Ukiah Valley Basin Groundwater Sustainability Agency Technical Advisory Committee Meeting

Ukiah Valley Groundwater Sustainability Plan Development Update

January 9, 2020

LARRY WALKER ASSOCIATES
GEI Consultants
WATER MANAGEMENT LAB
SCIConsultingGroup

Outline

- TAC Meeting Schedule
- State of GSP Prior to This Meeting
- Review and Commenting Process
- Water Budget Discussion
  - Hydrological Model (PRMS)
  - Root Zone Water Budget (IDC)
  - Groundwater Model (MODFLOW)
  - Integration (GSFLOW)
- Preliminary Discussion on Sustainable Management Criteria

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Technical Advisory Committee Recommendations on the Hydrogeological Conceptual Model (HCM)

Preliminary TAC Meeting Schedule

- January 2020: Water budget, Introduction to Sustainable Management Criteria (SMC)
- March 2020: Goal of the plan, SMC: water quality
- May 2020: Review Water Quality SMC, start subsidence
- July 2020: Review Subsidence SMC, start SW/GW interactions
- September 2020: SW/GW interactions
- November 2020: SW/GW interactions
- January 2021: TBD

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State of GSP Prior to this Meeting

- First phase of DMS is conducted and ready to be delivered.
- Draft HCM was presented to the TAC for commenting and review.
- Preliminary results of the integrated hydrogeological model was presented for separate modeling parts: PRMS, IDC, MODFLOW.
- Overview of TSS was discussed and next steps need to be taken.

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Review and Commenting Process

- Given the large number of reviewers, accommodating track changes or other editing options within the original draft sections distributed to all members can be challenging.
- Reviewer forms are distributed. Instructions were provided in the first page of the form and examples are written in the form. In summary, including the following would be increasingly helpful:
  - For suggested text changes, please copy and paste the text you wish to change and place your suggested edits in track changes or strikethrough features in this document.
  - Please note the line number

Review and Commenting Process

A GSP has five chapters:

1. Introduction 
2. Plan Area and Basin Setting 
3. Sustainable Management Criteria 
4. Projects and Management Actions 
5. Plan Implementation 

Review and Commenting Process

2.1. Description of Plan Area

2.1.1. Summary of Jurisdictional Areas and Other Features

2.1.2. Water Resources Monitoring and Management Programs

2.1.3. Land Use Elements or Topic Categories of Applicable General Plans

2.1.4. Additional GSP Elements

2.1.5. Notice and Communication

Information Needed for Ch 2 Section 2.1

2.1. Description of Plan Area

2.1.1. Summary of Jurisdictional Areas and Other Features

- General information about the Russian River Watershed and PVP

2.1.2. Water Resources Monitoring and Management Programs

- Check monitoring entities and see if we should add or remove any programs listed
- Provide additional information, if available, for programs that are highlighted as needing feedback

Information Needed for Ch 2 Section 2.1

2.1. Description of Plan Area

2.1.2. Water Resources Monitoring and Management Programs

- Additional information regarding TMDLs would be helpful

2.1.3. Land Use Elements or Topic Categories of Applicable General Plans

- We need information regarding the County's zoning plan
- Any other relevant plans other than the General Plan and UVAP that should be included and is missing.

Information Needed for Ch 2 Section 2.1

2.1. Description of Plan Area

2.1.4. Additional GSP Elements

Anything to include in or add to the following sections :

- Migration of contaminated groundwater
- Groundwater cleanup sites Relationships with State and federal regulatory agencies.
- Impacts on groundwater dependent ecosystems

Example for reviewer form

Reviewer name:
Submission date:
GSP sections reviewed:

Line number	Suggested revision (*please delete example text below once you submit*)
69	Example: In the acknowledgements section, please add XXX as a partner
131	Example: Can you provide source of information, footnote or otherwise?
220	Example of how to make edits to original document text: In 2014, the State of California enacted the Sustainable Groundwater Management Act, which includes requirements that must be addressed in the Scott Valley Basin, as this area is considered a medium priority groundwater basin.

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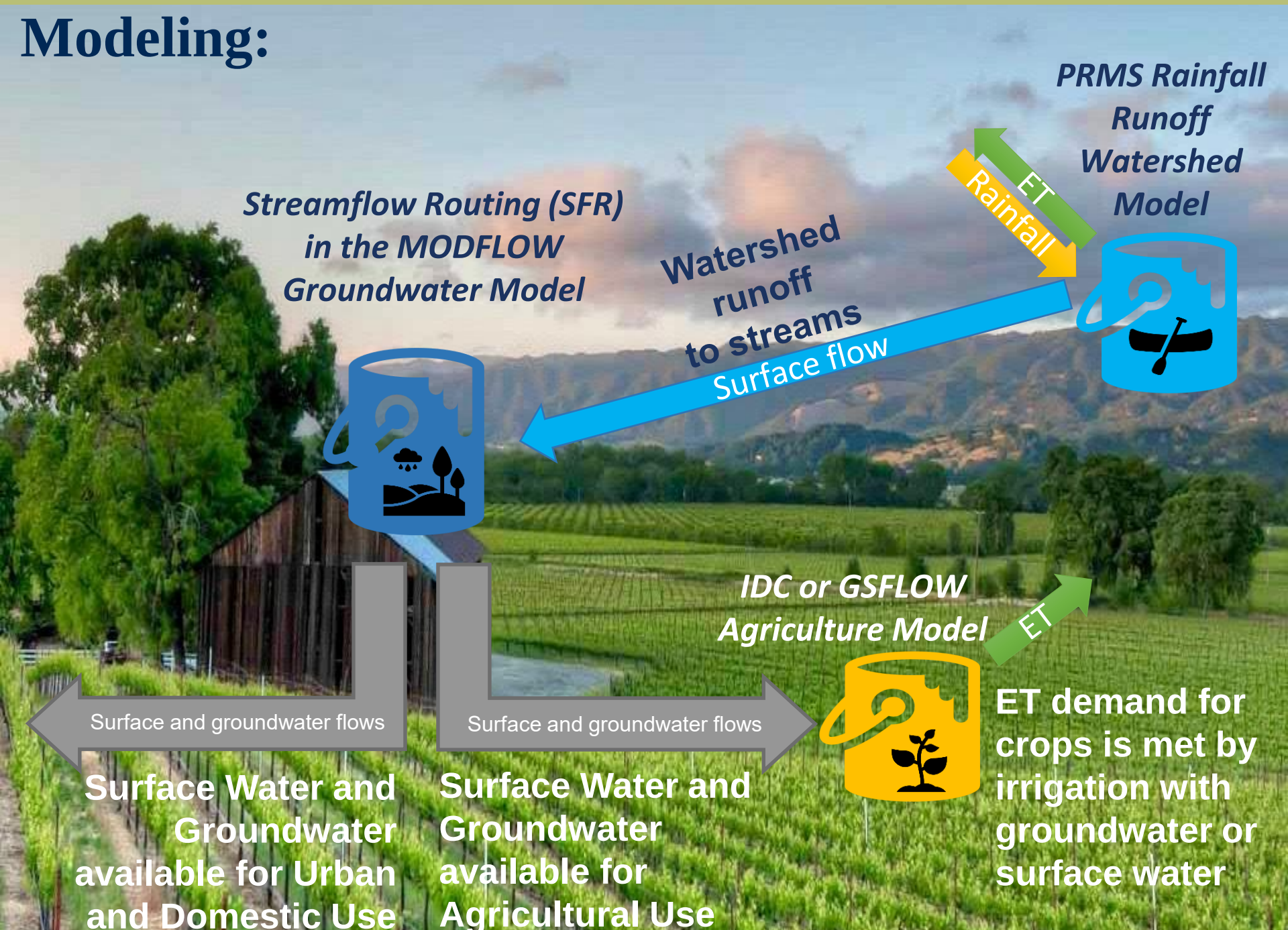
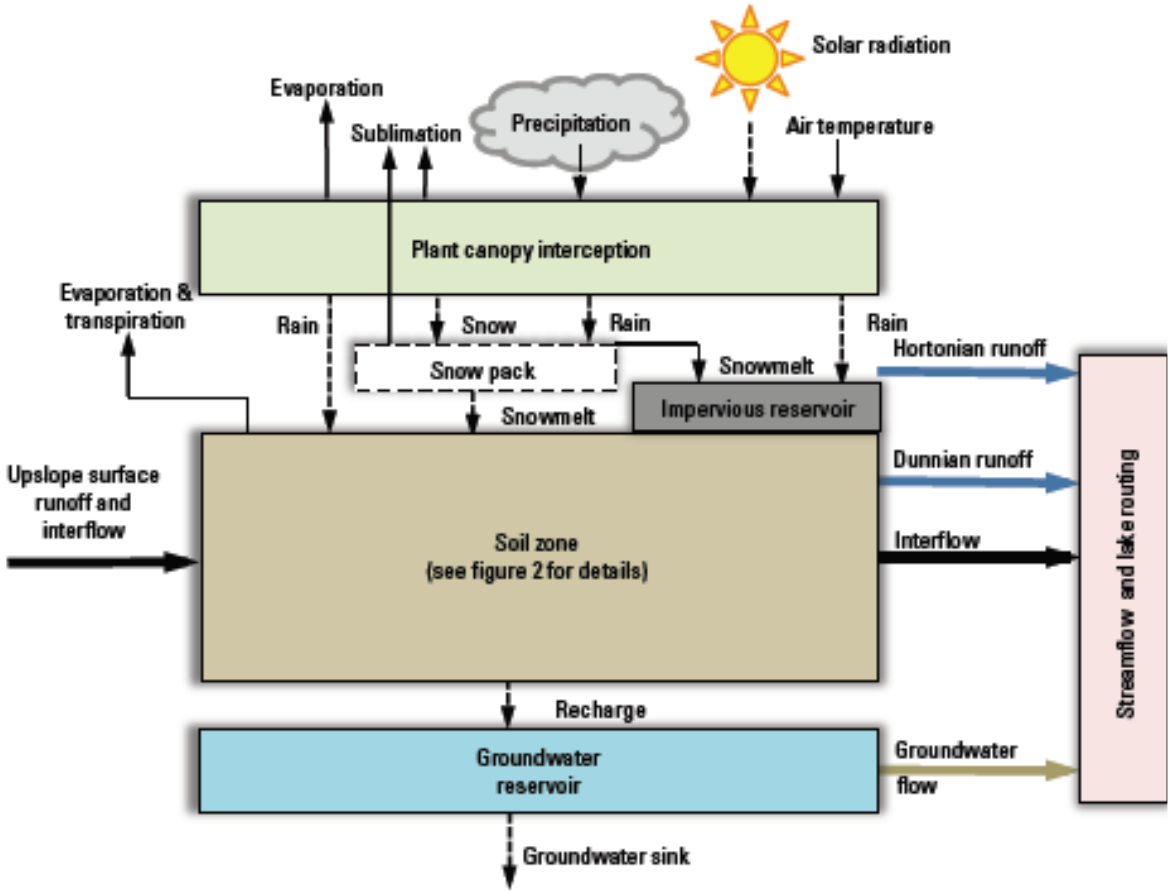
Modeling:


PRMS Rainfall Runoff Watershed Model
ET
Rainfall
Streamflow Routing (SFR) in the MODFLOW Groundwater Model
Watershed runoff to streams
Surface flow
IDC or GSFLOW Agriculture Model
ET
Surface and groundwater flows
Surface and groundwater flows
Surface Water and Groundwater available for Urban and Domestic Use
Surface Water and Groundwater available for Agricultural Use
ET demand for crops is met by irrigation with groundwater or surface water

PRMS:


Solar radiation
Evaporation
Sublimation
Precipitation
Air temperature
Plant canopy interception
Evaporation & transpiration
Rain
Snow
Rain
Rain
Hortonian runoff
Snow pack
Snowmelt
Snowmelt
Impervious reservoir
Upslope surface runoff and interflow
Soil zone
(see figure 2 for details)
Dunnian runoff
Interflow
Streamflow and lake routing
Recharge
Groundwater reservoir
Groundwater flow
Groundwater sink

PRMS: State of the Model

- PRMS is setup and initial calibration is complete.
- Undergoing additional refinement to address TAC and Board comments on ag. demands and frost protection.
- PRMS currently simulates natural hydrology, but will include SW diversions and ag. demand with GSFLOW Ag Package … awaiting release from USGS.
- Reservoir operation (Coyote Dam and PVP) will be added to the model for future projections within GSFLOW … will be developed in coordination with Sonoma Water.

PRMS: Assumptions and Data Gaps

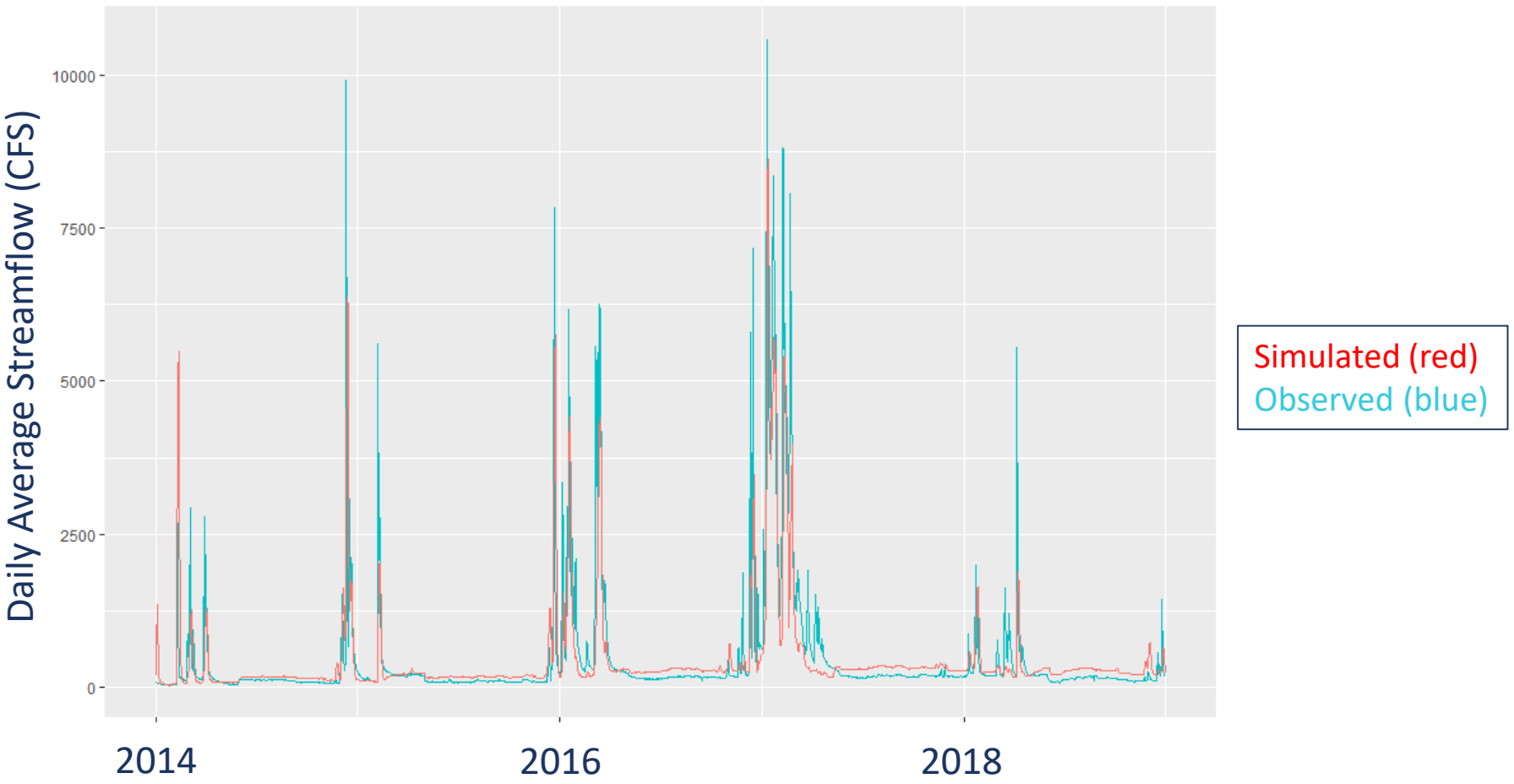
- All simulations are limited by data provided privately through members or from publicly-available sources … We can always benefit from more/improved data.
- Current simulations assume constant land use (2010 Land Use Map) for 1991–2018 … Next model version may change land use with time.
- USGS stream gage data from PVP and Lake Mendocino sufficient to simulate historical reservoir releases … future releases will be simulated dynamically for future projections.
- In general, uncertainty from gage and station measurements (streamflow and climate) is considered inherited … Manual adjustments of these data have been avoided.

