

EKI TECHNICAL PRESENTATION #23

COSUMNES SUBBASIN GSP DEVELOPMENT

16 DECEMBER 2020

COSUMNES SUBBASIN WORKING GROUP MEETING

AGENDA ITEM #2

GROUNDWATER SUSTAINABILITY PLAN TECHNICAL WORK AND PLANNING

- 3-month Look Ahead
- Progress on Prop 68 Tasks
- Sustainability Goal and Undesirable Results for Cosumnes Subbasin
- Sustainable Management Criteria (SMCs)
 - Feedback from Surface Water Advisory Group (SWAG) Meeting #3
 - Introduction to Sustainability Goal and Undesirable Results
 - Interconnected Surface Water (ISW)
- Water Budget and Baseline Calculations
- Projects and Management Actions
- Summary of Inter-Basin Coordination

THREE MONTH LOOK AHEAD – 12/16/2020

- Legend**
- Current schedule
 - Deadline
 - Ad-Hoc Meeting



TM 11 “Establishment of Sustainability Criteria”

TM 8 “Water Budget and Estimate of Sustainable Yield”

TM 14 “Proposed Monitoring Network & Protocols”
TM will be finalized after new monitoring wells are installed.

PROP 68 TASKS – METERING (1 OF 7)

- SRCD/OHWD identified aquaculture well volunteer.
- Grant requirement fulfilled but potentially can install up to two more meters.
- **Next Steps –**
 - GSAs coordinate site visit by contractor to assess installation requirements at aquaculture well
 - GSAs share installation design plans (when received from contractor) with well owners and finalize access agreements
 - EKI finalize contract with driller and coordinate with GSAs to install meters.

Meter	GSA	Well Use	Land Use	Meter Status
1	OHWD	Irrigation	Vineyard – irrigated drip	Planned for meter
2	GID	Irrigation	Corn/Alfalfa	Meter in-place
3	SRCD	Irrigation	Ag-Residential	Planned for meter
4	SRCD	Irrigation	Horse Property: Pasture/Water Trough/Arena	Planned for meter
5	Clay WD	Irrigation	Almonds	Meter in-place
6	OHWD	Irrigation	Aquaculture	Planned for meter

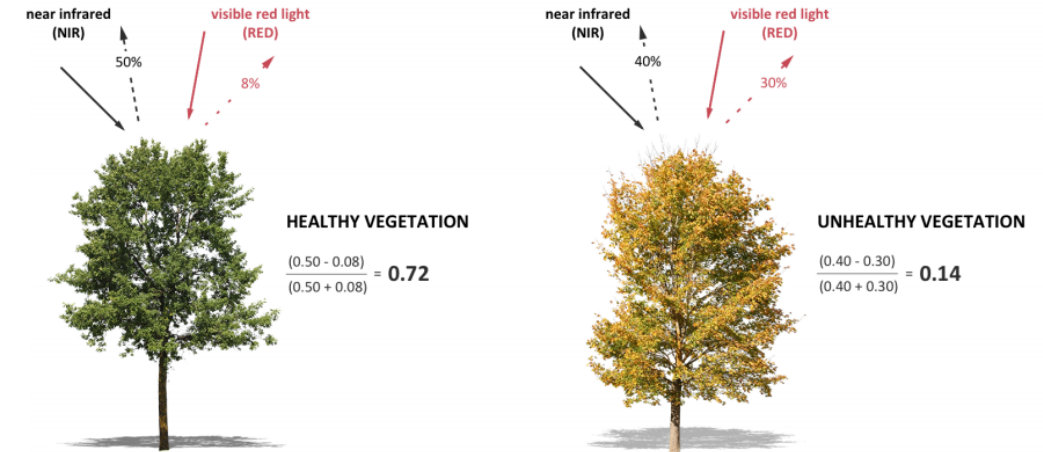
PROP 68 TASKS – GDE VERIFICATION (2 OF 7)

Approach to GDE Pulse analysis

- Download appropriate data
 - GDE Pulse
 - Natural Communities Commonly Associated with Groundwater [NCCAG]
 - Climate data from NWS site (Sac. Executive Airport)
- Combined dataset to assign reported average NDVI (greenness) and average NDMI (wetness) value for each NCCAG polygon
 - NDVI (greenness) represents vigor/growth/photosynthetic rate
 - NDMI (wetness) represents soil moisture
- Values for each NCCAG polygon averaged for the basin
- Annual results plotted with annual average precipitation

Spectral Index	Equation	Source
NDVI	$NDVI = (NIR - red)/(NIR + red)$	(Rouse et al. 1974)
NDMI	$NDMI = (NIR - SWIR)/(NIR + SWIR1)$	(Wilson and Sader 2002)

