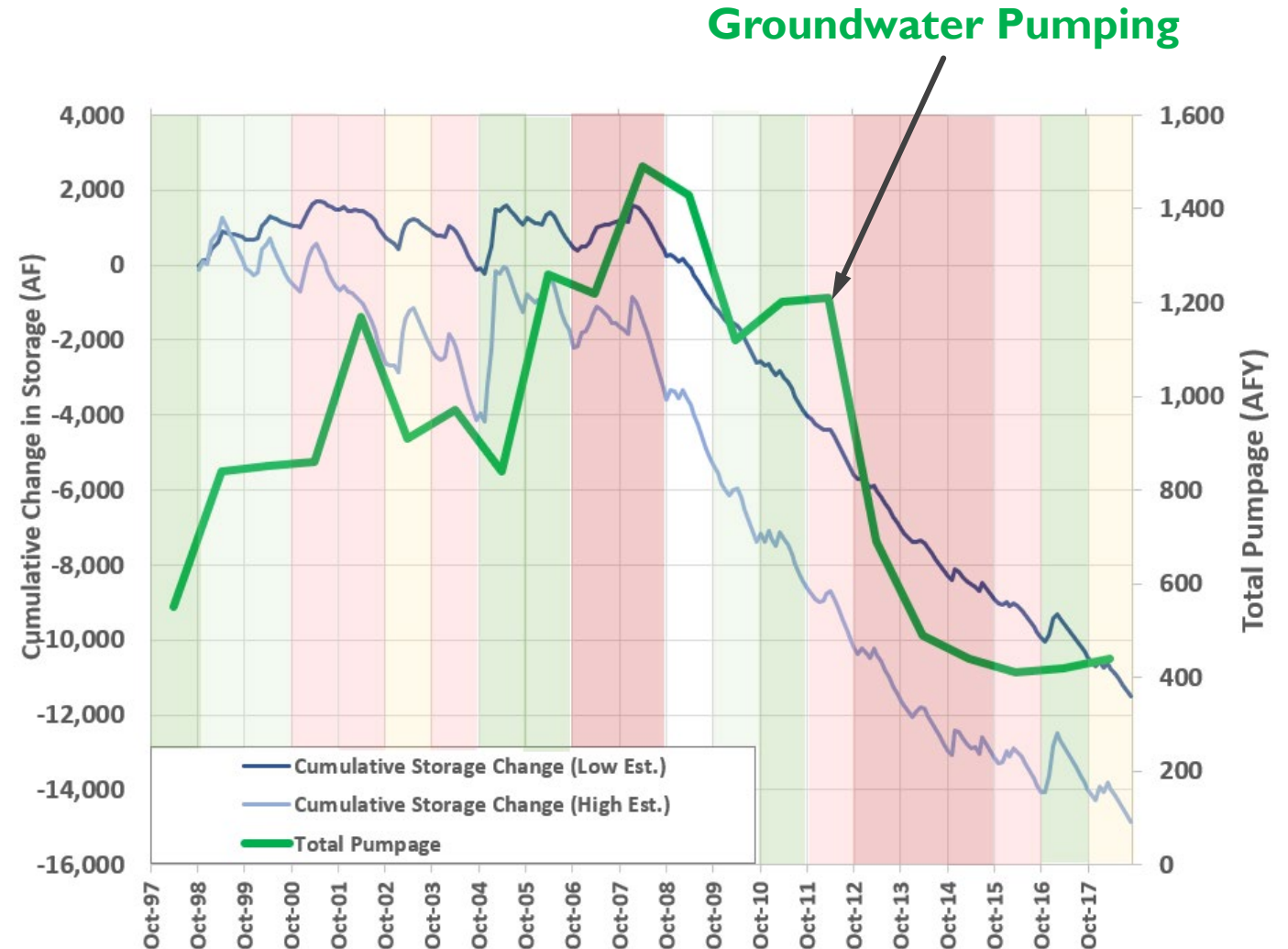
- Average: -570 to -740 AFY
- Cumulative: -11,460 to -14,850 AF
- Groundwater level and storage data show that climate is the primary driver of groundwater storage in Castac Basin



Historical Water Budget Accounting

Groundwater Pumping and Return Flows

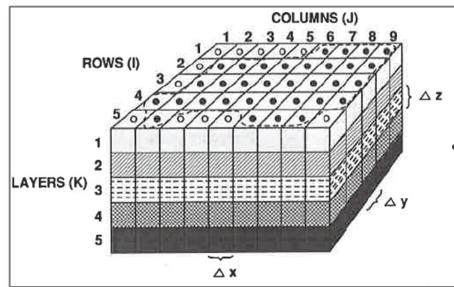
- Historical changes to groundwater storage do not correlate well with pumping records
- Pumping does not appear to be a major factor in historical water level changes
- Pumping was estimated based on energy consumption records, counter units, and reported values
- Return flows were estimated as 15% of the applied agricultural pumpage or 50% of developed area pumpage



