



COLUSA AND GLENN GROUNDWATER AUTHORITIES

Colusa Subbasin
Joint Technical Advisory Committee
GSP Development

June 11, 2021

Meeting Topics

Item 4.a. Sustainable Management Criteria

–4.a.i. Sustainability Indicator #4: Degraded Water Quality

(TAC Action)

–4.a.ii. Sustainability Indicator #6: Depletions of Interconnected Surface Water **(TAC Action)**

Item 4.b. Groundwater Dependent Ecosystems

Item 4.c. Projects and Management Actions

Item 5. Well Monitoring Pilot Program

Item 6. Topics for Next (July 9) Joint TAC Meeting

Item 4.a.i. Sustainability Indicator #4 Degraded Water Quality

Item 4.a.i. Degraded Water Quality

- Prior Approach (TAC approved at April 9 meeting)
 - No quantitative SMCs in 2022 GSP
 - Monitor between 2022 and 2027
 - Set quantitative SMCs in 2027 GSP Update
- Revised Approach
 - Maximize reliance on existing water quality monitoring and regulatory programs
 - Identify and address data gaps
 - Set quantitative SMCs to the extent possible with limited data
 - Monitor between 2022 and 2027
 - Review, refine and expand quantitative SMCs in 2027 GSP

Background on Degraded Water Quality

- Groundwater quality in the Colusa Basin is generally good with local exceedances of water quality objectives for some constituents
- Existing regulatory programs address most water quality concerns
- GSP will document the methodology for coordination between the GSAs and existing water quality regulatory programs

Proposed Statement of Significant and Unreasonable Degradation of Water Quality

Significant and unreasonable degradation of water quality occurs when GSP projects or management actions cause an increase in the concentration of applicable constituents of concern in groundwater supply wells that lead to adverse impacts on beneficial uses or users of groundwater.

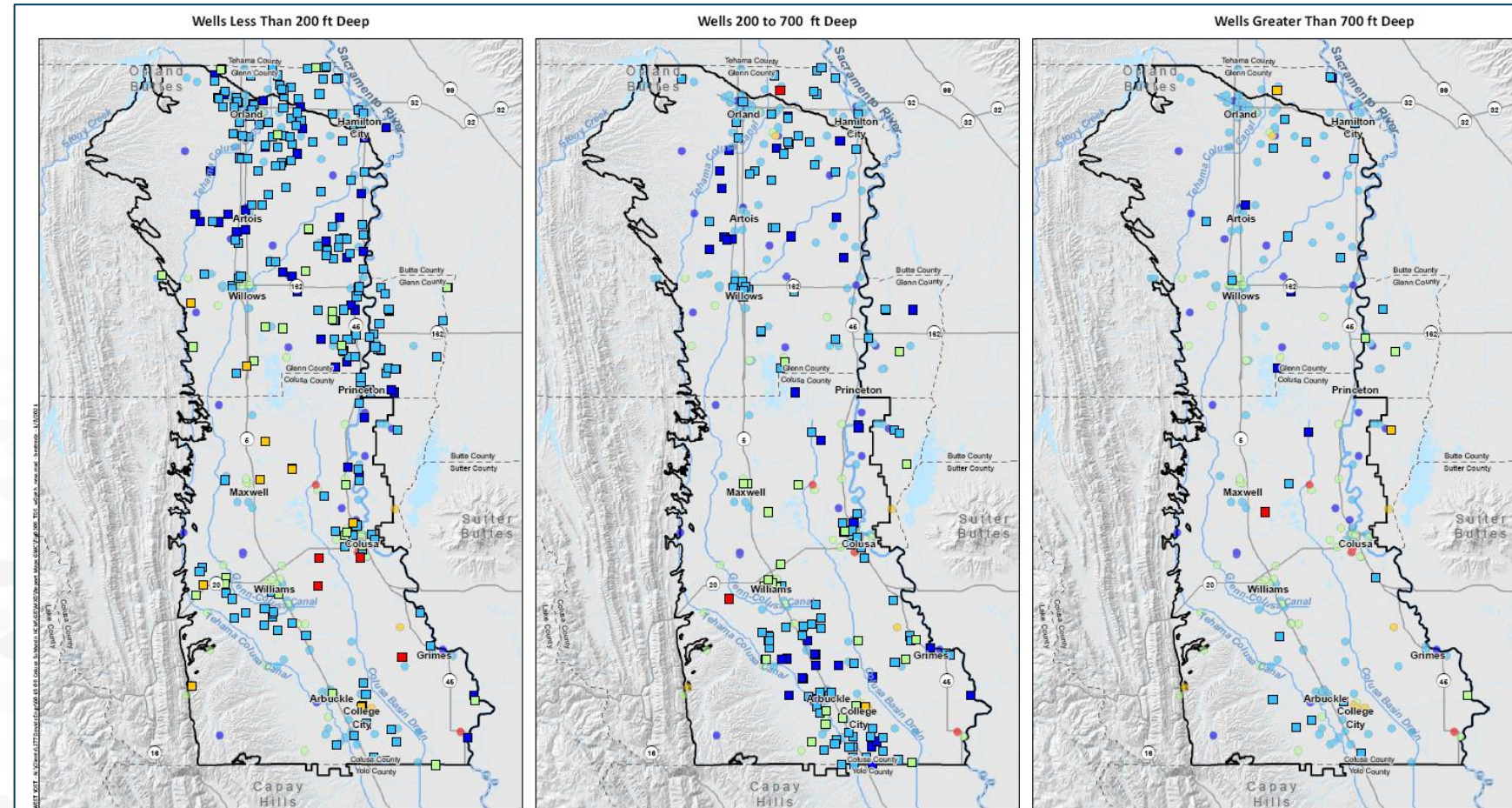
Recommended Water Quality Constituent

- Salinity from anthropogenic sources is being addressed through the Central Valley Salt and Nitrate Management Plan.
- Concerns remain over the potential for mobilization of naturally-occurring connate water from below the base of fresh water or along faults as a result of GSP projects and management actions and other groundwater development.