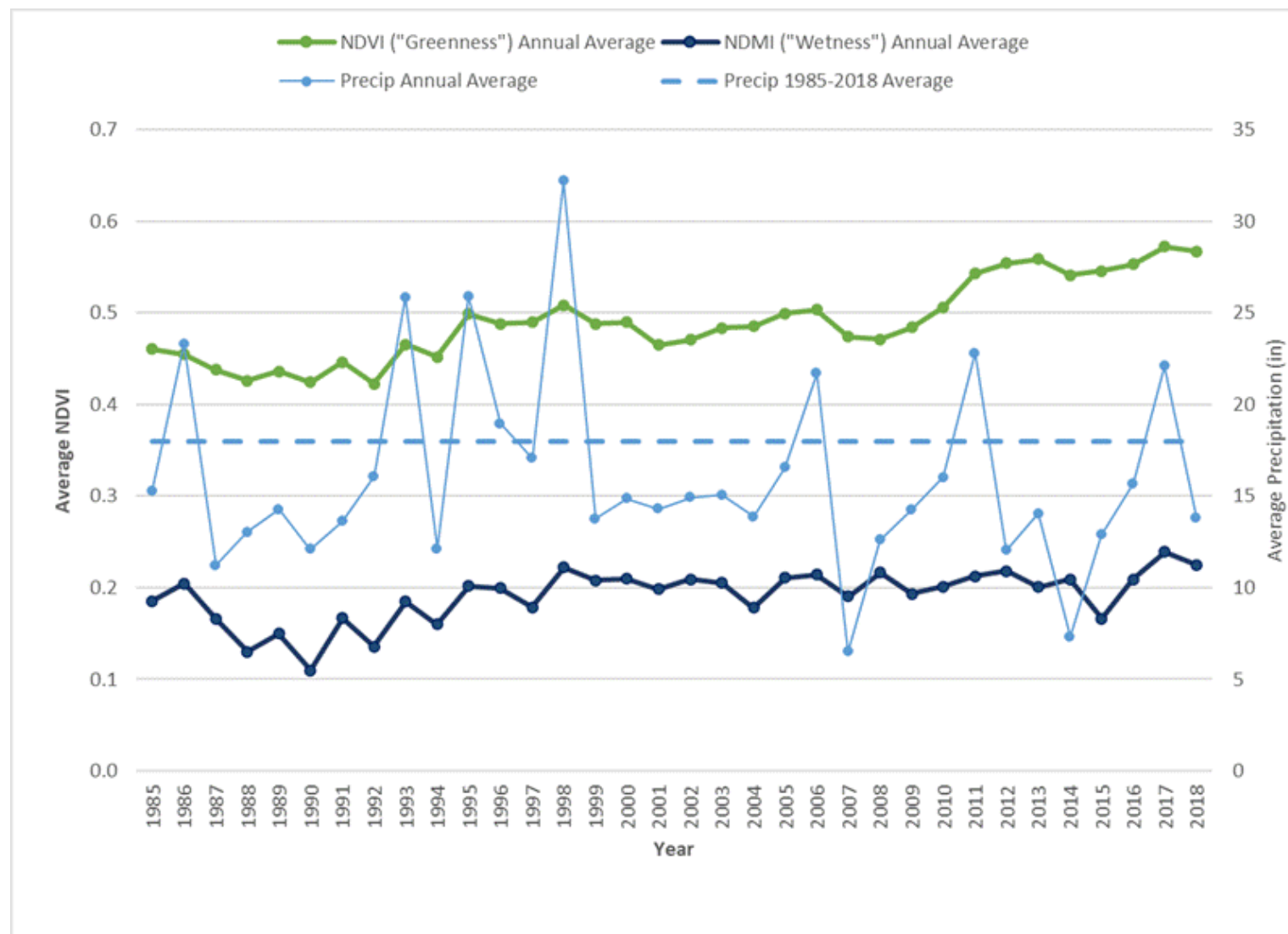
Table 1: Vegetation Metrics in GDE Pulse



PROP 68 TASKS – GDE VERIFICATION (3 OF 7)

Preliminary GDE Pulse analysis results

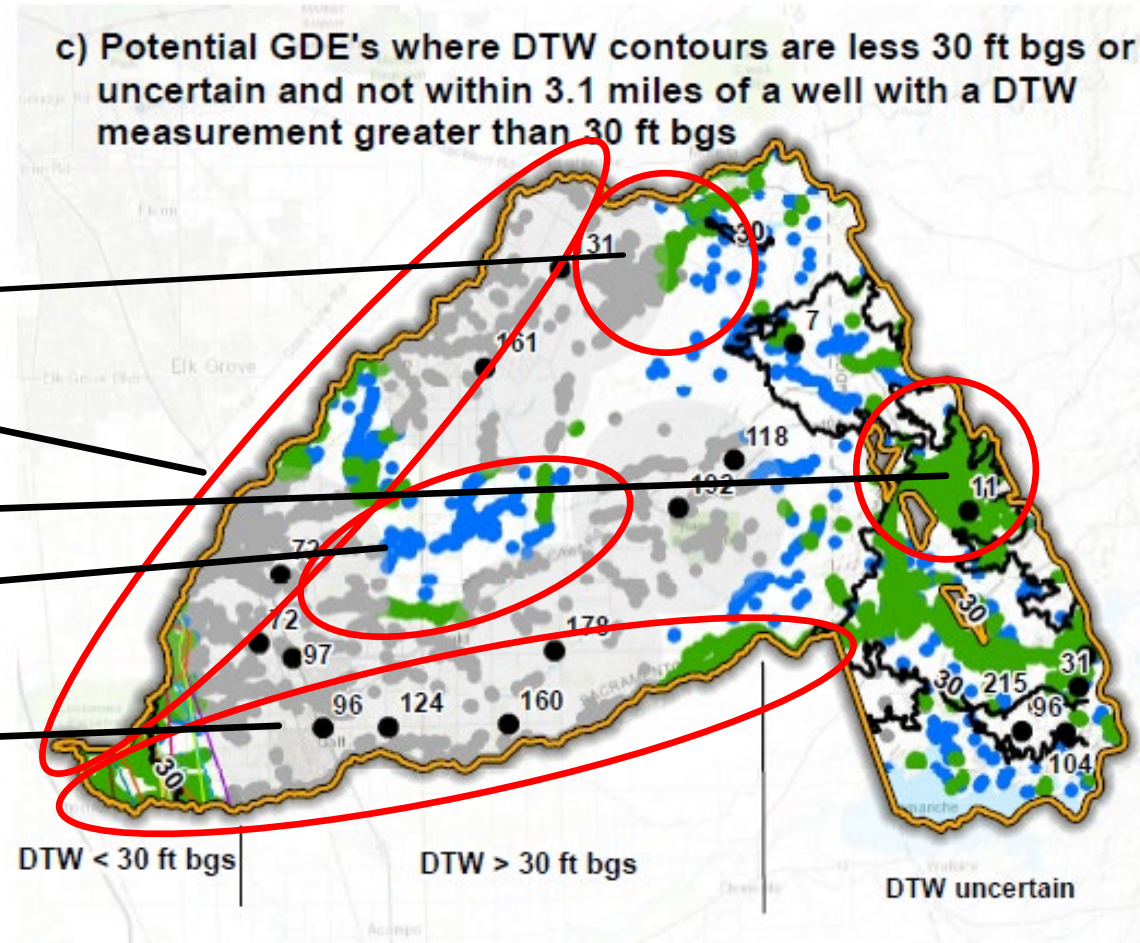
- Average greenness index suggests upward trend
 - Forest maturation?
 - Canopy expansion?
 - Perched groundwater?
- Average wetness index appears to trend with rainfall
 - Wet vs. dry years
 - Variations between community types
- Need for further investigation
 - Field verifications