PRMS: Assumptions and Data Gaps

- Physical soil properties are derived from the SSURGO database. Uncertainties related to soil properties considered inherited … manual adjustments have been avoided.
- No water is imported into the model from outside the Russian River Watershed, except for imports from PVP.
- Streamflow network developed in coordination with the TAC … assumed to be of sufficient detail.
- Simulation results are bound by physical limitations of and assumptions of PRMS.
- Simulation results are constrained by spatial and temporal discretization: 100mX100m cells, daily time step.

PRMS: Preliminary Results

Uncalibrated Simulated vs. Observed Flows at the Hopland Gage (PRMS)



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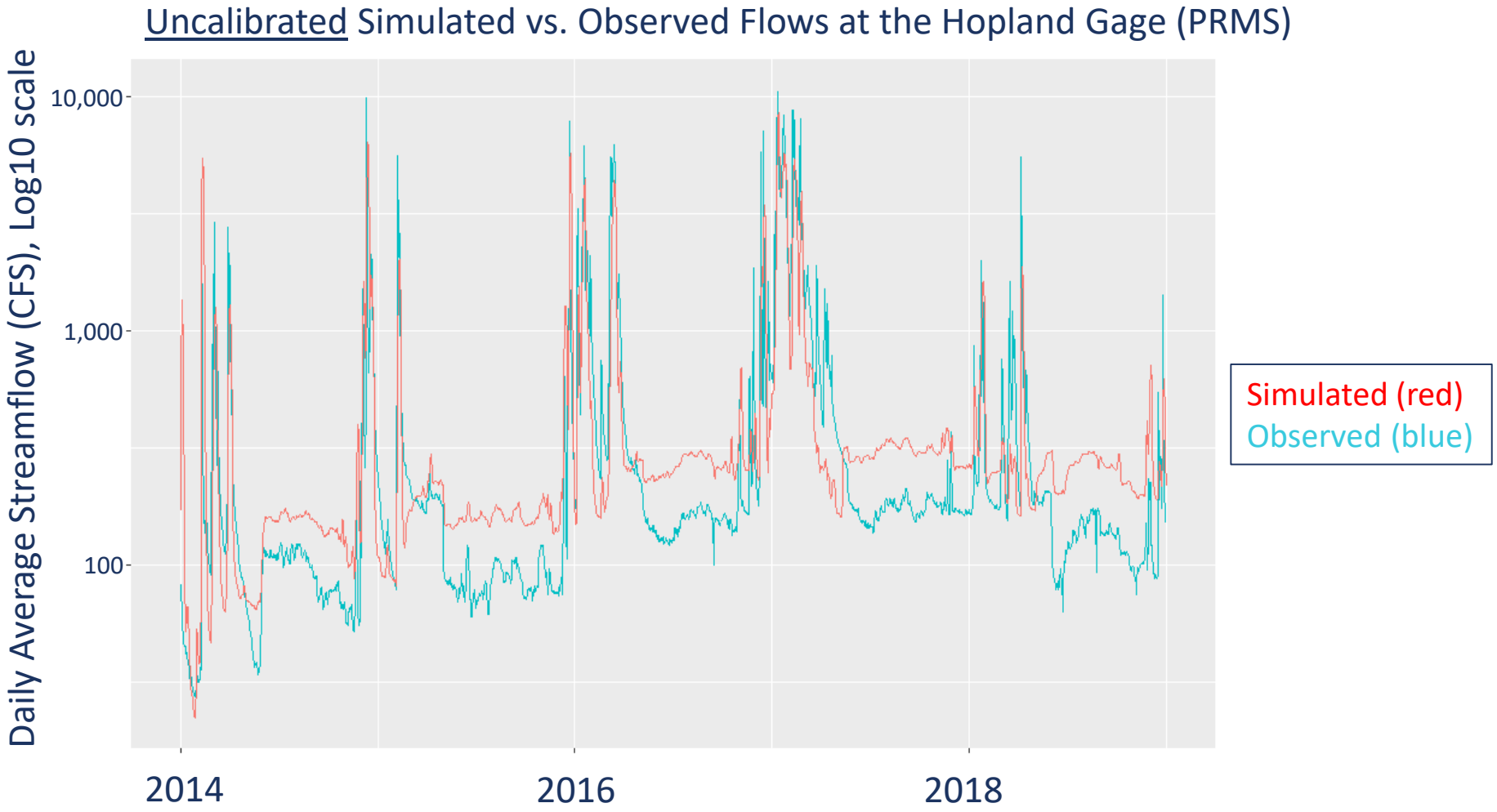

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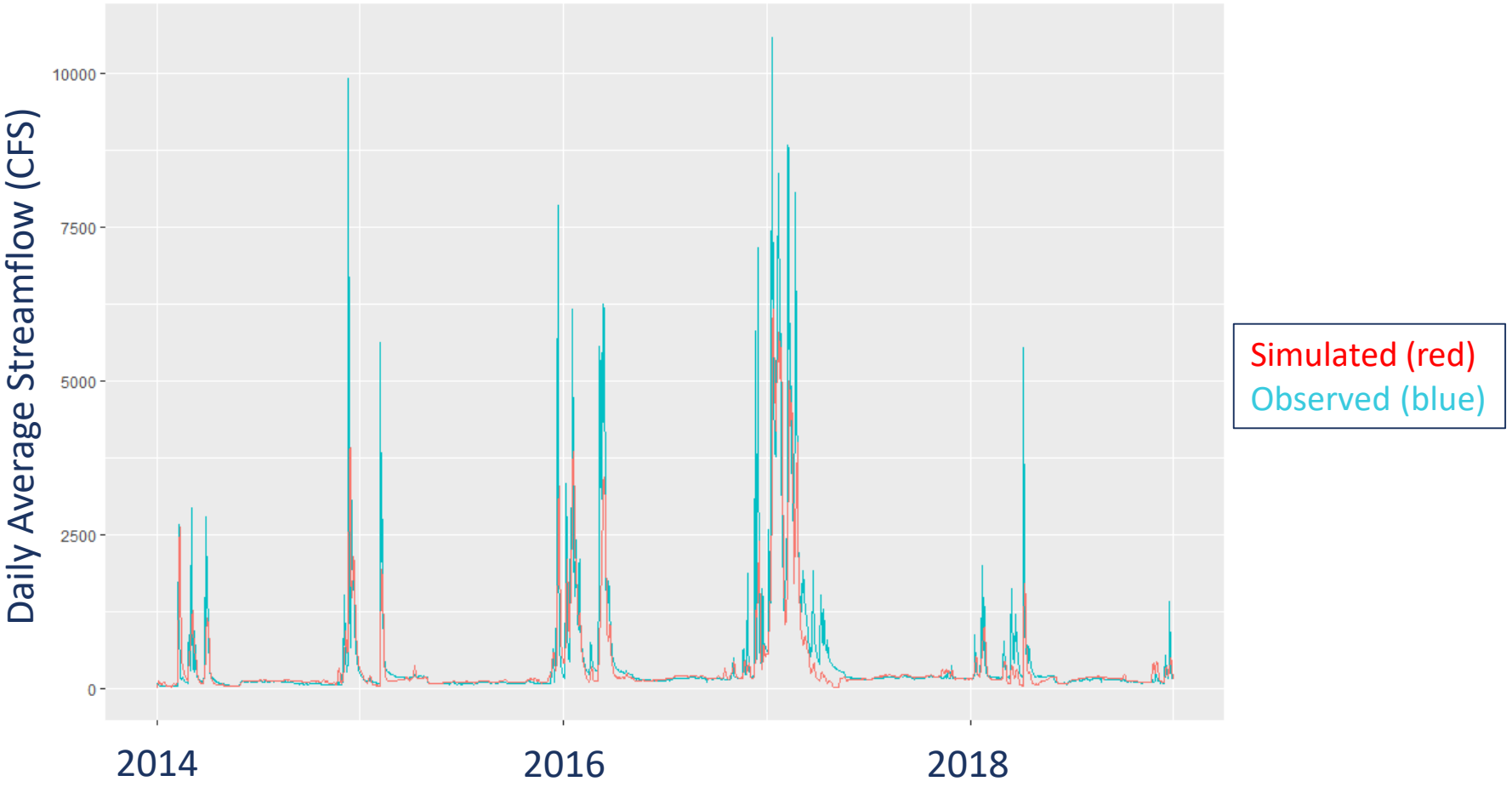