Recommendation: Adopt SMCs for salinity to supplement existing regulatory programs and water quality standards.

Saline Groundwater Quality Monitoring

- Total Dissolved Solids
- Inadequate historical data
- Establish a monitoring network for groundwater to monitor upwelling saline water



Source: Total dissolved solid (TDS) concentration and well depth information was downloaded from GeoTracer Groundwater Ambient Monitoring and Assessment Program (GAMA) and U.S. Geological Survey (USGS) National Water Information System (NWIS), 2020.

Horizontal Datum: North American Datum of 1983 (NAD 83), California State Plane Zone II, feet.

Note:
 1. TDS concentrations shown are the maximum detected at that location.
 2. The drinking water standards (2018) secondary maximum contaminant level for TDS is 500 mg/L (recommended), 1,000 mg/L (upper limit), and 1,500 mg/L (short term).

Colusa Subbasin
 Maximum TDS Concentration (mg/L) in Wells with Known Depth

■ < 250
■ 250 - 500
■ 500 - 1,000
■ 1,000 - 1,500
■ > 1,500

Maximum TDS Concentration (mg/L) in Wells with Unknown Depth

● < 250
● 250 - 500
● 500 - 1,000
● 1,000 - 1,500
● > 1,500

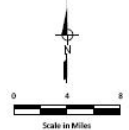


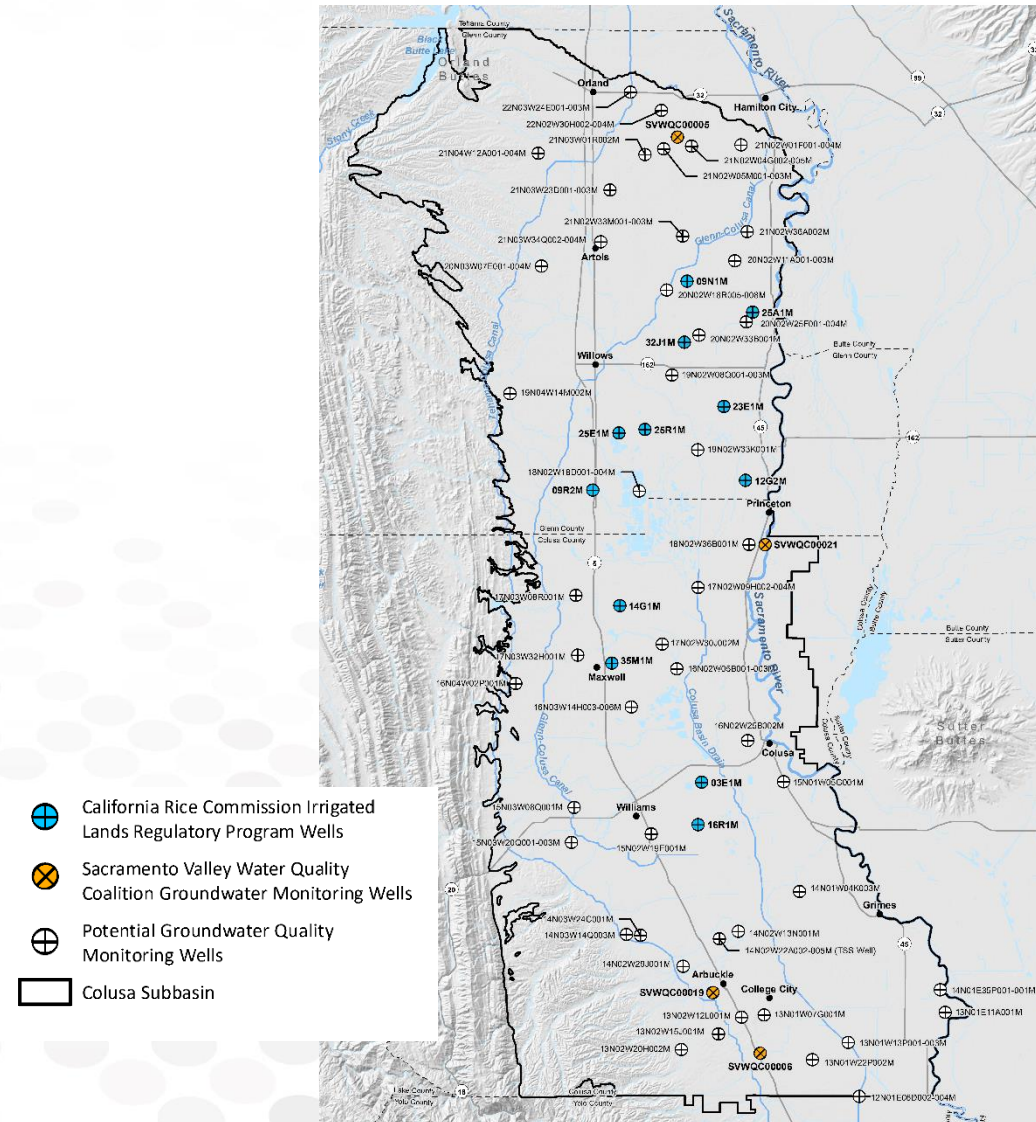
Figure 3-9

Historical Concentrations
 Total Dissolved Solids
 Colusa GSA and Glenn GSA
 Colusa Subbasin
 Draft Groundwater Sustainability Plan

Salinity Monitoring Network

Network Consists of:

- California Rice Commission Irrigated Lands Regulatory Program Wells (12 wells)
- Sacramento Valley Water Quality Coalition Groundwater Monitoring Wells (4 wells)
- Public Supply Wells Monitored for Division of Drinking Water Compliance (7 of 29 active wells; not shown on map)
- Network may be expanded using existing or new wells, as needed to address data gaps



Technical Team Recommendation for Degraded Water Quality (Salinity) MOs, MTs, and UR

- Measurable Objective: 700 $\mu\text{S}/\text{cm}$ (agricultural water quality objective)
- Minimum Thresholds, higher of:
 1. 900 $\mu\text{S}/\text{cm}$ (recommended California Secondary Maximum Contaminant Level), OR
 2. Pre 2015 historical maximum
- Undesirable Result:
 - 25% (currently, 6 of 23) representative monitoring wells fall below the minimum threshold for two consecutive years
- Data gaps and necessary improvements to the network will be documented in the GSP.