PROP 68 TASKS – GDE VERIFICATION (4 OF 7)

Preliminary areas of interest for field verification

- Cottonwood
- Cosumnes River Corridor
- Foothills
- Oaks
- Dry Creek Corridor

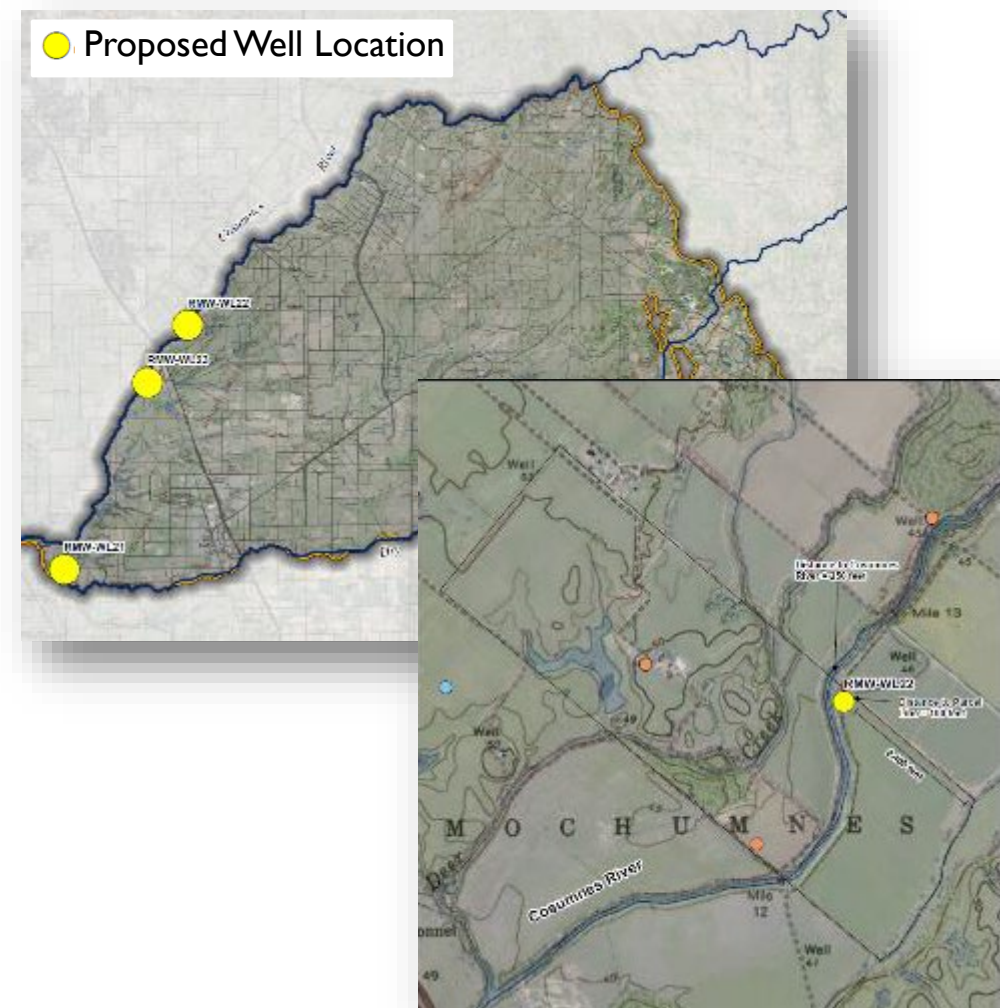


From: Draft Technical Memorandum #6 Hydrogeological Conceptual Model and Groundwater Conditions

PROP 68 TASKS – MONITORING WELLS (5 OF 7)

- Finalizing well locations
- Drafted well location and site maps
- Developed preliminary well designs
- **Next Steps -**
 - Sacramento County (Grantee) contact DWR about proposed site locations with EKI's support
 - Sacramento County (Grantee) to put bid out for well driller
 - EKI finalize well location and well design
 - Conduct CEQA analysis (i.e., finding that it is not required):
 - EKI draft Notice of Exemption, where needed.
 - GSAs signed NOE and get approval by any Board or Directors, as needed.
 - GSAs file signed NOE with County Clerk
 - Sacramento County (Grantee) submit all signed NOEs and receipt of filings to DWR
 - DWR conducts their CEQA analysis

Target installation date: Spring 2021



PROP 68 TASKS – SWAG (6 OF 7)

- Surface Water Advisory Group (SWAG) Meeting #3 was held on December 4th
- Received positive feedback from SWAG members and volunteers to help with gaining access for the GDE field verification study.
- Summarized later under Sustainable Management Criteria for Interconnected Surface Water.