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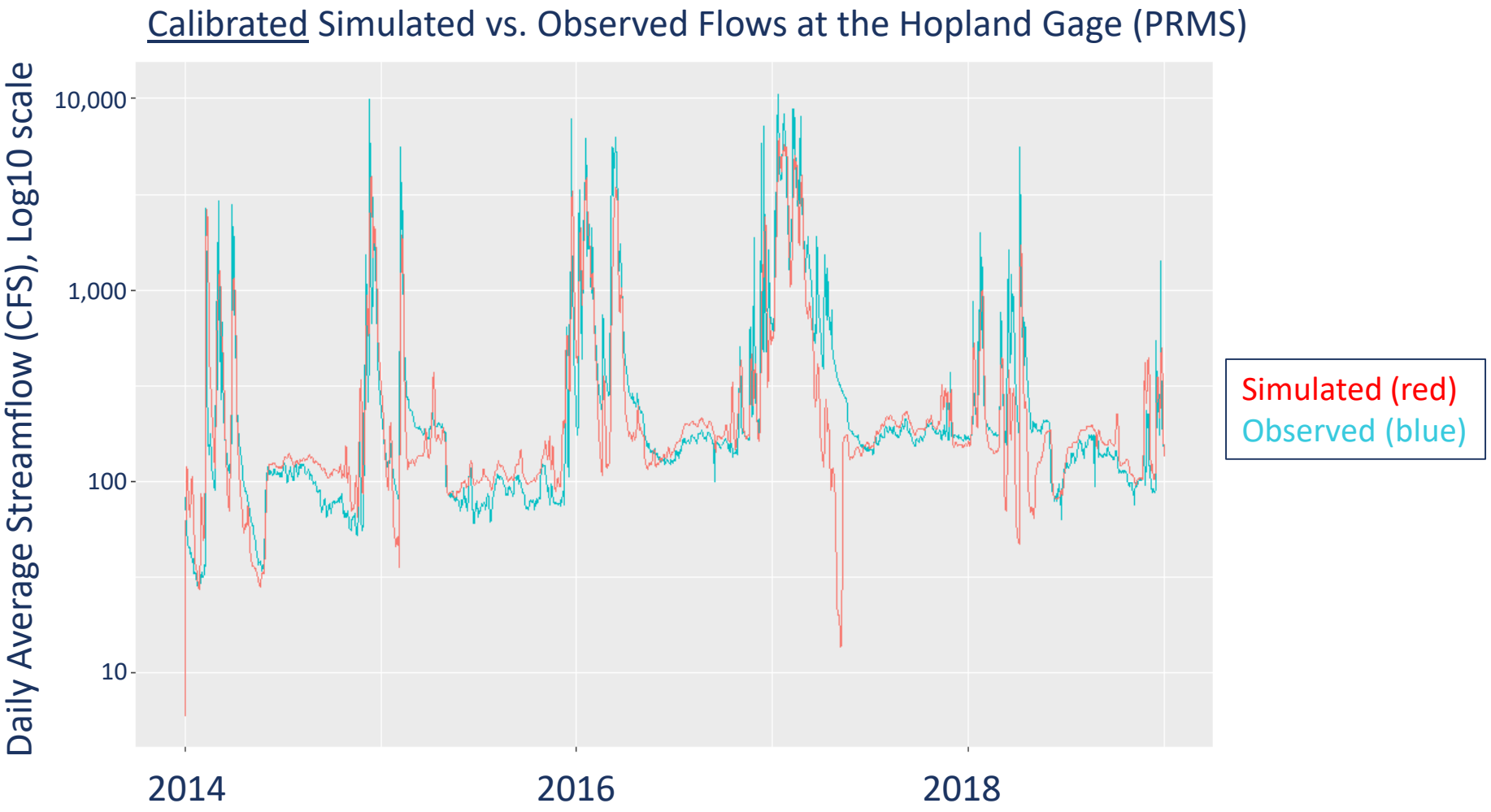


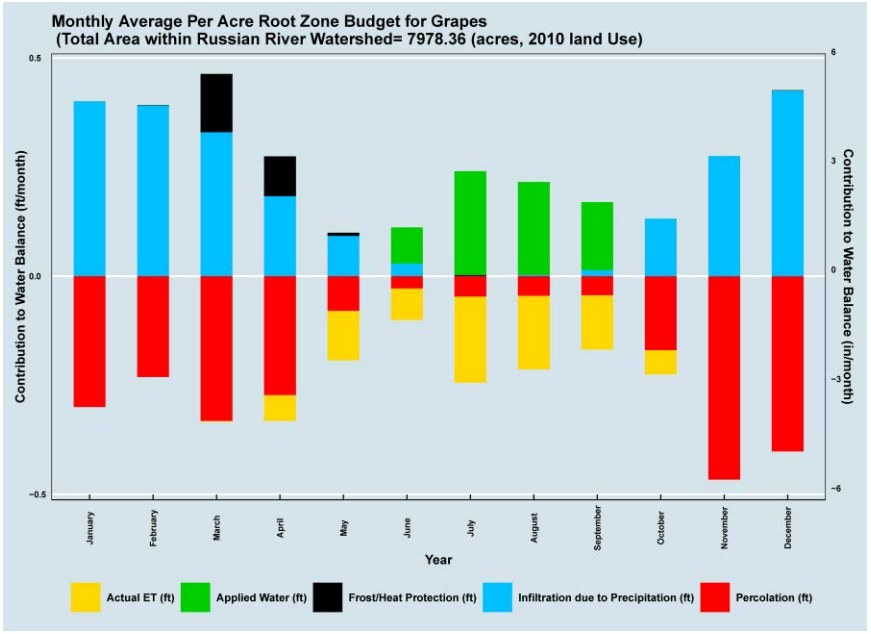
Integrated Water Flow Model Demand Calculator (IDC)

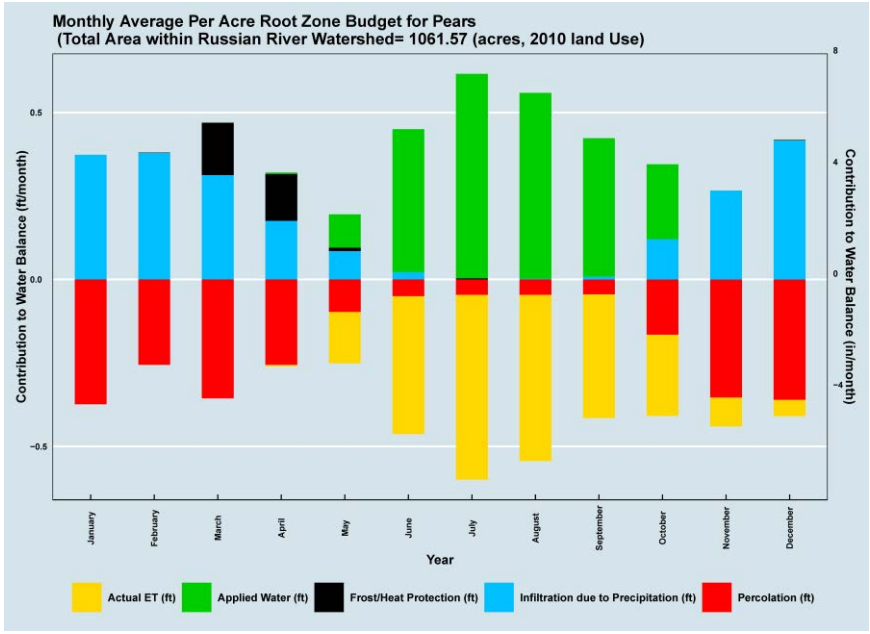
- Model was completed and results were presented in the November Meeting.
- Updates made to the model since then:
  - Included Dew Point as an extra factor in frost protection analysis. It did not lead to significant changes since the major factor is hourly climate data gaps.
  - Followed up with Farm Bureau, RCD, and Agricultural Representative to receive detailed data. We are in the process of assessing Boonville station data to see if we can eliminate some data gaps. Hard data from WDMP annual reports will be added after this meeting.

Integrated Water Flow Model Demand Calculator (IDC)

- Model was completed and results were presented in the November Meeting.
- Updates made to the model since then:
  - Assessment of alternative ways for frost (i.e., based on daily data, which will be the model future temporal resolution)
  - Agricultural demands and diversion were estimated for the northern watershed and assigned to Surface Water and groundwater based on reasonable judgment and available data.
  - We are awaiting the release of Ag Package and will use these results as a basis for comparison and validation.