Proposed Action

The Joint TAC recommends that the GSA Boards adopt measurable objectives, minimum thresholds, and undesirable results as described on Slide 10 for Sustainability Indicator #4: Degraded Water Quality.

Note: A written “Decision Record” will be prepared following the meeting to document the TACs’ decisions.

Discussion

Item 4.a.ii. Sustainability Indicator #6: Depletions of Interconnected Surface Water

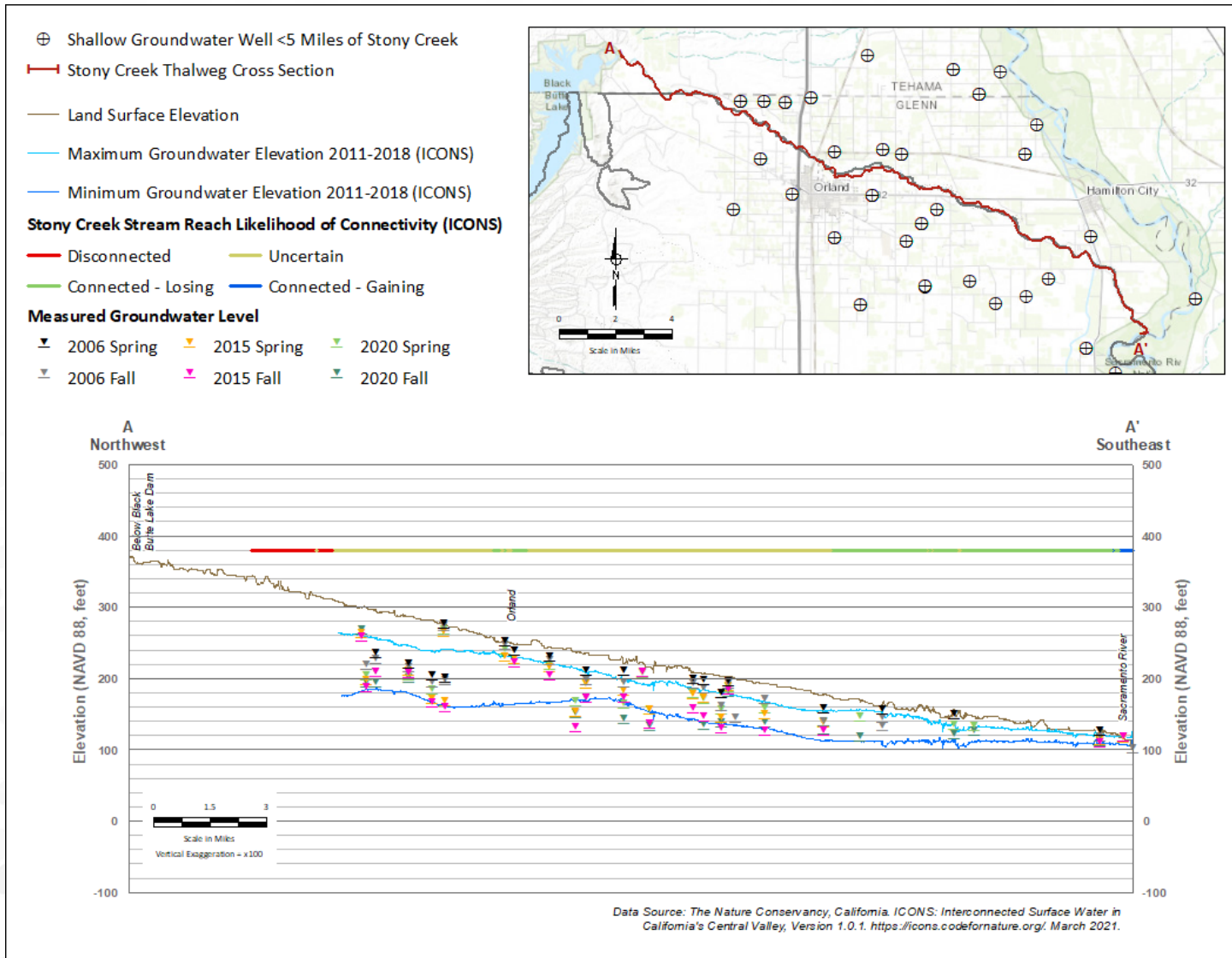
Item 4.a.ii. Sustainability Indicator #6: Depletions of Interconnected Surface Water

- 1) Revised Undesirable Result criteria
- 2) Interconnectedness of Stony Creek
- 3) Additional monitoring wells for Colusa Basin Drain

Item 4.a.ii. Depletions of Interconnected Surface Water: Revised Undesirable Result Criteria

- TAC-approved criteria (at May 19, 2021 meeting)
 - 25% of the 10 monitoring wells fall below their MT for 24 consecutive months
- Revised criteria adopted by CGA
 - 25% or 3 of the 10 monitoring wells, which ever is greater, fall below their MT for 24 consecutive months

Item 4.a.ii. Depletions of Interconnected Surface Water: Interconnectedness of Stony Creek