Overview of Project & Management Actions
Under Consideration
SWAG Meeting #3, Dec. 4, 2020

PRESENTATION OUTLINE

- Feedback from SWAG Meeting #2
- Groundwater Dependent Ecosystems (GDEs) Verification Study
- Sustainable Management Criteria (SMCs) Interconnected Surface Water (ISW)
- Historical Basin Water Budget
- Projects and Management Actions

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PROP 68 – SGM IMPLEMENTATION GRANT (7 OF 7)

- \$103M available for two rounds of grant solicitations
 - Round 1: \$26M for critically over drafted basins only (applications due January 2021)
 - Round 2: \$62M for medium and high priority basins
- Grant Amount per Basin: \$2M to \$5M
- Minimum cost share: 25%
- Eligibility:
 - Projects include activities associated with implementation of the adopted GSP and **must be listed within an adopted GSP**
 - Must contain a minimum of three multiple benefits: (1) address a proposition 68 preference; (2) address the sustainability goal within the adopted GSP; and (3) benefit multiple planning documents
- Anticipated solicitation Spring 2022

SUSTAINABILITY GOAL (1 OF 2)

§ 354.24 Sustainability Goal. Each Agency shall establish in its Plan a sustainability goal for the basin that culminates in the absence of undesirable results within 20 years of the applicable statutory deadline.

DWR’s Sustainable Management Criteria Best Management Practices (BMPs) guidelines for developing the Sustainability Goal:

- Qualitatively state the GSA’s objective or mission statement for the basin
 - Summarize the overall purpose for sustainably managing groundwater resources
 - Reflect local economic, social, and environmental values
- Discuss measures that will be implemented
 - Consistent with Projects and Management Actions proposed in the GSP.
 - Affirm that these measures will lead to operations within basin’s sustainable yield.
- Explain how the Goal will be achieved in 20 years.

SUSTAINABILITY GOAL EXAMPLES (2 OF 2)

■ Eastern San Joaquin Subbasin

- *The sustainability goal description for the ESJ Subbasin is to maintain an economically-viable groundwater resources for the beneficial use of the people of the ESJ Subbasin by operating the Subbasin within its sustainable yield or by modification of existing management to address future conditions. This goal will be achieved through the implementation of a mix of supply and demand type projects consistent with the GSP implementation plan.*

■ Yuba Subbasin

- *To maintain a locally managed, economically viable, sustainable groundwater resource for existing and future beneficial use in Yuba County by continuing existing management to maintain operation within the sustainable yield or by modification of existing management to address unforeseen future conditions.*

■ Delta-Mendota Subbasin

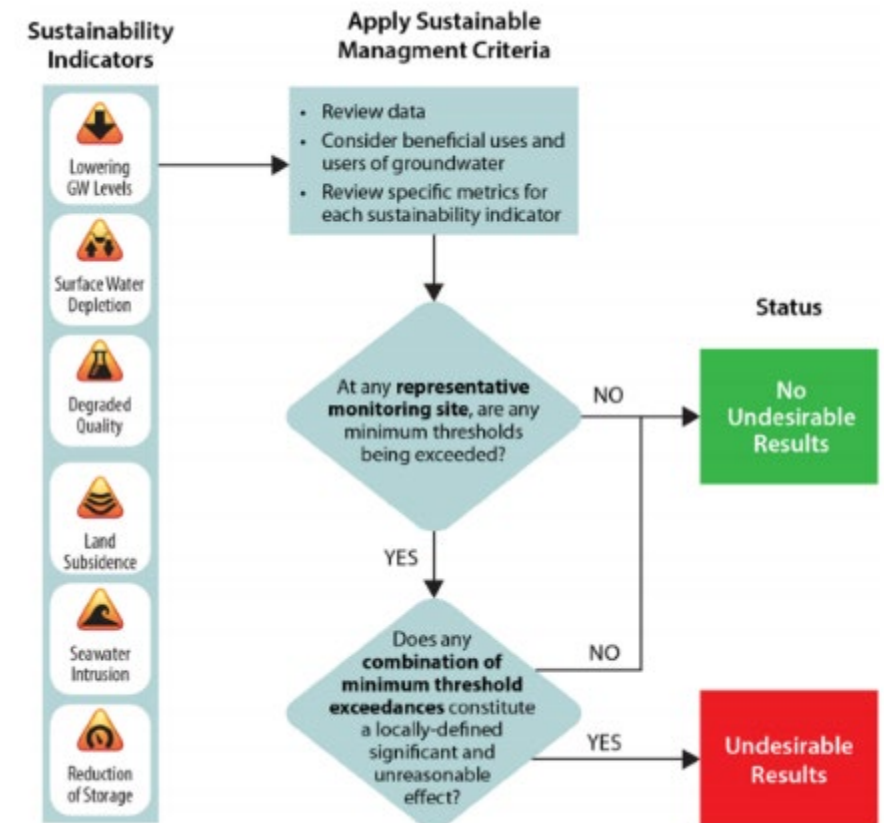
- *The Delta-Mendota Subbasin will manage groundwater resources for the benefit of all users of groundwater in a manner that allows for operational flexibility, ensures resource availability under drought conditions, and does not negatively impact surface water diversion and conveyance and delivery capabilities. This goal will be achieved through the implementation of the proposed projects and management actions to reach identified measurable objectives and milestones through the implementation of the GSP(s), and through continued coordination with neighboring subbasins to ensure the absence of undesirable results by 2040.*

UNDESIRABLE RESULTS (1 OF 4)

§ 354.26. Undesirable Results. (a) Each Agency shall describe in its Plan the processes and criteria relied upon to define undesirable results applicable to the basin. Undesirable results occur when significant and unreasonable effects for any of the sustainability indicators are caused by groundwater conditions occurring throughout the basin.