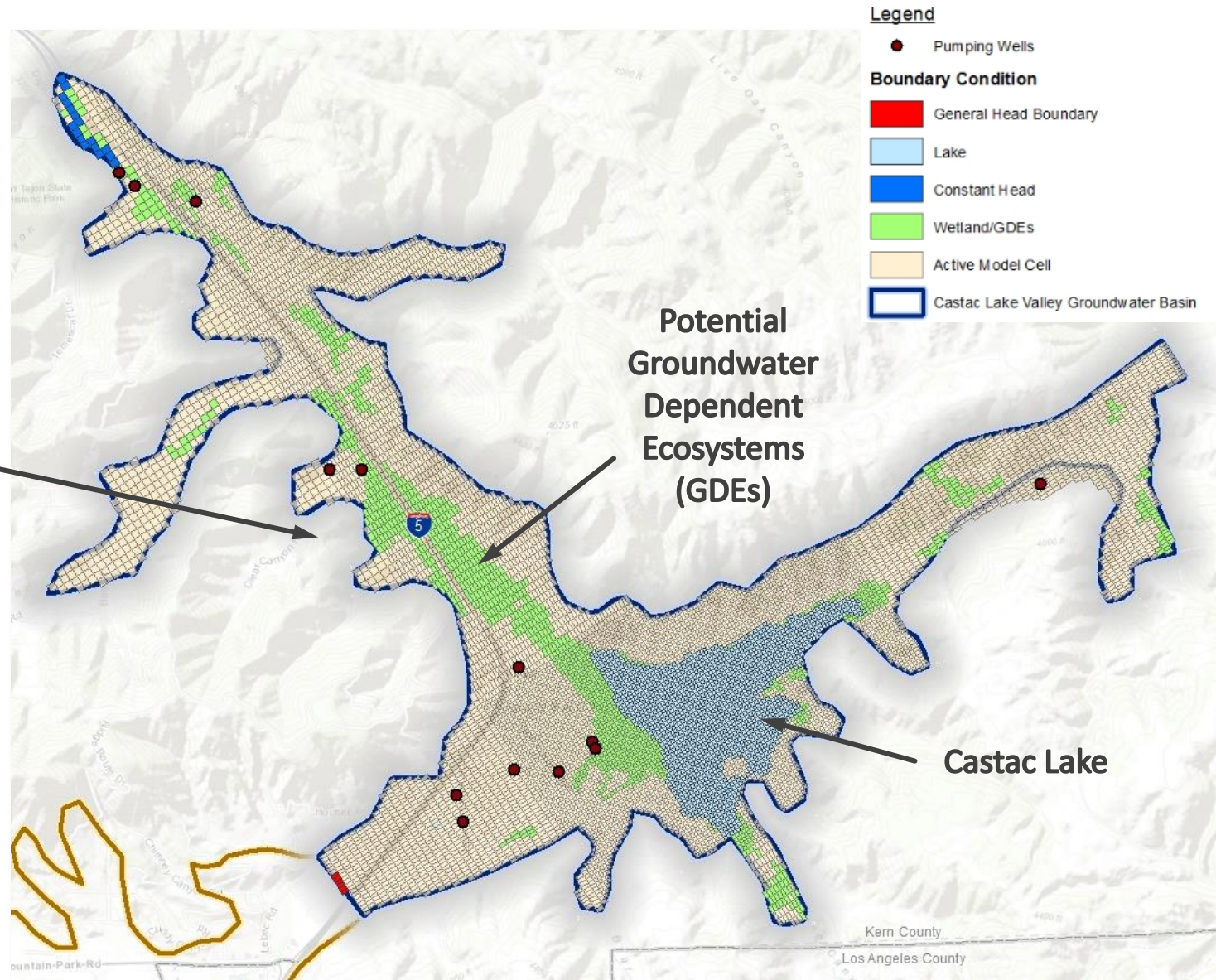
Numerical Groundwater Flow Model Development

- MODFLOW-NWT model software from U.S. Geological Survey
- 3-D model set up with locally-specific dimensions and parameters to represent the Castac Basin, as shown in this map