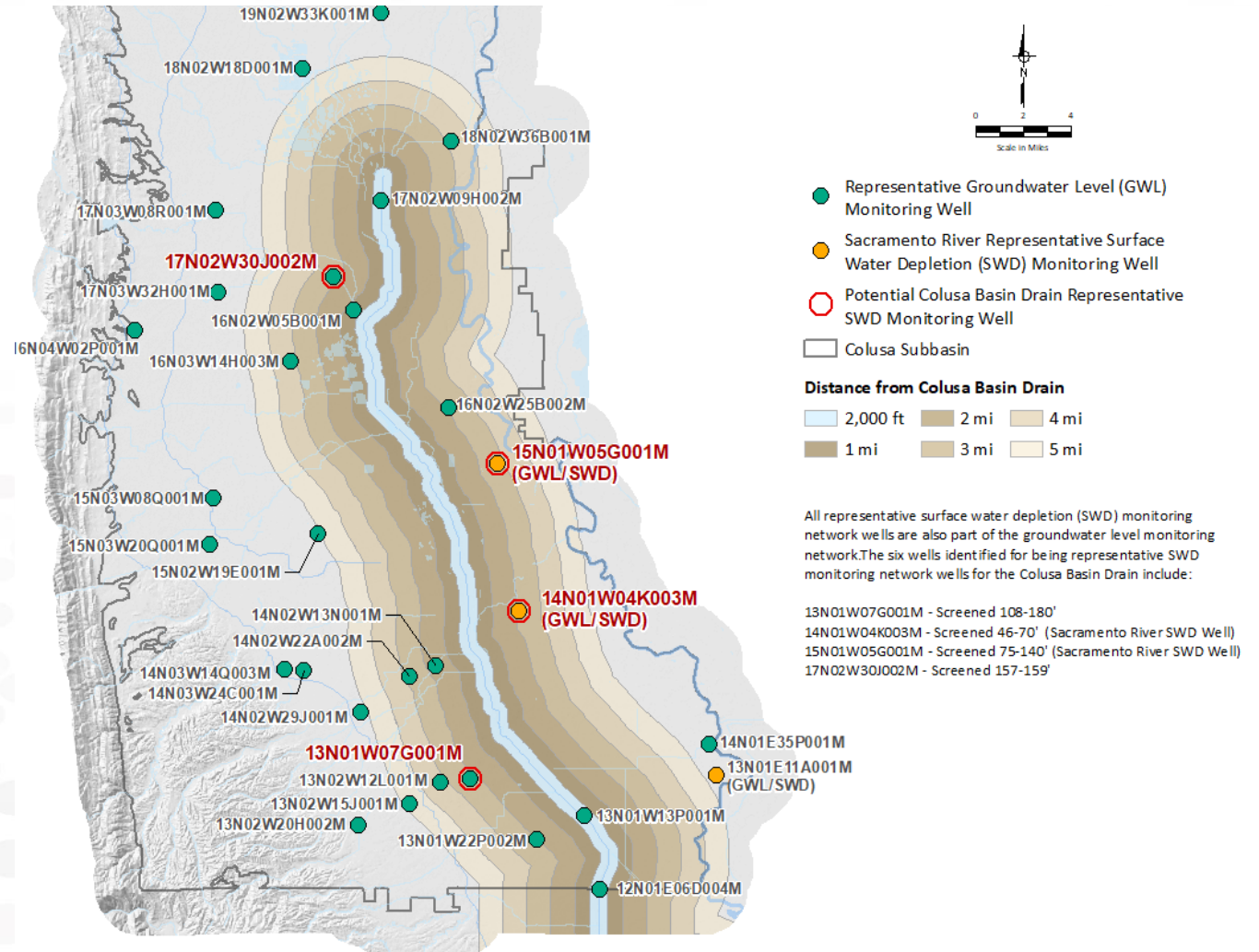


- Review of the available local groundwater and topographic data for Stony Creek does not resolve the uncertainty over connectivity of the stream and groundwater
- When flowing, Stony Creek is likely a losing stream over most of the reach below Black Butte Reservoir

Item 4.a.ii. Depletions of Interconnected Surface Water: Additional Monitoring Wells for Colusa Basin Drain