Guidelines from DWR's Sustainable Management Criteria BMPs on selection and purpose of Undesirable Results (URs)

- Occur when conditions related to any of the six sustainability indicators become significant and unreasonable.
- Defined by MT exceedances and the minimum number of exceedances at a single monitoring site, multiple sites, a portion or subarea of the basin, a management area, or an entire basin.
- DWR utilizes them to determine whether the sustainability goal has been achieved within the basin.



UNDESIRABLE RESULTS EXAMPLES – WATER LEVELS (2 OF 4)

■ Eastern San Joaquin Basin

- Description: *Is experienced if sustained groundwater levels are too low to satisfy beneficial uses within the Subbasin over the planning and implementation horizon of the GSP.*
- Identification: *Occurs when at least 25% of representative monitoring wells used to monitor groundwater levels fall below their minimum level thresholds for two consecutive years that are categorized as non-dry years.*

■ Kern Subbasin – Arvin Edison Management Area

- Description: *The point at which significant and unreasonable impacts over the planning and implementation horizon, as determined by depth/elevation of water, affect the reasonable and beneficial use of, and access to, groundwater by overlying users.*
- Identification: *If Minimum Thresholds are exceeded in 40% or more of the Representative Monitoring Sites over four consecutive seasonal measurements.*

■ North Yuba Subbasin

- Description: *...is a result that would cause significant and unreasonable reduction in the long-term viability of domestic, agricultural, municipal, or environmental uses over the planning and implementation horizon of this GSP.*
- Identification: *...when more than 25% of representative monitoring wells used to monitor groundwater levels fall below their minimum elevation thresholds for two consecutive years at each location.*

UNDESIRABLE RESULTS EXAMPLES – WATER QUALITY (3 OF 4)

■ Eastern San Joaquin Subbasin

- Description: ...is experienced if SGMA-related groundwater management activities cause significant and unreasonable impacts to the long-term viability of domestic, agricultural, municipal, environmental, or other beneficial uses over the planning and implementation horizon of the GSP.
- Identification: ...occurs when more than 25% of representative monitoring wells exceed the minimum thresholds for water quality for two consecutive years and where these concentrations are the result of groundwater management activities.

■ Kern Subbasin – Arvin Edison Management Area

- Description: Water management actions that affect the reasonable and beneficial use of, and access to, groundwater by overlying users.
- Identification: ... if the Minimum Threshold in the representative monitoring well is exceeded for four consecutive seasonal measurements.

■ Santa Cruz Mid-County Subbasin:

- Description: Groundwater quality, attributable to groundwater pumping or managed aquifer recharge, that fails to meet state drinking water standards
- Identification: ... occurs when as a result of groundwater pumping or managed aquifer recharge, any representative monitoring well exceeds any state drinking water standard.

UNDESIRABLE RESULTS EXAMPLES – INTERCONNECTED SURFACE WATER (4 OF 4)

■ Eastern San Joaquin Subbasin

- Description: ...is depletions that result in reductions in flow or levels of major rivers and streams that are hydrologically connected to the basin such that the reduced surface water flow or levels have a significant and unreasonable adverse impact on beneficial uses and users of the surface water within the Subbasin over the planning and implementation horizon of this GSP.
- Identification: Same identification used for undesirable results from chronic lowering of groundwater levels. (Groundwater levels are used as a proxy)

■ Santa Cruz Mid-County Subbasin

- Description: Significant and unreasonable depletion of surface water due to groundwater extraction, in interconnected streams supporting priority species, would be undesirable if there is more depletion than experienced since the start of shallow groundwater level monitoring through 2015.
- Identification: ... any shallow Representative Monitoring Point's groundwater elevation falling below its minimum threshold would be an undesirable result.

■ North Yuba Subbasin

- Description:... is a result that causes significant and unreasonable adverse effects on beneficial uses of interconnected surface water within the Yuba Subbasins over the planning and implementation horizon of the GSP.
- Identification: Same identification used for undesirable results from chronic lowering of groundwater levels. (Groundwater levels are used as a proxy)



SI: DEPLETION OF ISW (1 OF 5)

Surface Water Advisory Group Meeting #3

Summary by CBI

- Topic 1: Responses to SWAG Feedback from SWAG #2
- Topic 2: Groundwater Dependent Ecosystems
- Topic 3: Update on Sustainable Management Criteria for Interconnected Surface Water
- Topic 4: Historical Water Budget Update
- Topic 5: Projects and Management Actions



SI: DEPLETION OF ISW (2 OF 5)

SGMA defined Sustainability Indicator is a rate or volume (or via a proxy).