- **Model has a 3-D Structure**

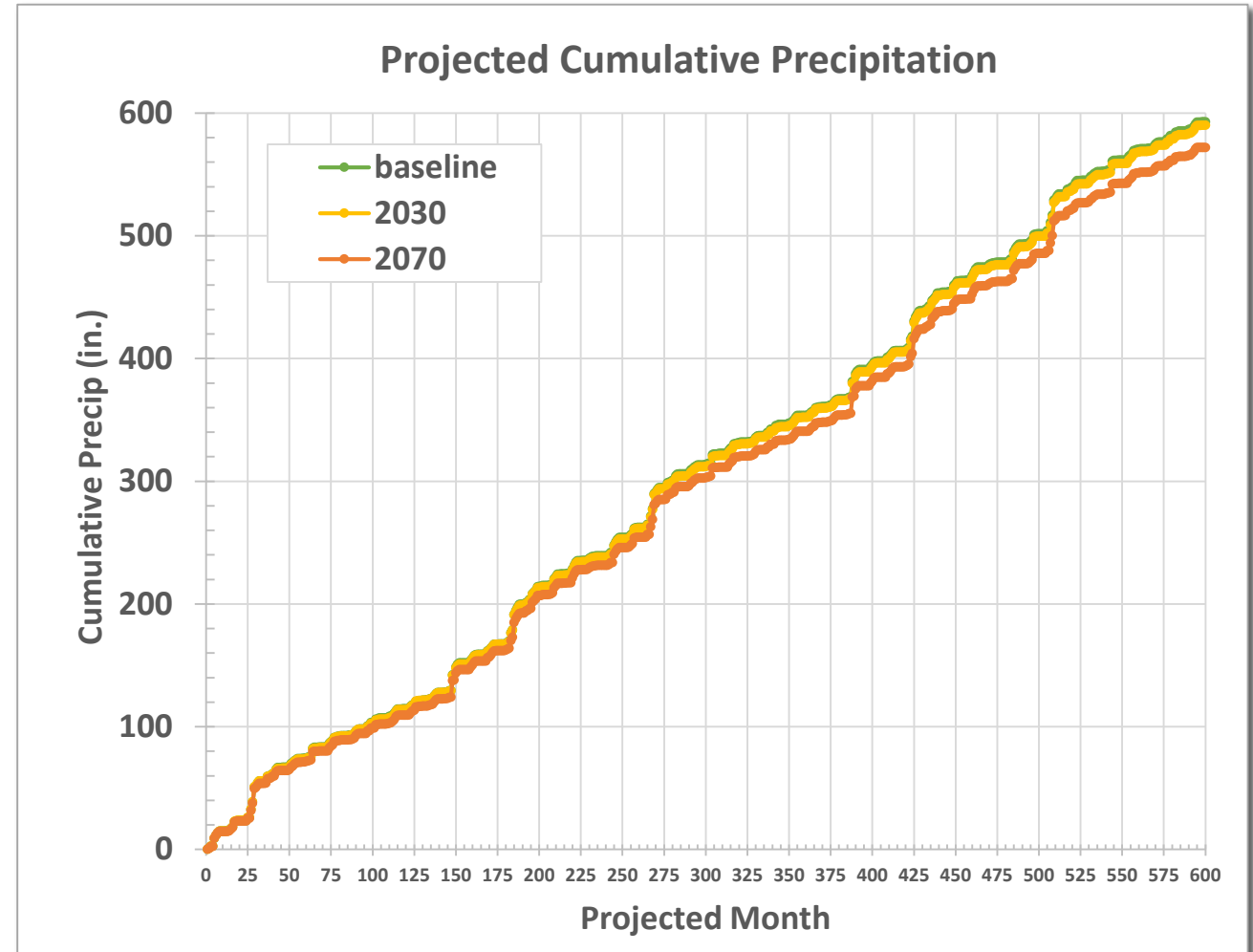


- Two *transient* modeled periods:
 - 20-year historical (Water Years 1999-2018)
 - 50-year projected (Water Years 2020-2070)



Projected Future Water Budget Scenarios: (Without Groundwater Supply-Enhancing Projects)

- Calibrated numerical model projected to run for 50 years (2020 - 2070) under three climate change scenarios as estimated by DWR:
 1. Estimated Baseline (no climate change)
 2. 2030 Estimated Climate Change
 3. 2070 Estimated Climate Change
- All scenarios include projected land use changes



Projected Future Water Budget Scenarios: With Projects

- Supply augmentation with Projects, or demand reduction with Management Actions
- Examples:
 - Managed recharge pond
 - Conservation
 - Stormwater capture and reuse
 - In-lieu recharge
 - Pumping restrictions
- Projects and Management Actions are a necessary part of the GSP
- **Seeking input on ideas for potential Projects and/or Management Actions**
- Request P&MA info forms to be returned by Friday 29 Nov 2019 to facilitate consideration and inclusion into the GSP

CASTAC BASIN GROUNDWATER SUSTAINABILITY AGENCY
PROJECT / MANAGEMENT ACTION
INFORMATION FORM

P/MA ID: _____ BASIN/MANAGEMENT AREA (if any): _____

TITLE: _____

DESCRIPTION:

EXPECTED ANNUAL BENEFIT (demand reduction or supply augmentation, in acre-feet per year):

AGENCY(S):
Primary/Lead: _____
Supporting: _____

LOCATION: Check here if Basin-wide
Township / Range: _____
Coordinates (Latitude / Longitude): _____
Description: _____

AFFECTED SUSTAINABILITY INDICATOR (check all that apply):
 Chronic Lowering of Groundwater Levels Reduction of Groundwater Storage
 Seawater Intrusion Degraded Water Quality
 Land Subsidence Depletions of Interconnected Surface Water

TYPE (check all that apply):
 Water Supply Augmentation
 Surface Water Groundwater (Recharge) Recycled Water
 Transfer Stormwater Other
Source of Outside Water (if applicable): _____

Water Demand Reduction
 Conservation Land / Water Use Changes
 Infrastructure / Capital Project Policy Project
 Data Gap Filling / Monitoring Water Quality Improvement
 Other: _____

¹ Please continue to next page or attach additional pages to this form as necessary