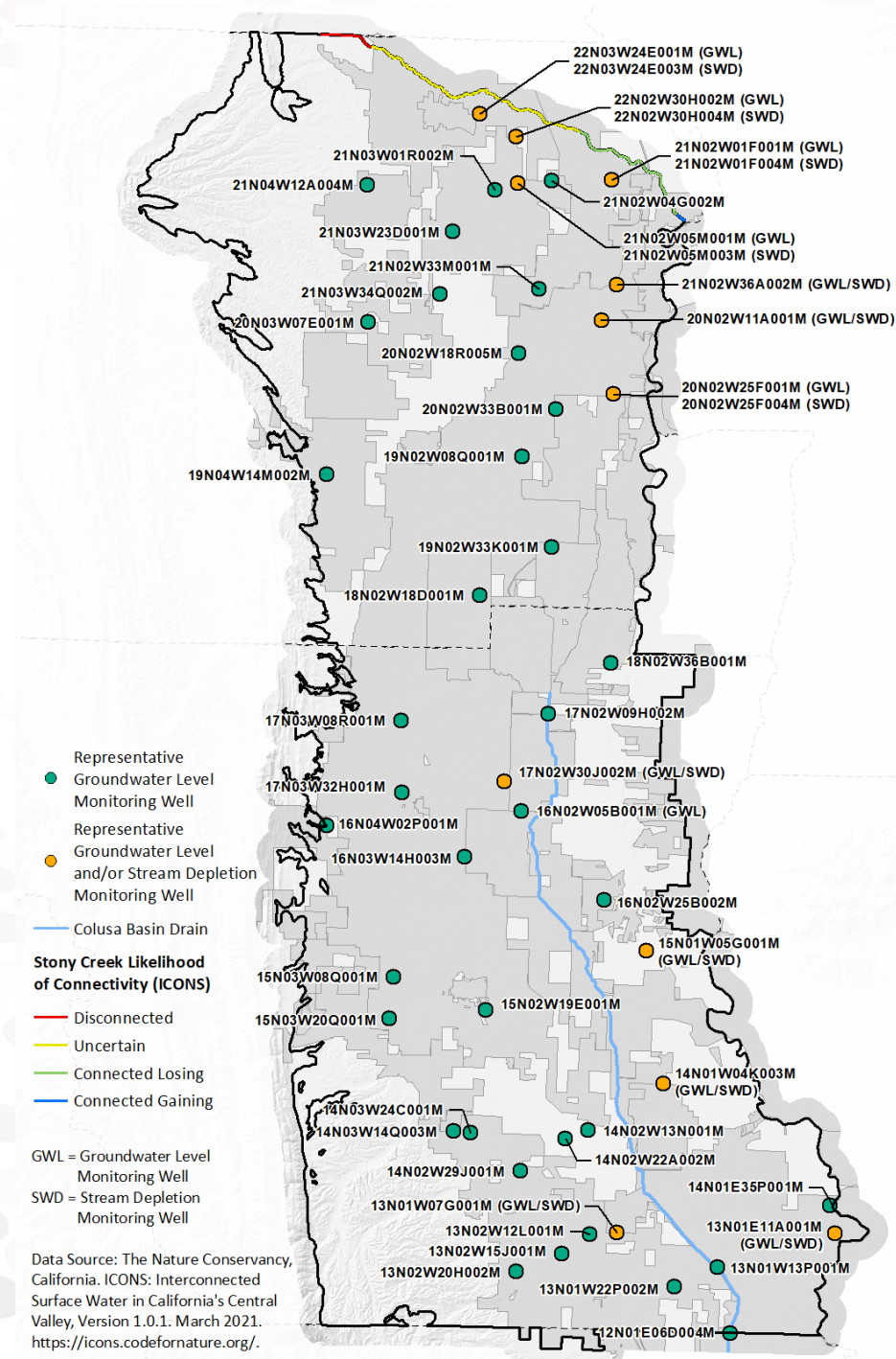
Representative Monitoring Network:

- Wells between 2,000 feet and five miles
- Less than 200 feet deep
- Four wells identified
- Two of the four wells also meet the criteria for the Sacramento River network



Interconnected Surface Water Monitoring Well Network

- Monitoring wells between 2,000 feet and five (5) miles of Interconnected Streams and less than 200 feet deep
- 12 qualifying wells (orange dots)



Technical Team Recommendation for Interconnected Surface Water MOs and MTs

- Measurable Objective: Calculated as the average of the most recent 5 years of available measurements; not a five-year rolling average
 - All data included (no deletions of low water levels due to temporary pumping)
- Minimum Threshold: 10 feet below the observed Fall 2015 groundwater level (depth to water)
- Undesirable Result:
 - 25% (3 of 12 representative monitoring wells) fall below the minimum threshold for 24 consecutive months (same rationale as for lowering of groundwater levels)
- Data gaps and necessary improvements to the network will be documented in the GSP.

Proposed Action

The Joint TAC recommends that the GSA Boards adopt measurable objectives, minimum thresholds, and undesirable results as described on Slide 19 for Sustainability Indicator #6: Depletions of Interconnected Surface Water.

Note: A written “Decision Record” will be prepared following the meeting to document the TACs’ decisions.

Item 4.b. Groundwater Dependent Ecosystems

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SGMA requires consideration of GDEs as beneficial users of groundwater when setting SMCs.

Implemented Actions:

- Potential GDEs identified and mapped using the best publicly available resources.
- Ranked to identify those most likely to be actual GDEs based on depth to groundwater, and proximity to surface water sources and irrigated lands that could rule out groundwater as a required source for potential GDEs.

Planned Actions:

- Evaluate and document potential impacts to GDEs under the adopted SMCs.
- Identify data gaps in the monitoring network and develop projects to fill the data gaps and support the beneficial use of groundwater by GDEs.
- Anticipated to include installation of shallow monitoring wells at priority GDE locations.

Discussion

Item 4.c. Projects and Management Actions (PMAs)

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- 1) PMA submittal deadlines
- 2) Overview of current draft PMA list
- 3) Draft project descriptions
- 4) Demand management economic analysis

Item 4.c. Projects and Management Actions (PMAs): Submittal Deadlines

- June 18 submittal cutoff for July 16 draft Chapter 6
- August 2 submittal cutoff for August 31 draft GSP
- PMAs submitted after cutoff dates will be added to list
 - Must pass technical screening
 - Described in lesser detail
 - Sponsors encouraged to provide as much detail as possible
- Ongoing opportunities during GSP implementation to add PMAs
 - Possible online PMA submittal process (like IRWM process)
 - TAC review/screening
 - GSA Board approval
 - Periodic list updates to incorporate approved PMAs
- Bottom line: the door remains continuously open to PMAs

Item 4.c. Projects and Management Actions (PMAs): Current Draft PMA List

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- There are currently 25 potential PMAs under consideration for the GSP
- A table with over 20 columns has been developed to summarize various aspects of each PMA per GSP regulations
- Table Columns:

PMA Title	Estimated Cost	Anticipated Start Date
Project Type	Potential Funding Sources	Anticipated Completion Date
Project GSP Category	Additional Information	Measurable Objectives Expected to Benefit
Project Proponent	Next Steps	Multi-Benefits Expected
Project Location		Serves Disadvantaged Community
Brief Project Description		Expected Yield
Implementation and Termination Timing/Criteria for Implementation		Benefit Evaluation Methodology
Public and/or Interagency Notice Process		Water Source
Required Permitting and Regulatory Process		Water Source Reliability
Current Status		Legal Authority Required

Item 4.c. Projects and Management Actions (PMAs): Current Draft PMA List (1 of 3) **DRAFT – SUBJECT TO CHANGE**