§ 354.28.(c)(6) Minimum Thresholds: Depletions of Interconnected Surface Water. 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. The minimum threshold established for depletions of interconnected surface water shall be supported by the following:

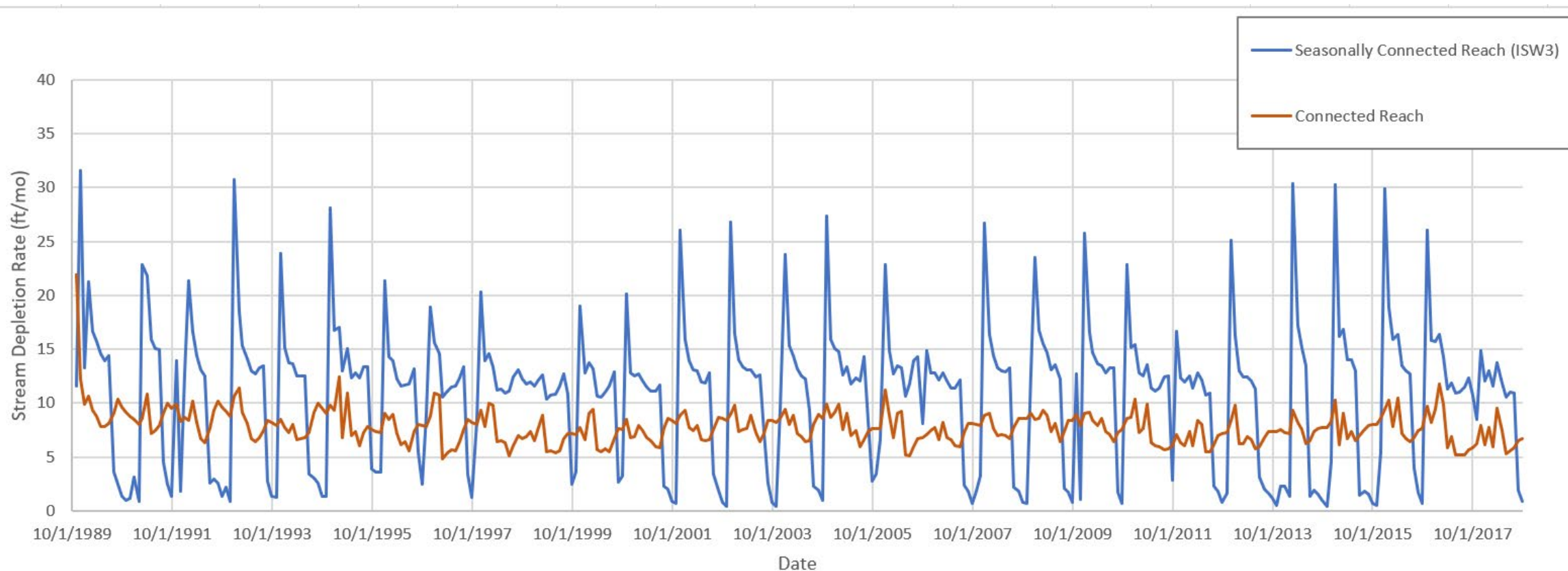
- (A) The location, quantity, and timing of depletions of interconnected surface water.
- (B) A description of the groundwater and surface water model used to quantify surface water depletion.



SI: DEPLETION OF ISW (3 OF 5)

Timing and magnitude of CoSANA-calculated depletions

- Upper seasonally connected reach – depletions “flashy” and dependent on river flow (~30,000 AFY)
- Lower connected reach – depletions relatively stable and influenced by groundwater levels (~11,000 AFY)