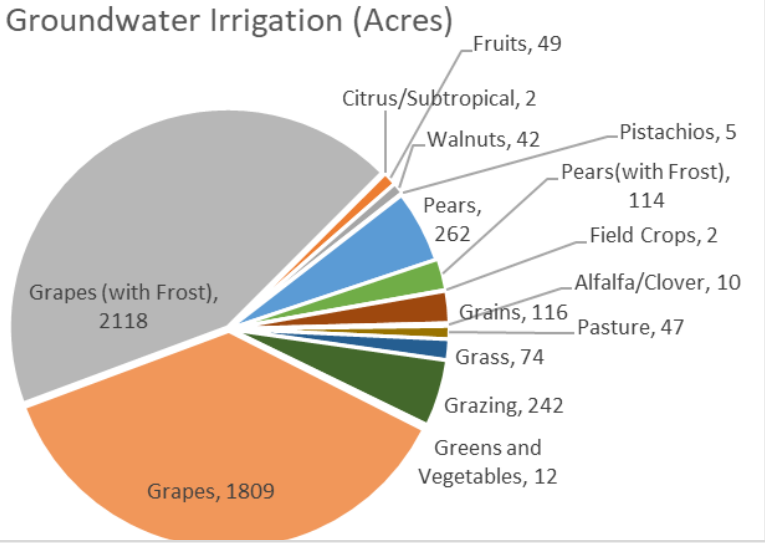
Integrated Water Flow Model Demand Calculator (IDC): Surface water vs. Groundwater

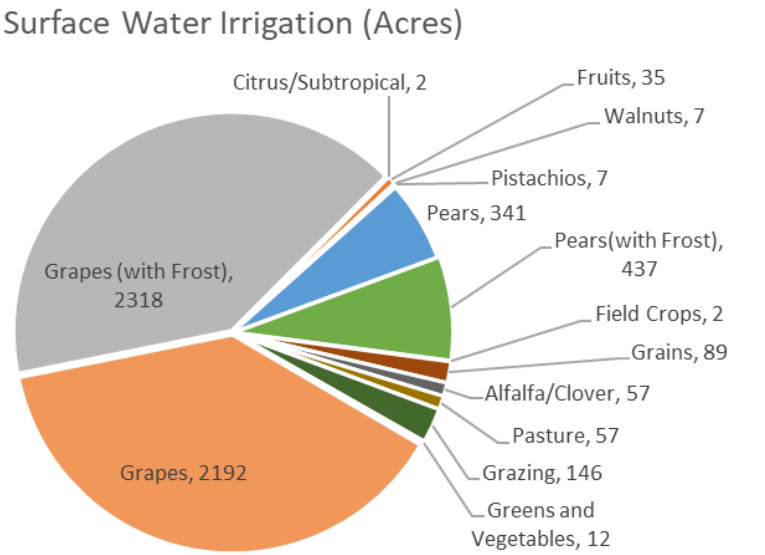


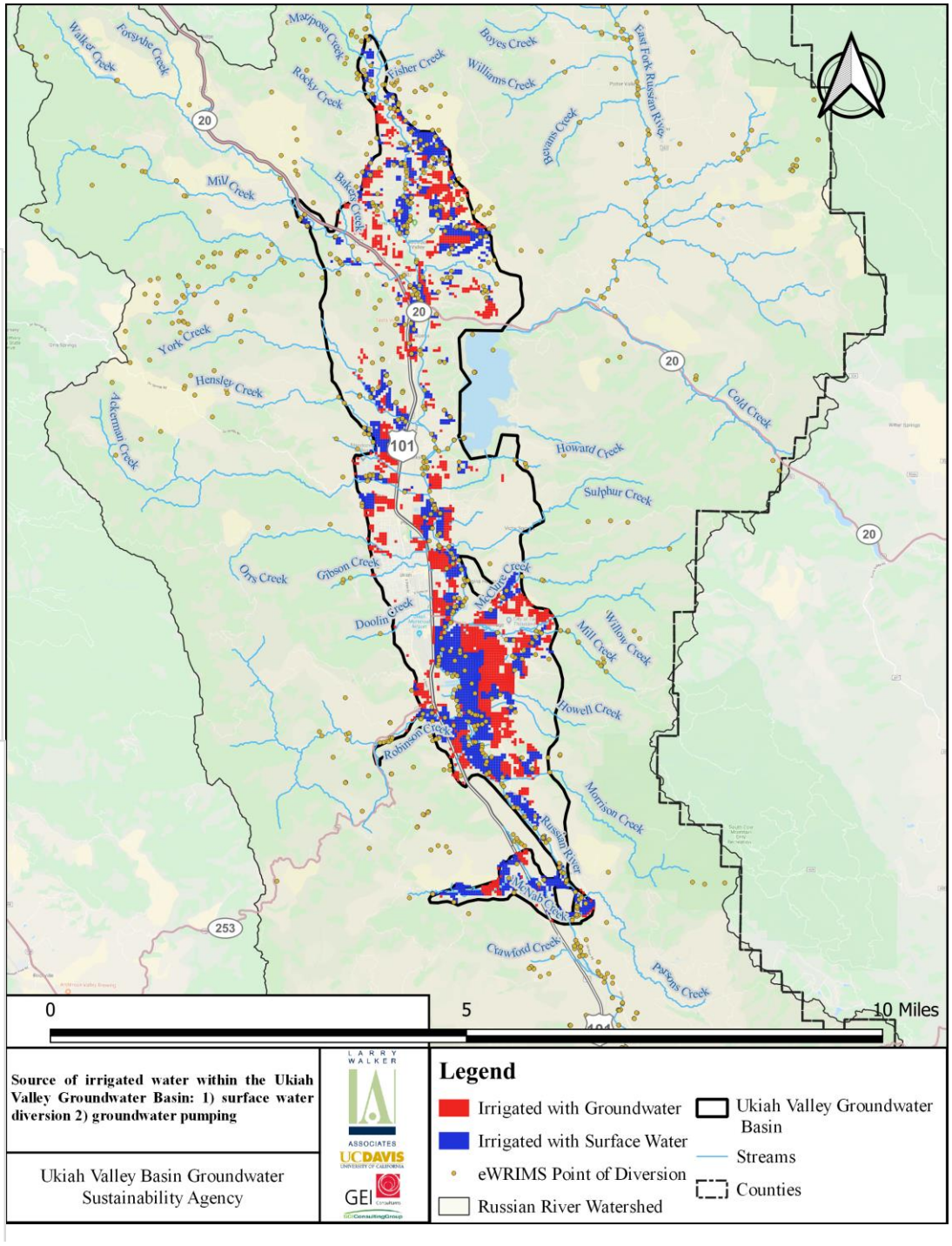


	No Frost Protection		With Frost Protection		Total	
	Groundwater	Surfae Water	Groundwater	Surface Water	Groundwater	Surfae Water
Grapes	1809	2192	2118	2318	3926	4510
	21.4%	26.0%	25.1%	27.5%	46.5%	53.5%
Pears	262	341	114	437	376	778
	22.7%	29.6%	9.9%	37.9%	32.5%	67.5%