Project/Management Action	Project Type	Project Proponent	Measurable Objectives Expected to Benefit	Water Source
Orland-Artois Water District Land Annexation and Groundwater Recharge	Direct and In-lieu Groundwater Recharge	OAWD	Groundwater levels and groundwater storage	Sacramento River through annual and multi-year water purchases and transfer agreements for in-lieu recharge, and Section 215 water for direct recharge
Colusa County Water District In-Lieu Groundwater Recharge (i.e. Increased Surface Water Usage)	In-lieu Groundwater Recharge	CCWD	Groundwater levels and groundwater storage	Sacramento River through CCWD's existing CVP contract and annual and multi-year water purchases and transfer agreements
Colusa County Multi-Benefit Groundwater Recharge (TNC)	Direct Groundwater Recharge	Colusa GA and TNC	Groundwater levels and groundwater storage	Sacramento River under a variety of water rights, contracts, and water purchase and transfer agreements
Westside Streams Diversion for Direct or In-lieu Groundwater Recharge	Direct and In-lieu Groundwater Recharge	CGA and GGA	Groundwater levels and groundwater storage	Westside Streams: Willow Creek, Logan Creek, Hunters Creek, Funks Creek, Stone Corral Creek, Salt Creek, and potentially smaller streams
Groundwater Well Monitoring Pilot Program	Management Action	CGA and GGA	Groundwater levels and groundwater storage	N/A
Orland-Artois Water District Direct Groundwater Recharge	Direct Groundwater Recharge	OAWD	Groundwater levels and groundwater storage	Sacramento River Section 215 water
Glenn Colusa Irrigation District In-lieu Groundwater Recharge	In-lieu Groundwater Recharge	GCID	Groundwater levels and groundwater storage	Sacramento River under GCID's contractual rights according to its Sacramento River Water Right Settlement contract and under an appropriative water right for diversion and use of "winter water" from November 1 through March 31 each year

Item 4.c. Projects and Management Actions (PMAs): Current Draft PMA List (2 of 3) **DRAFT – SUBJECT TO CHANGE**

Project/Management Action	Project Type	Project Proponent	Measurable Objectives Expected to Benefit	Water Source
Glenn Colusa Irrigation District Strategic Winter Water Use for Groundwater Recharge and Multiple Benefits	Direct and In-lieu Groundwater Recharge	GCID	Groundwater levels and groundwater storage	Appropriative water right for diversion and use of "winter water" from November 1 through Marh 31 each year
Glenn Colusa Irrigation District Expansion of In-Basin Program for In-lieu Groundwater Recharge	In-lieu Groundwater Recharge	GCID	Groundwater levels and groundwater storage	Sacramento River under GCID's contractual and appropriative rights
Glenn Colusa Irrigation District Water Transfers to TCCA CVP Contractors	In-lieu Groundwater Recharge	GCID	Groundwater levels and groundwater storage	Sacramento River under GCID's contractual rights according to its Sacramento River Water Right Settlement contract
Sites Reservoir	Surface Water Supply Augmentation	Sites Project Authority	Groundwater levels and groundwater storage (to the extent that project yield is dedicated to recharge projects).	Sacramento River under new appropriative water rights
Reduce Non-beneficial Evapotranspiration/Invasive Species Eradication (Arundo, Eucalyptus, Tamarisk, etc.)	Reduce Groundwater Demand	CGA and GGA	Groundwater levels and groundwater storage	N/A
Colusa County Public Water System Water Filtration Plant	In-lieu Groundwater Recharge	Ben King (stakeholder)	Groundwater levels and groundwater storage	Sacramento River under new appropriative water rights
Orland Unit Water Users Association Flood Water Conveyance	Direct Groundwater Recharge	Ouwua	Groundwater levels and groundwater storage	Stony Creek flood releases that cannot be held in Stony Creek reservoirs
Orland Unit Water Users Association Irrigation Moderization for Increased Surface Water Delivery and Reduced Groundwater Pumping	In-lieu Groundwater Recharge	Ouwua	Groundwater levels and groundwater storage	Stony Creek water available to the Ouwua under the Angle Decree
Enhanced Infiltration of Precipitation on Agricultural Lands	Direct Groundwater Recharge	CGA and GGA	Groundwater levels and groundwater storage	Precipitation

Item 4.c. Projects and Management Actions (PMAs): Current Draft PMA List (3 of 3) **DRAFT – SUBJECT TO CHANGE**

Project/Management Action	Project Type	Project Proponent	Measurable Objectives Expected to Benefit	Water Source
Reclamation District 108 and Colusa County Water District Agreement for Five-Year In-Lieu Groundwater Recharge Project	In-lieu Groundwater Recharge	RD108 & CCWD	Groundwater levels and groundwater storage	Sacramento River water available to RD108 through contractual rights under Sacramento River Settlement Contract 14-06-200-876A between RD108 and the Bureau of Reclamation
Colusa Subbasin In-lieu Recharge & Banking Program	In-lieu Groundwater Recharge	South Valley Water Resources Authority	Groundwater levels, groundwater storage, land subsidence, and potentially groundwater quality	To be determined
Westside Offstream Reservoir and In-Lieu Groundwater Recharge	In-lieu Groundwater Recharge	TCCA Contractors	Groundwater levels and groundwater storage	Sacramento River Section 215 water
Sycamore Slough Groundwater Recharge Pilot Project	Direct Groundwater Recharge	Davis Ranches	Groundwater levels and groundwater storage	Sacramento River
Domestic Well Mitigation Program	Management Action	CGA and GGA	Groundwater levels and groundwater storage	N/A
Demand Management (Short-Term)	Management Action	CGA and GGA	Groundwater levels and groundwater storage	N/A
Well Inventory Program	Management Action	CGA and GGA	Groundwater levels and groundwater storage	N/A
Well Registration Program	Management Action	CGA and GGA	Groundwater levels and groundwater storage	N/A
Glenn County Managed Aquifer Recharge	Direct Groundwater Recharge	GGA	Groundwater levels and groundwater storage	Sacramento River under a variety of water rights, contracts, and water purchase and transfer agreements