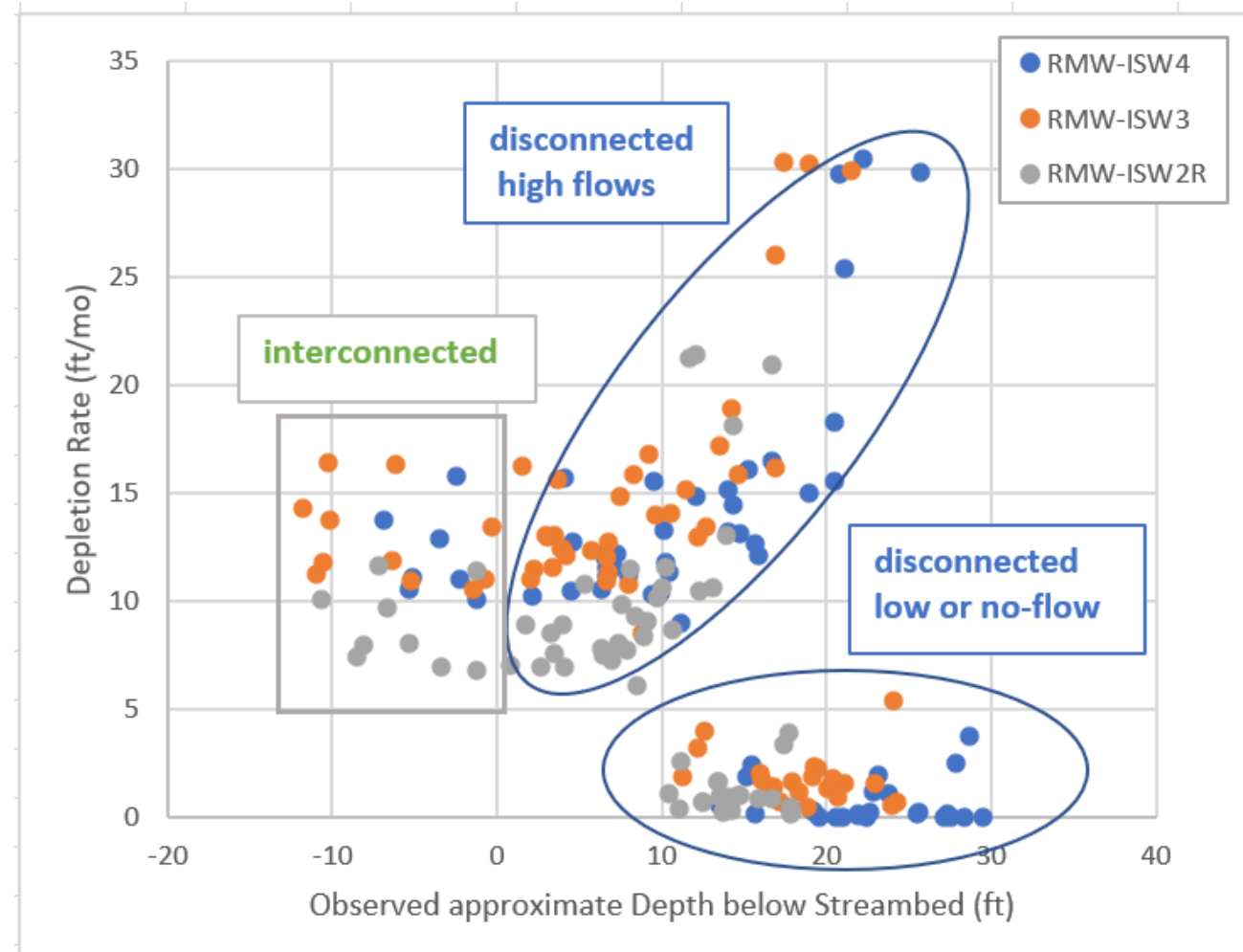




SI: DEPLETION OF ISW (4 OF 5)

Relationship between measured groundwater levels and model-calculated depletions

- Examined 3 wells in seasonally connected reach.
- Greatest depletions occur during high river flows and disconnected conditions.
- Smallest depletions occur during low- to no river flows and disconnected conditions.
- No correlation between observed groundwater levels and model-calculated depletions during connected conditions.

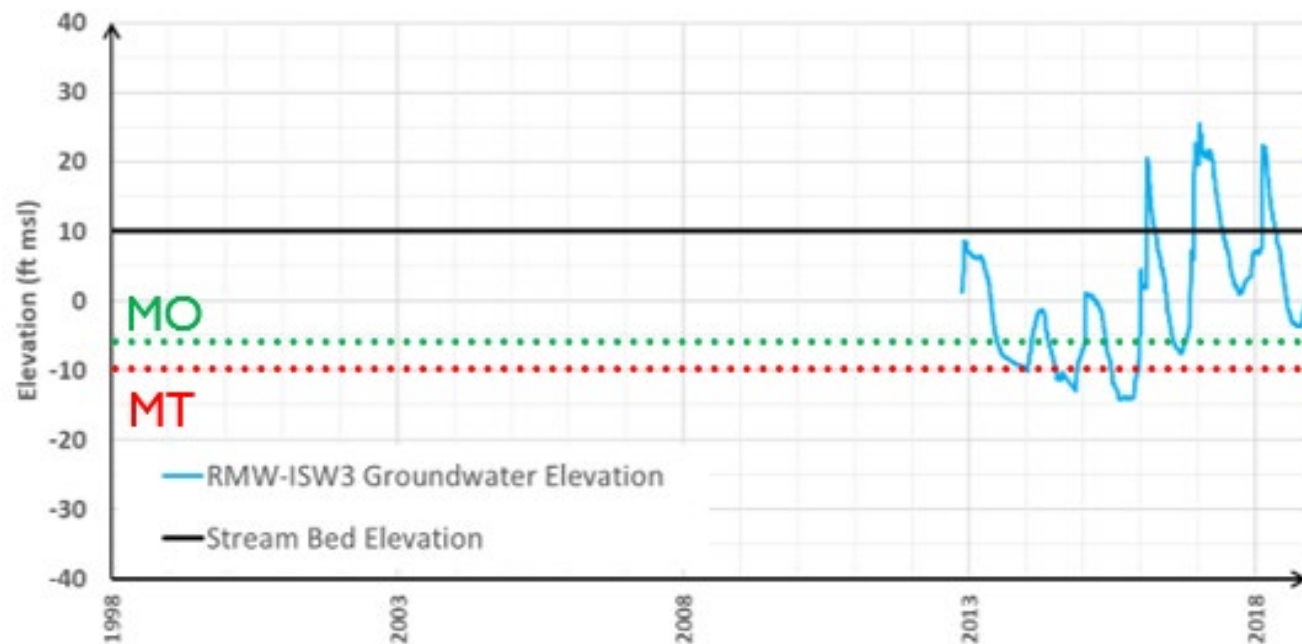




SI: DEPLETION OF ISW (5 OF 5)

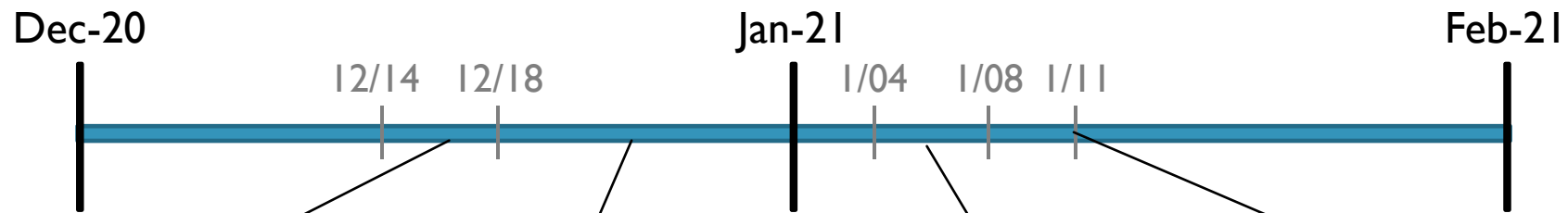
No changes in recommended approach for ISW SI's

- Utilize groundwater levels as proxy.
- MT and MO based on historical measured seasonal and longer-term trends through 2015.
- Groundwater levels are protective of beneficial surface water users.
 - Timing and extent of interconnected conditions
 - Can consider rooting depths of identified GDEs
- Coordinate final approach with South American Subbasin.