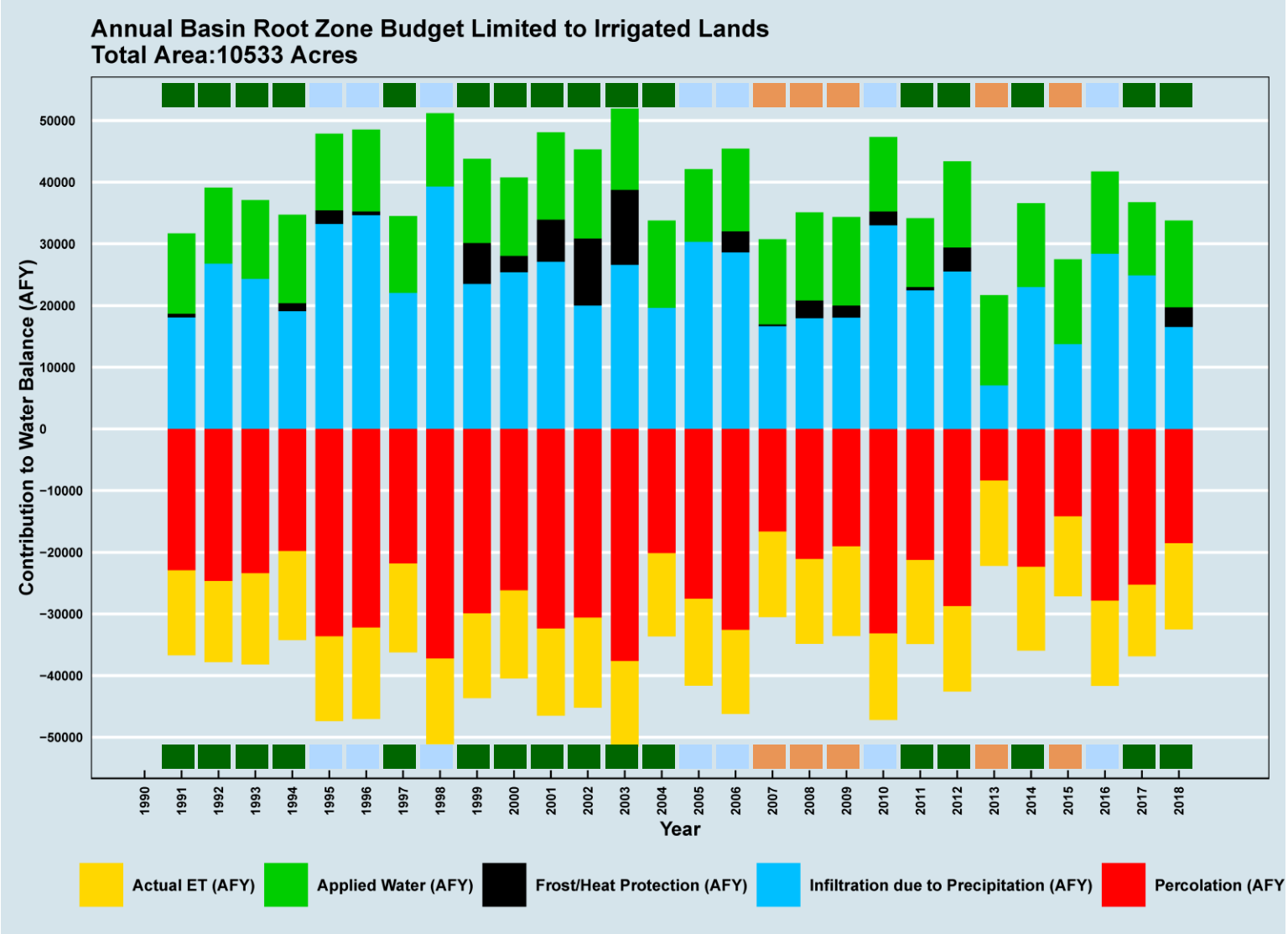
IDC: Surface water vs. Groundwater







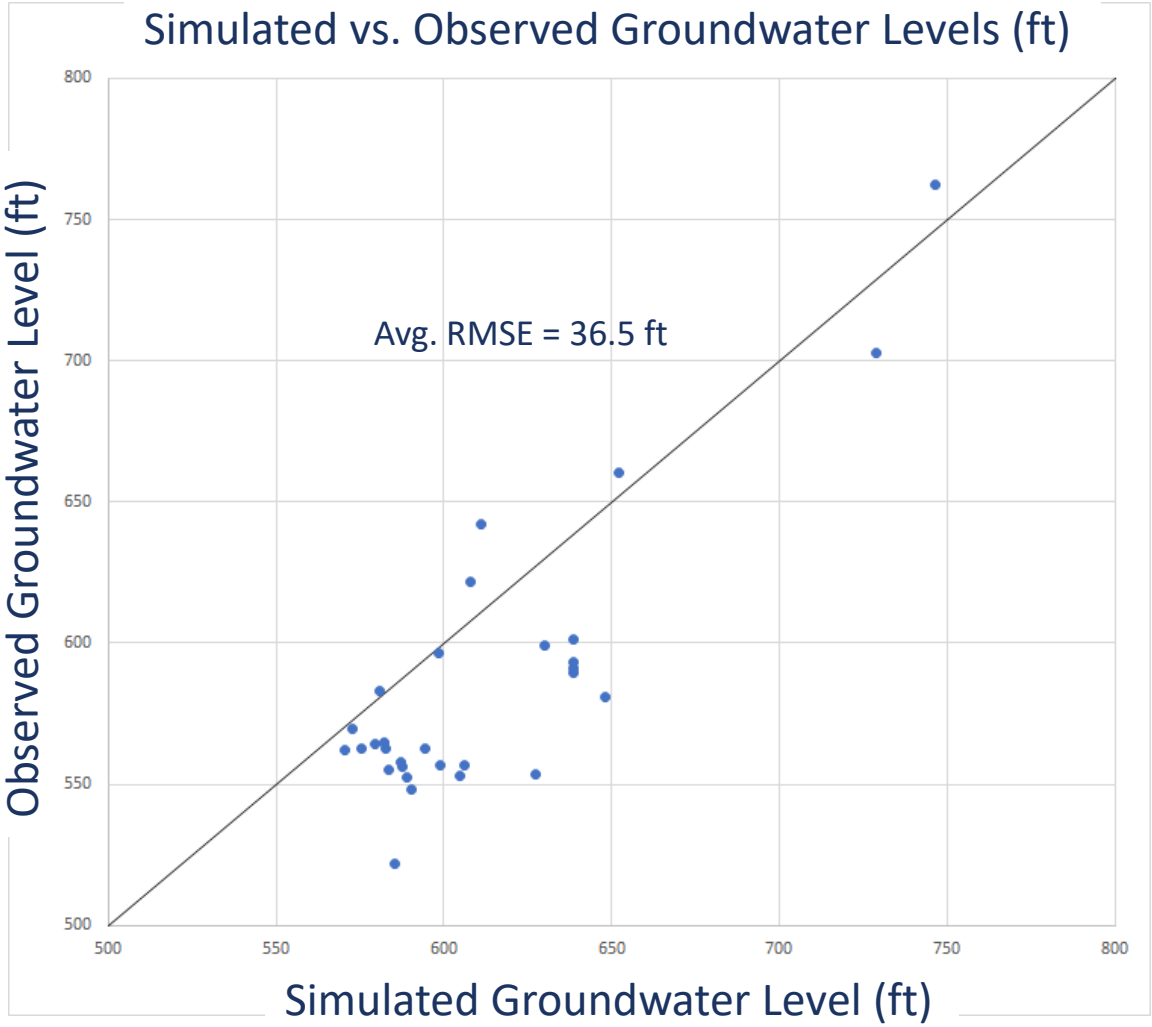
IDC: Root Zone Budget in UVGB



MODFLOW: State of the Model

- MODFLOW is setup and running … groundwater heads and bulk water budget terms are mostly reasonable … calibration will improve them.
- Calibration and sensitivity analysis are in progress to adjust hydraulic properties and refine boundary conditions.
- MODFLOW and PRMS are calibrated independently prior to coupling with GSFLOW.
- Additional refinement of some boundary conditions (i.e., stream/aquifer interactions, ag. pumping, recharge) will occur when coupled with GSFLOW & Ag. Package.
- Since no comments were made on the HCM, geological model is set in the model to follow the HCM and IHCM findings.

Groundwater Model: Preliminary Results



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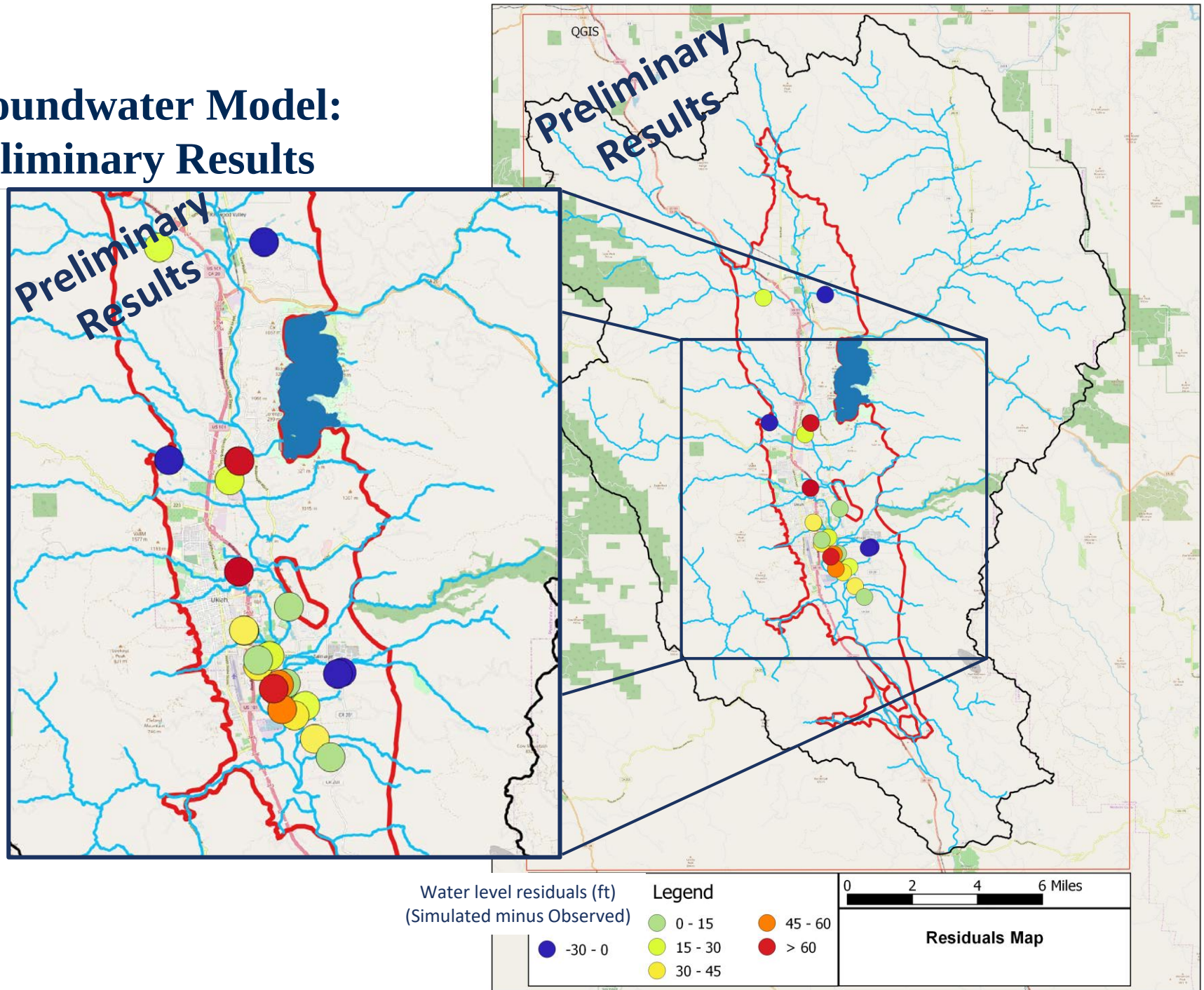