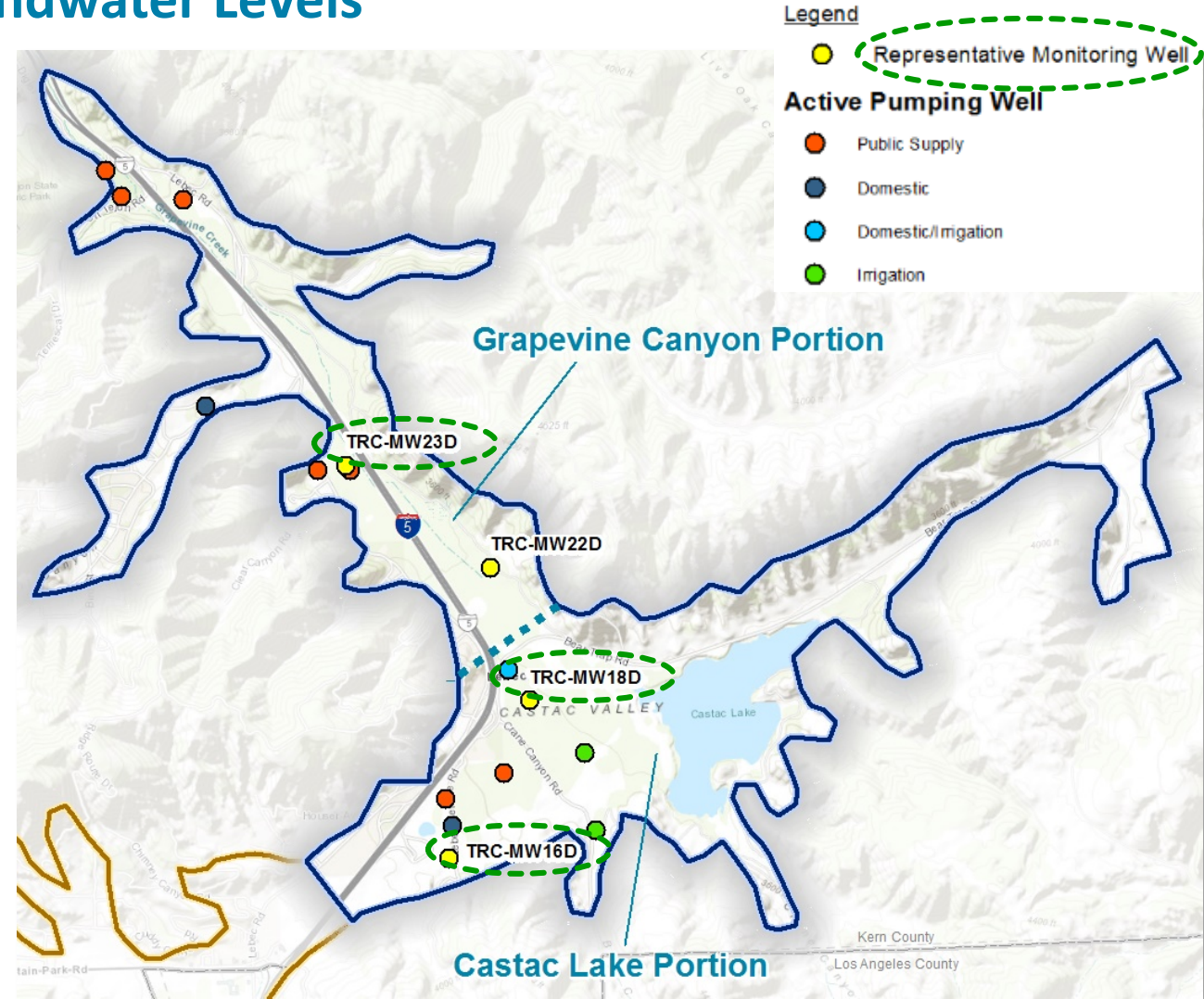
**Status of the Castac Lake Basin's
Groundwater Sustainability Plan (GSP):**