WATER BUDGET AND BASELINE CALCULATIONS

Baseline results are the conditions from which all other runs are compared (e.g., P/MAs)



12/14-12/18: CoSANA baseline models for NASb and SASb delivered to EKI

12/18-12/31: EKI incorporate Current Conditions and projected Future Conditions for Cosumnes Subbasin into respective CoSANA baselines

1/04-1/08: EKI run and analyze baselines.

1/11: EKI adds P/MAs to baselines and evaluate effectiveness for reaching Sustainability Goal.

P/MAS AND MODEL IMPLEMENTATION (1 OF 2)

Title	Description	Storage Benefit (AFY)	Model Implementation	Timing	Comments
Groundwater Recharge Project	Flood dormant vineyards with stormwater from Cosumnes River	2,000	500 AF/mo of recharge during Dec-Mar	2021-2031	What is the rule set that determines magnitude and timing of diversions?
Fallowing Plan	Fallow ~2,500 acres/yr to achieve net reduction in extraction	6,700	6,700 AF annual reduction of agricultural extractions	2024-2072	Geographic extent? Specific crop types?
FSC Recharge from Sacramento River	Flood 2,000 acres of farmland along FSC near Twin Cities Road with Sacramento River water	4,000	1,000 AF/mo recharge during Dec-Mar	2024-2027	
Groundwater Banking	4,000 AFY extracted from basin for dry-year augmentation	n/a	800 AF/mo dry-year extractions during June-Oct.	2024-2027	Limit extractions equal or less than cumulative recharge?
Cosumnes River Flow Augmentation	Prewet disconnected reaches of the Cosumnes River with 1,500 AFY CVP water (or other source)	600	~1,700 AF/mo released to Cosumnes River from an existing turnout of the FSC during Oct-Dec	2024-2072	
FSC Ag recharge from American River	Flood 2,000 acres of farmland along FSC near Twin Cities Road with American River water	12,000	3,000 AF/mo recharge during Dec-Mar	2027-2072	

P/MAS AND MODEL IMPLEMENTATION (2 OF 2)

Title	Description	Storage Benefit (AFY)	Model Implementation	Timing	Comments
FSC Dry Wells	Infiltrate American River water in 50 vadose zone wells located along FSC from Cosumnes River to Clay Station Road	4,000	~7 AF/mo annual infiltration	2027-2072	
Groundwater Banking	6,000 AFY extracted from basin for dry-year augmentation	n/a	1,200 AF/mo extracted during June-Oct.	2027-2072	Limit extractions equal or less than cumulative recharge?
City of Galt WWTP reuse	Using treated wastewater for winter flooding of cropland	1,200	300 AF/mo of recharge during Dec-Mar	2027-2072	Location of cropland?
City of Galt Recycled Water Recharge	Redirection of recycled water to Badger Creek	TBD	TBD	xxxx-2072	?
City of Galt Stormwater capture and LID/Dry Wells	Implement LID practices to redirect stormwater runoff for recharge	TBD	TBD	xxxx-2072	?
Other P/MAs (to be determined)	Recharge from Cosumnes, recharge net metering on farmlands, use of ponds, recharge basins, and/or dry wells.	4,000	TBD	2027-2072	?

SUMMARY OF INTER-BASIN COORDINATION (1 OF 2)

- Eastern San Joaquin (ESJ) Subbasin
 - Regular attendance at ESJ Groundwater Authority (ESJGWA) Steering Committee and Board meetings
 - Attendance at the first Technical Advisory Committee (TAC) meeting and plans to attend future meetings
 - Performed constructive review and feedback on the Draft ESJ Subbasin GSP and met with ESJ Subbasin representatives to discuss the modeling and water budget results
 - Attendance at some Northern San Joaquin Water Conservation District (NSJWCD) meetings
 - South American (SA) Subbasin
 - Regular attendance at SA Sacramento Central Groundwater Authority (SCGA) Board, Budget Subcommittee, and Work Group meetings, and all public meetings
 - Attendance at Northern Delta GSA (NDGSA) Board meetings and reclamation district's in the Delta, as requested
 - Modeling coordination (CoSANA)
 - Isotope study coordination and sampling planning with SA technical team
 - Monitoring well installation coordination and planning
- SA Subbasin representatives have attended SWAG meetings

SUMMARY OF INTER-BASIN COORDINATION (2 OF 2)

■ Additional coordination

- Regular attendance at OHWD, SRCD and South Sacramento County Agricultural Water Authority (SSCAWA) Board meetings
- Coordination with Regional San about including the Harvest Water Program as a project in the Cosumnes and SA Subbasins
- Coordination with Sacramento Area Flood Control Agency (SAFCA), East Bay Municipal Utility District (EBMUD) and Sacramento Municipal Utility District (SMUD) about potential projects and management actions.
- Field work planning and coordination with landowners

NEXT STEPS

- Voluntary meter program
 - GSAs coordinate contractor site visit to inspect aquaculture well
 - EKI/GSAs schedule and coordinate meter installations
 - GSAs Implement plans for meter reading and reporting
- Install new monitoring wells
 - Sacramento County submit preliminary plans to DWR
 - EKI finalize well location, access, design, and help with CEQA analysis
 - Sacramento County put out bid for well driller
- GSAs compile access agreements
- GSAs initiate 2021 monitoring program implementation
- Plan Area – Working Group review scheduled for end of January