Item 4.c. Projects and Management Actions (PMAs): Simple Project Descriptions

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- Condensed outline (see right)
- Described based on available information
- Anticipated to be 1-2 pages in length
- Less likely to include maps, tables, figures
- Less likely to include quantified benefits and costs

Simple Project Description Outline

- Overview
- Implementation
- Benefits and Costs

Item 4.c. Projects and Management Actions (PMAs): Detailed Project Descriptions

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- Expanded outline (see right)
- Described based on available information plus limited additional work
- Anticipated to be 3-5 pages in length
- More likely to include maps, tables, figures
- More likely to include quantified benefits and costs (to support economic analysis)

Detailed Project Description Outline

- Overview
- Implementation
 - Schedule
 - Noticing
 - Construction Activities
 - Water Source
 - Implementation Criteria
 - Legal Authority, Permitting, etc.
- Operation and Monitoring
- Benefits and Costs

Discussion

Demand Management Economic Analysis

Demand Management Economic Analysis

- Types of demand management
 - Allocation (pumping limits)
 - Allocation + water market
 - Land repurposing/idling programs
 - Fees/financial incentive programs

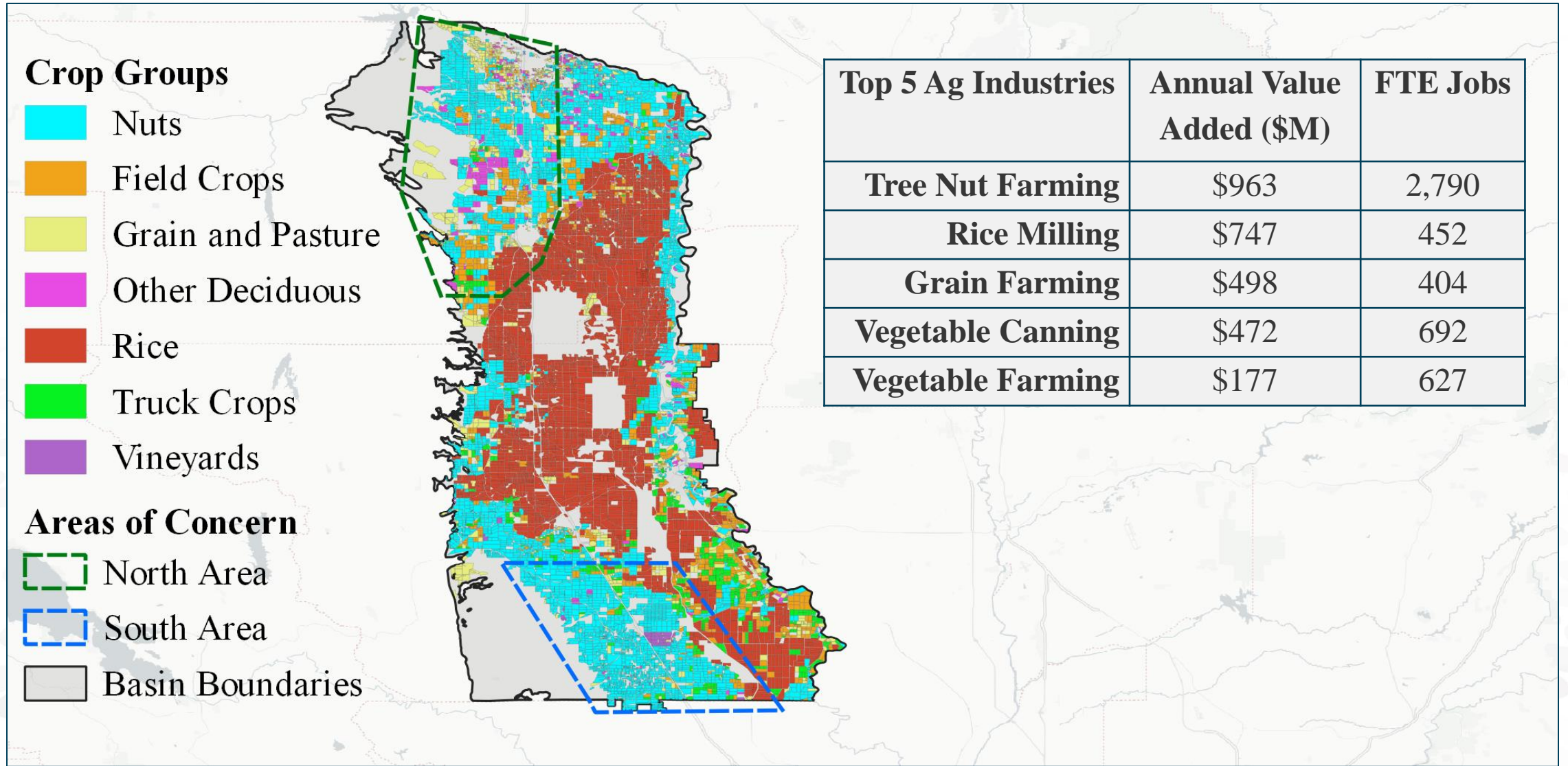
Strategic Demand Management Program

- Potential demand management program
 - Strategic, temporary land idling for drought and localized short-term groundwater management
- Program motivation:
 - Localized areas of concern, especially under drought conditions
 - Potential for future increasing frequency and severity of droughts
 - Program could be easily scaled and turned on/off with little or no new construction