**Development of Sustainable
Management Criteria (SMCs)**

GSP DEVELOPMENT UPDATE: Development of SMCs

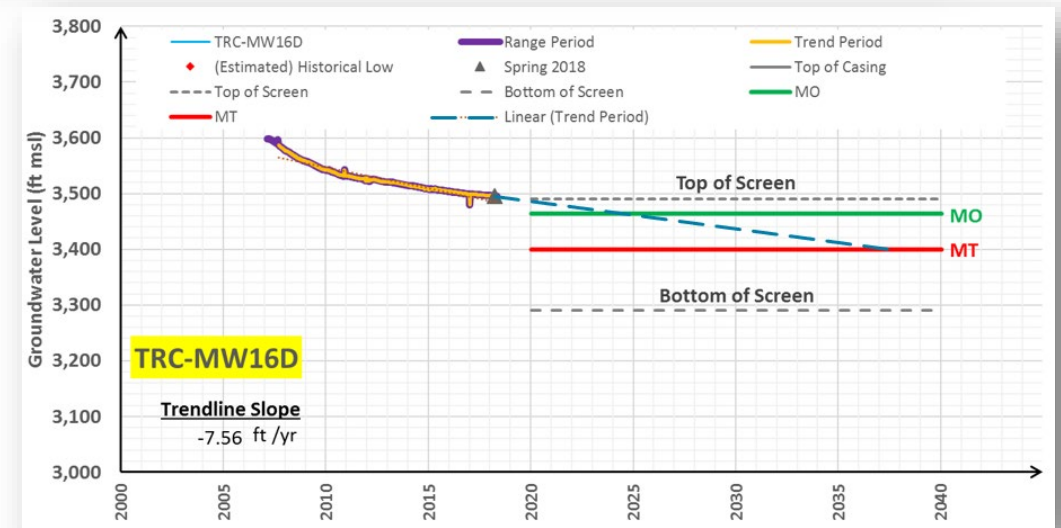
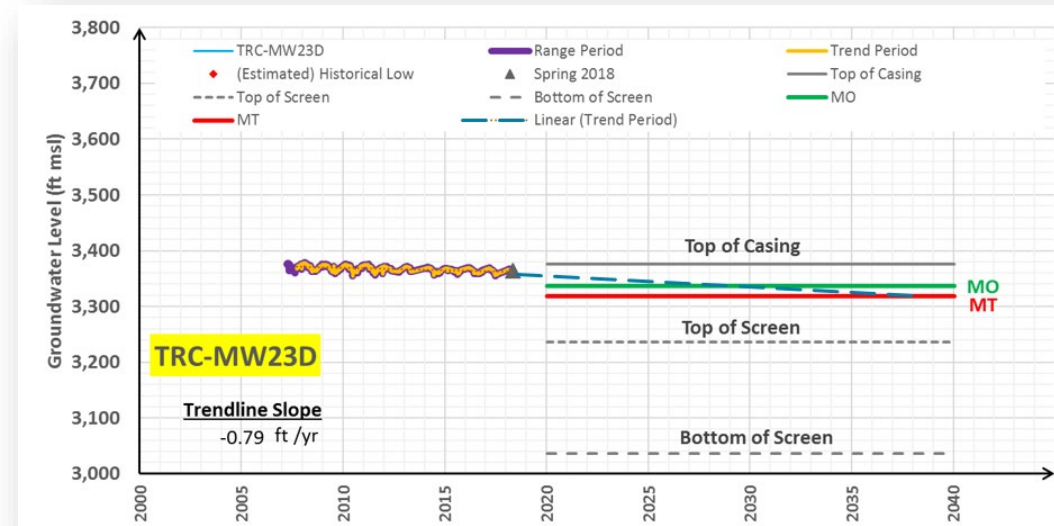
Proposed Representative Wells for Groundwater Levels

- Two wells in the Castac Lake portion
- One well in the Grapevine Canyon portion
- Supplement Representative Monitoring Network with data collected from other monitoring wells, as appropriate
 - Data collection to include shallow wells to monitor conditions for Groundwater Dependent Ecosystems
- Water levels measured bi-annually (Spring & Fall) to capture seasonal trends



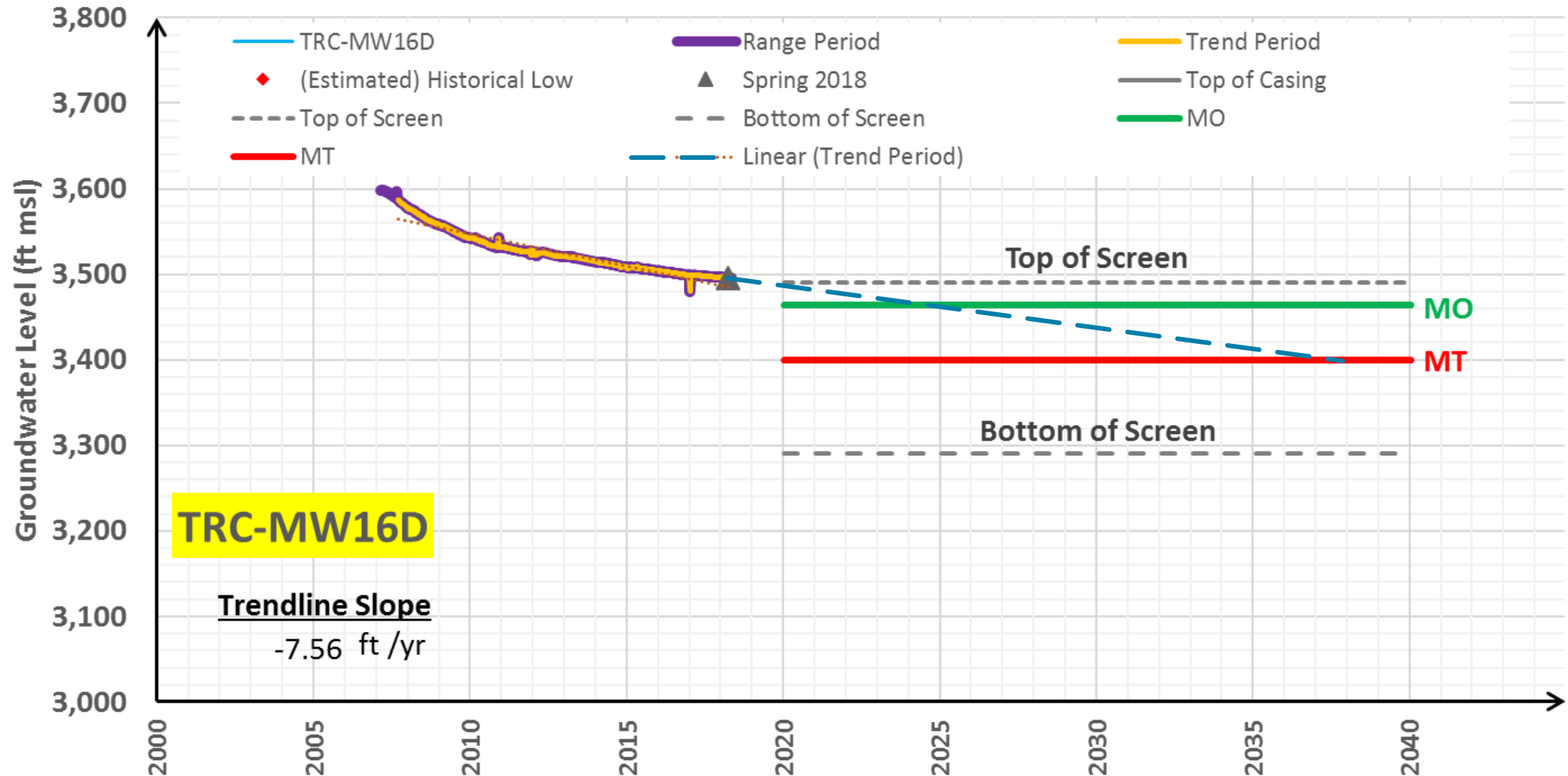
SMCs: Methods and Calculation for Water Level MTs and MOs