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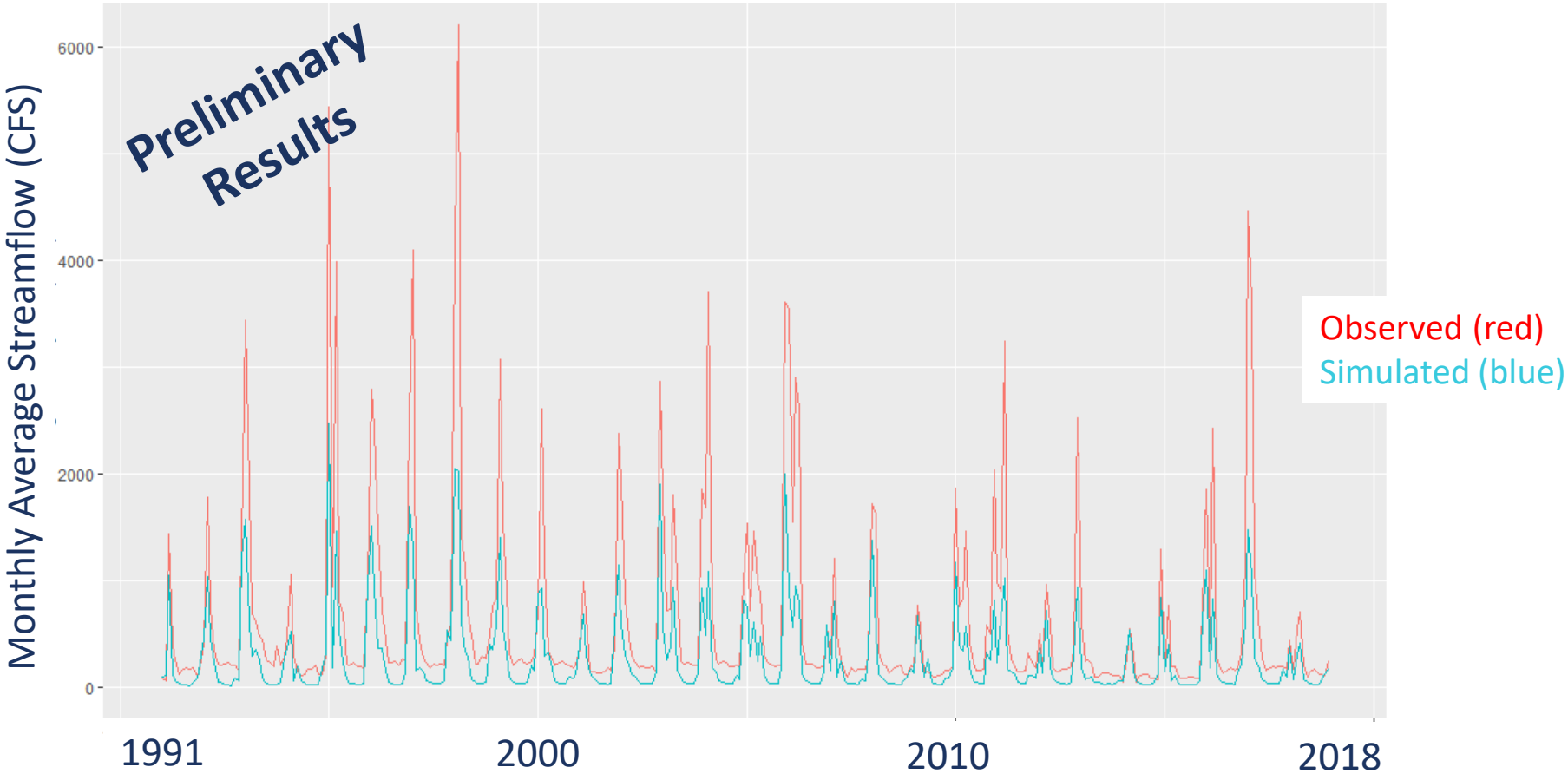
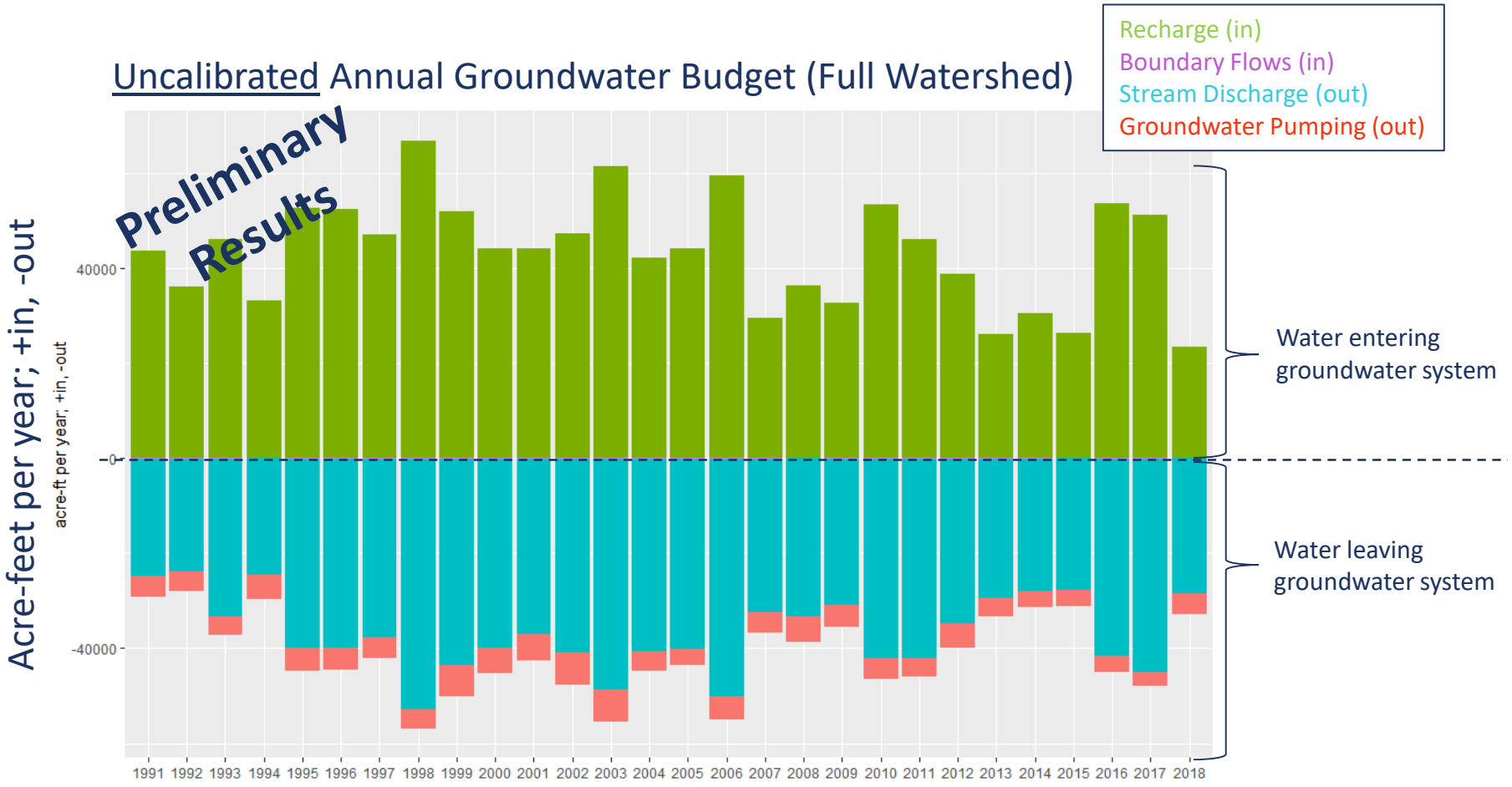