Strategic Demand Management Program

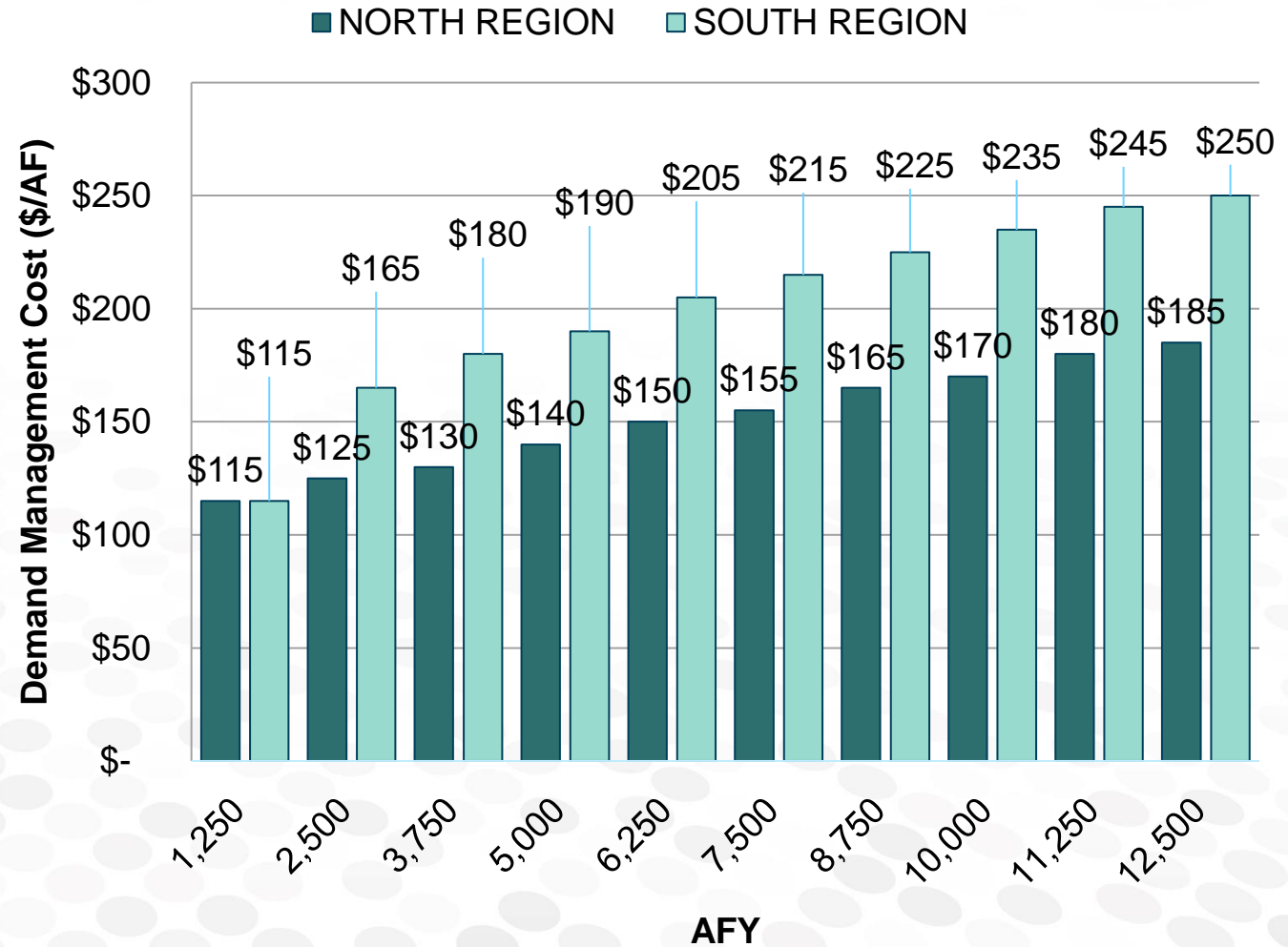
- Program concept:
 - Voluntary program to temporarily idle land and make water available for areas of concern in years of need
 - General program options include:
 1. Groundwater-using lands in drought-affected areas would be idled to alleviate sustainability challenges
 2. Surface water-using lands anywhere in the subbasin would be idled, and the saved water would be used in-lieu of groundwater in area of concern

Colusa Subbasin Demand Management Analysis



Demand Management Cost Example

- Conceptual demand management program that would reduce crop ETAW
 - Costs are for temporary (annual) demand reduction
- The cost of demand management is defined as the loss in net return to farming on lands that are idled



Program Benefits, Costs, and Funding Options

- Program design would consider:
 - Establish program areas
 - Quantify program costs, benefits, and beneficiaries
- Options for program funding include:
 1. Assessment to all subbasin lands for subbasin-wide sustainability benefits
 2. Assessment specific to the specific program areas
 3. Hybrid approach that allocates costs in proportion to benefits received under the program
 4. Potential for grant funding if land idling in specific areas can support other benefits (e.g., habitat or other ecosystem services)

Demand Management Summary

- Targeted program could provide flexibility in future severe drought conditions, other program considerations include:
 - Program incentive structure
 - Program participants, districts, and individuals
 - Evaluate and indirect (secondary) economic effects from temporary idling
 - Funding options
- Broader funding considerations
 - Management costs that apply to the entire subbasin
 - Targeted funding mechanisms that relate to benefits/costs

Discussion

Item 5. Well Monitoring Pilot Program (status report)

Item 5. Well Monitoring Pilot Program (status report)

- 21 applications received, scored, and ranked
- 6 applications selected (3 in each county)
- 5 of 6 well inspections completed in May (all 5 qualify)
- Owner-GSA agreements to be executed
- Monitoring equipment currently being spec'd and costs estimated; each site will have:
 - Flow meter and water level sensor (existing meters on 4 wells)
 - Solar powered data logger with cellular modem
 - Note: possible delivery delays due to COVID-19
- Investigating options for data management and access

Item 6. Topics for Next (June 9) Joint TAC Meeting

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- To be determined

Discussion