- Linear trend of measured water level data over the period 2008 -2018
- Proposed first-cut approach, to be checked against future projected scenarios and data
- **Measurable Objective (MO)** is based on a projected 10-year trend starting in Spring 2018
- **Minimum Threshold (MT)** is based on a projected 20-year trend starting Spring 2018



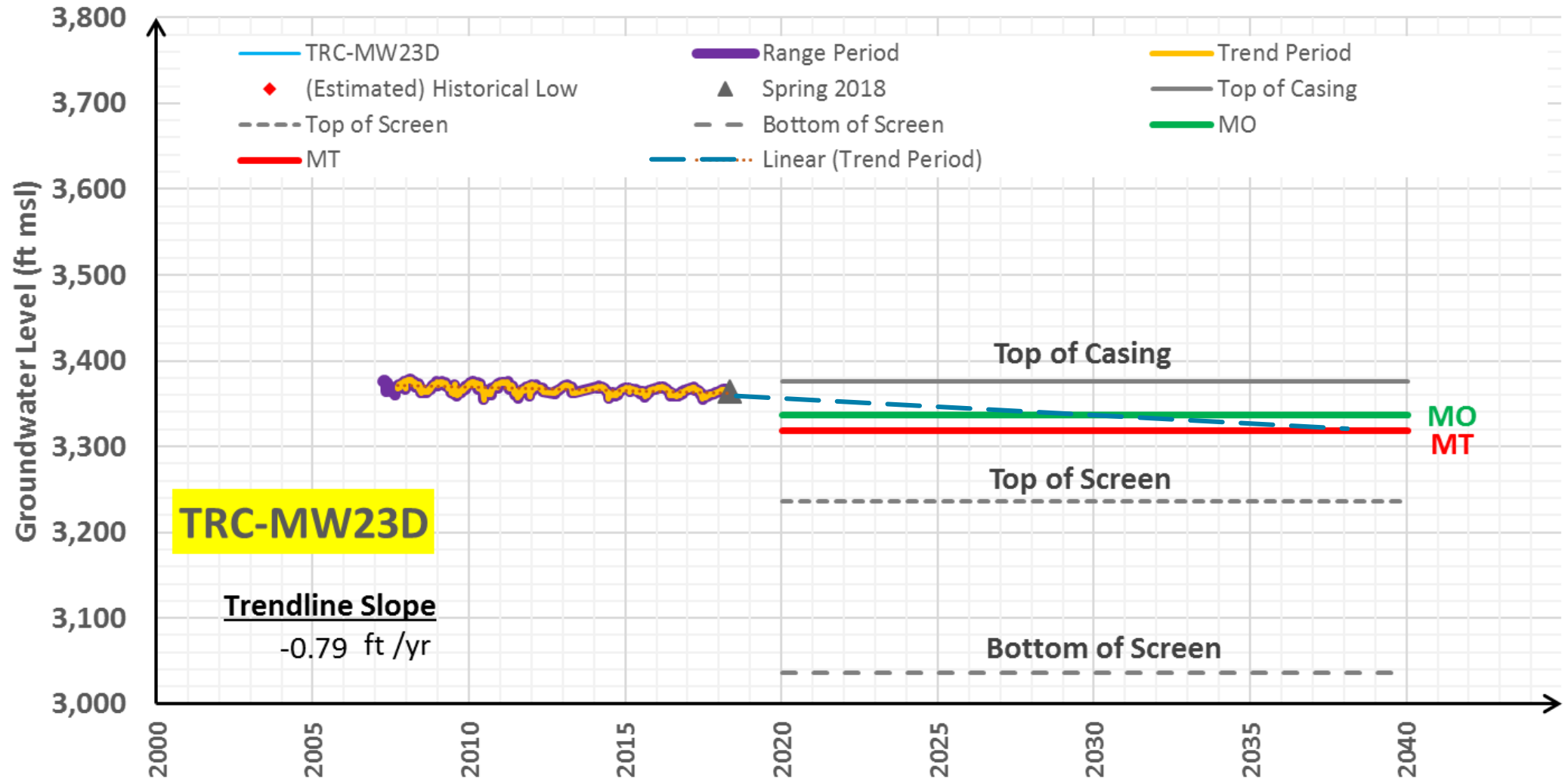
Proposed MT and MO for TRC-MW16D, Upper Castac Basin (Castac Lake Portion)

Draft – results subject to revision



Proposed MT and MO for TRC-MW23D, Lower Castac Basin (Grapevine Portion)

Draft – results subject to revision



SMCs: Water Quality MTs and Mos

GSP Emergency Regulations § 354.28(c)

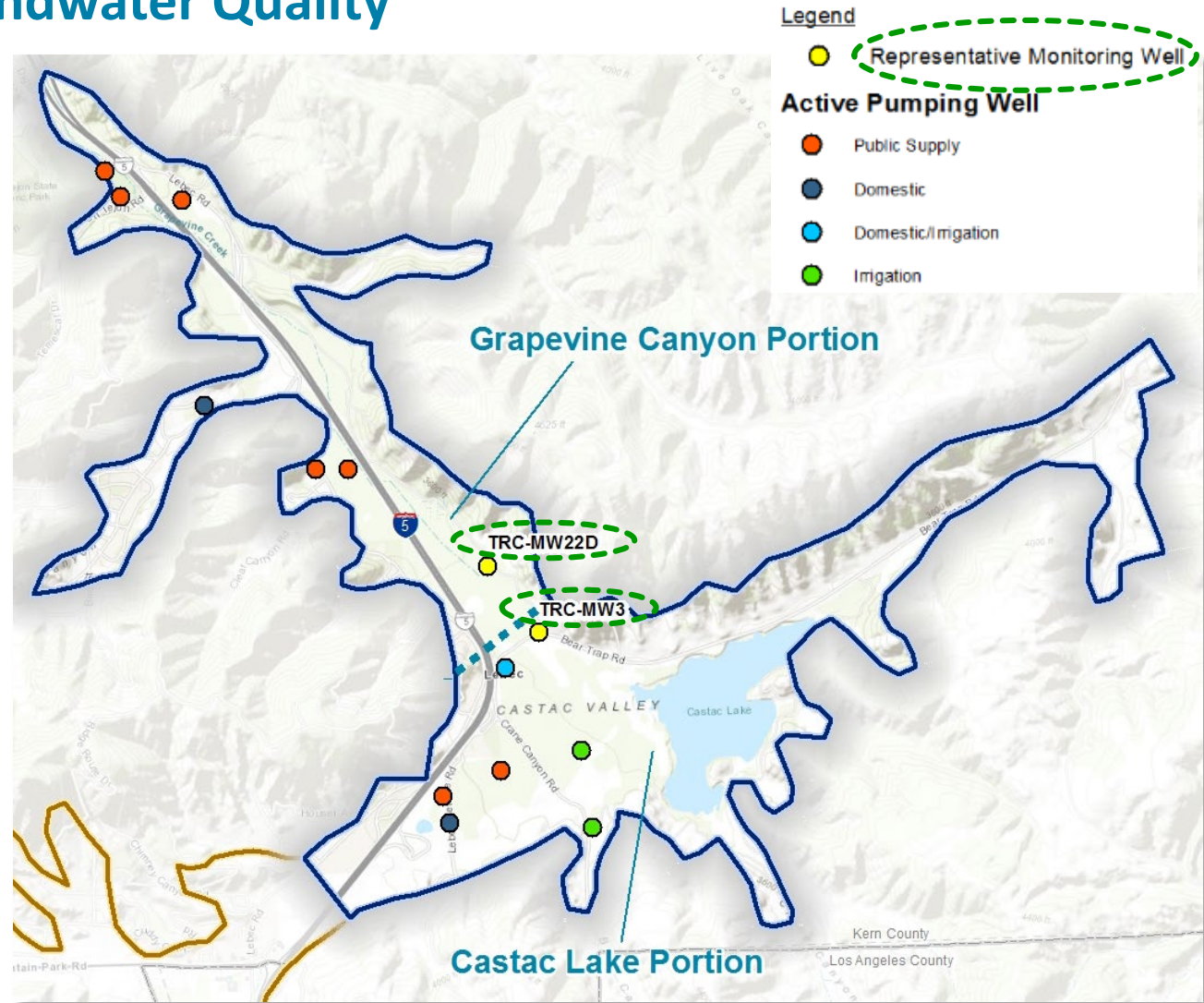
“...The minimum [Water Quality] threshold shall be based on the number of supply wells, a volume of water, or a location of an isocontour that exceeds concentrations of constituents determined by the Agency to be of concern for the basin. In setting minimum thresholds for degraded water quality, the Agency shall consider local, state, and federal water quality standards applicable to the basin.”

- SGMA does not empower GSAs to develop or enforce water quality standards
- Other agencies such as the California Regional Water Quality Control Board (RWQCB) set water quality policy
- Very limited recent data are available to analyze water quality trends in relation to water level trends relevant to SGMA
- Need to establish a baseline for current conditions initially
- **Water quality SMCs are yet to be determined**
- If Castac Basin GSA begins water-supply enhancement Project(s), SMCs for water quality will be needed

GSP DEVELOPMENT UPDATE: Development of SMCs

Proposed Representative Wells for Groundwater Quality

- Public water system wells for which water quality data are reported to the State
- One supplemental well in the Castac Lake portion
- One supplemental well in the Grapevine Canyon portion
- Propose wells to be sampled annually for TDS & major ions



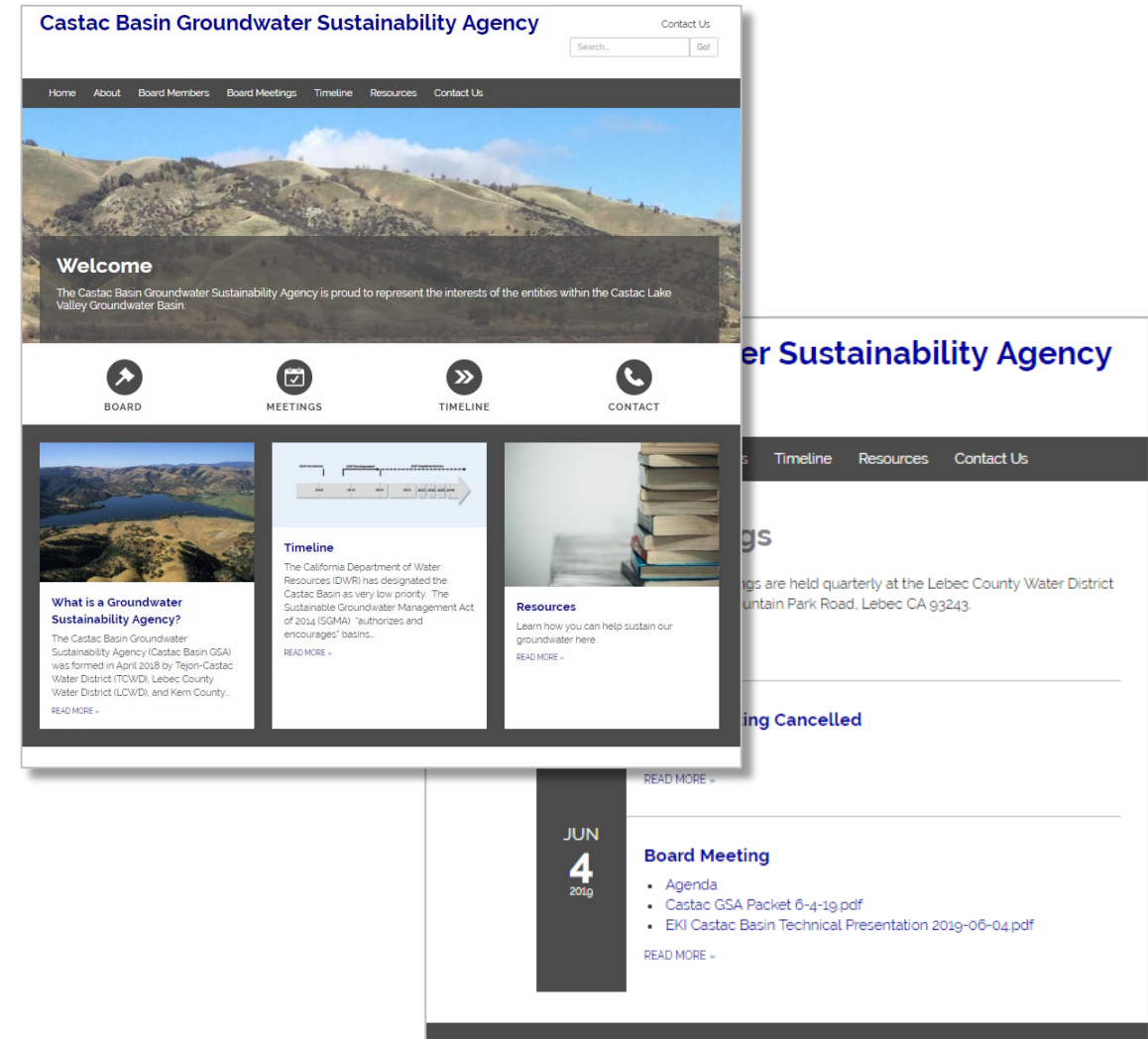
Next Steps in GSP Development

NEXT STEPS

- Continue sustainability planning:
 - Identify Projects and/or Management Actions
 - Conduct projected future runs with identified Projects and/or Management Actions
 - Finalize *Sustainability Management Criteria (SMCs): Measurable Objectives (MOs), Interim Milestones (IMs), and Minimum Thresholds (MTs)* based on projected model results

OPPORTUNITIES FOR ENGAGEMENT

- Castac Basin GSA Board Meetings
 - Generally on the first Tuesday of every third month (Mar, Jun, Sep, & Dec)
 - Notice posted on website and at U.S. Post Office
 - Public Workshops
- Castac Basin GSA Website:
<https://www.castacgsa.org/>



QUESTIONS?

You can send questions or comments using the website:

<https://www.castacgsa.org/contact-us>



Or contact us directly:

Angelica Martin, Co-Chair

amartin@tejonranch.com