MODFLOW: Preliminary Water Budget



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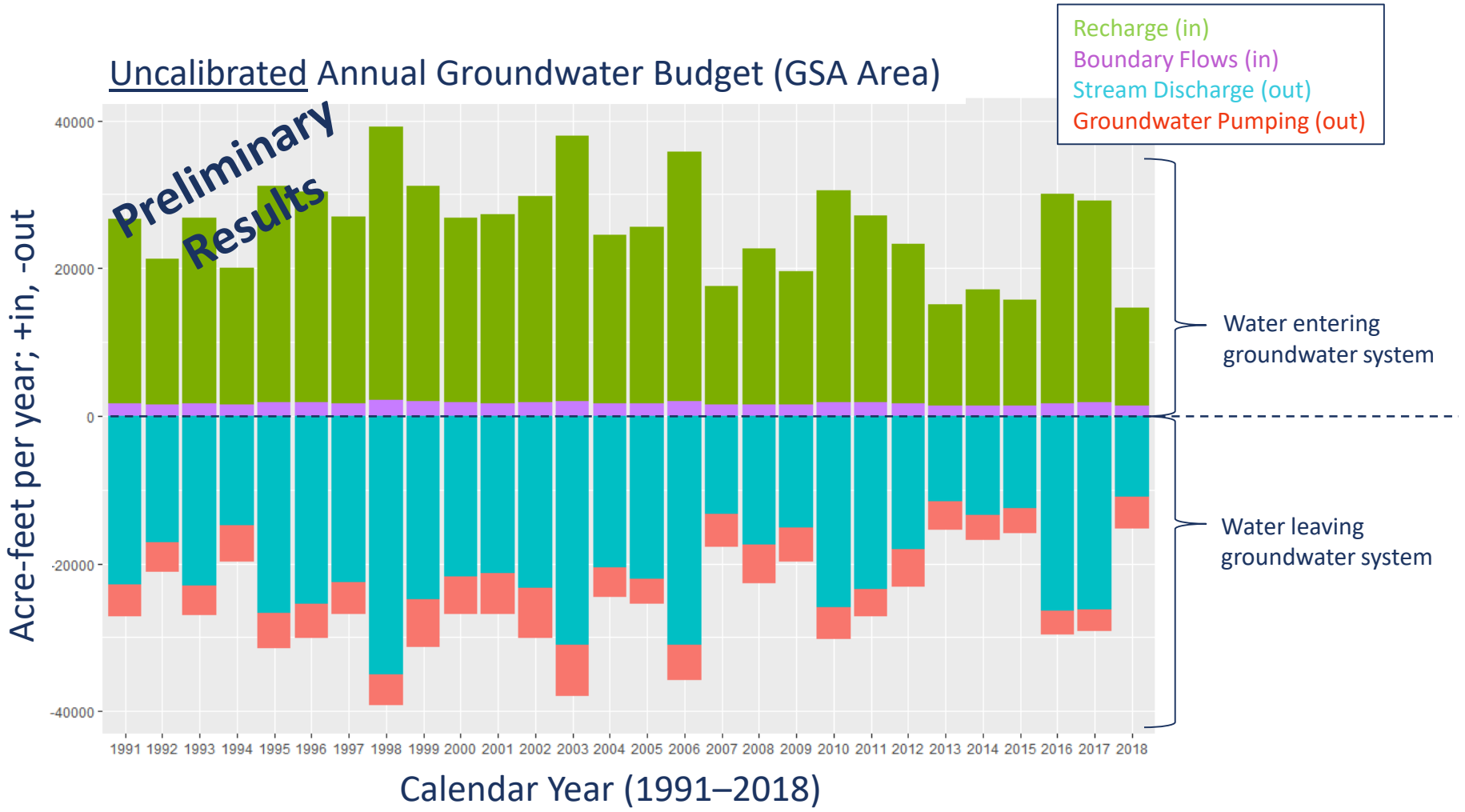

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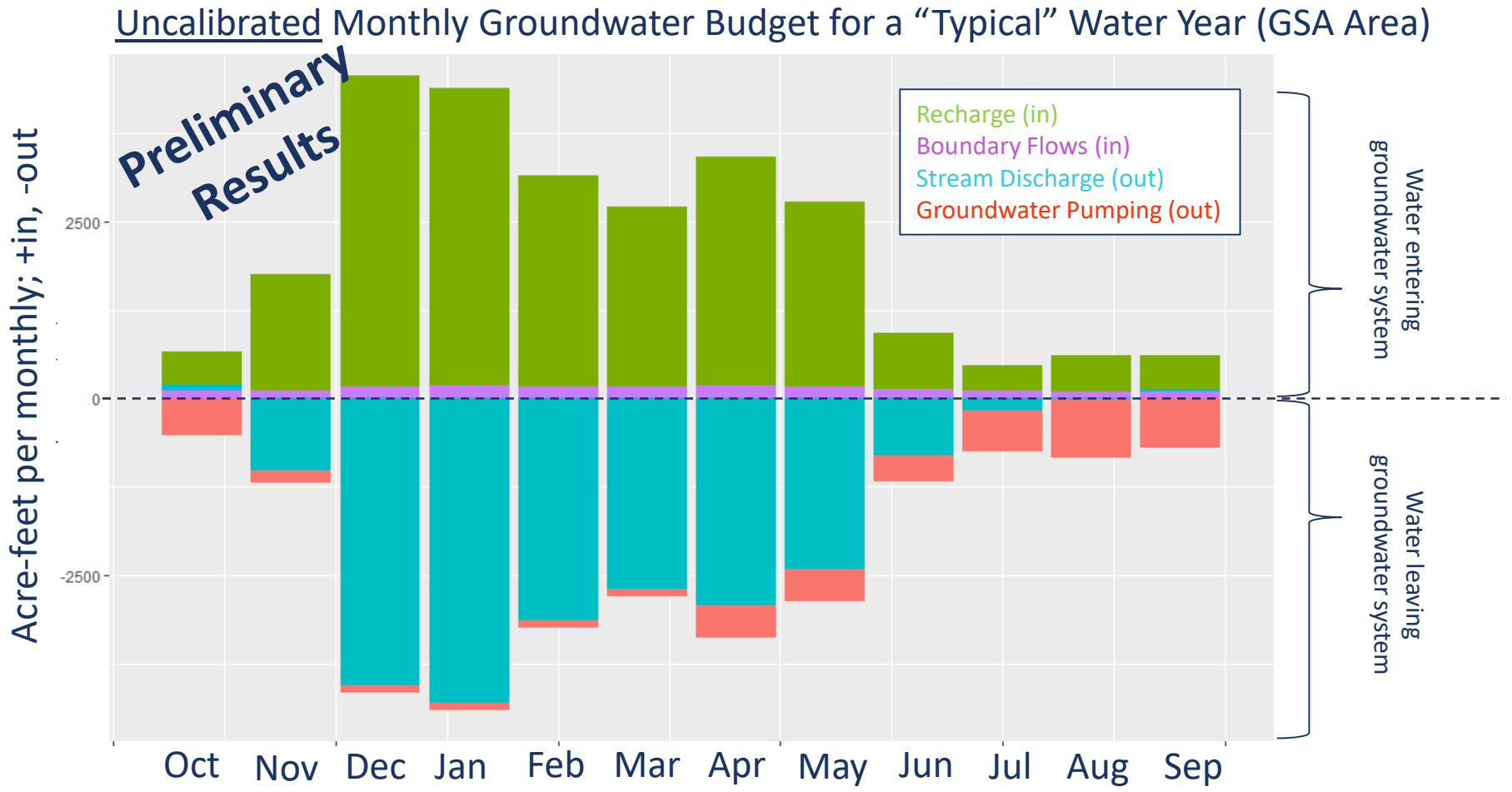

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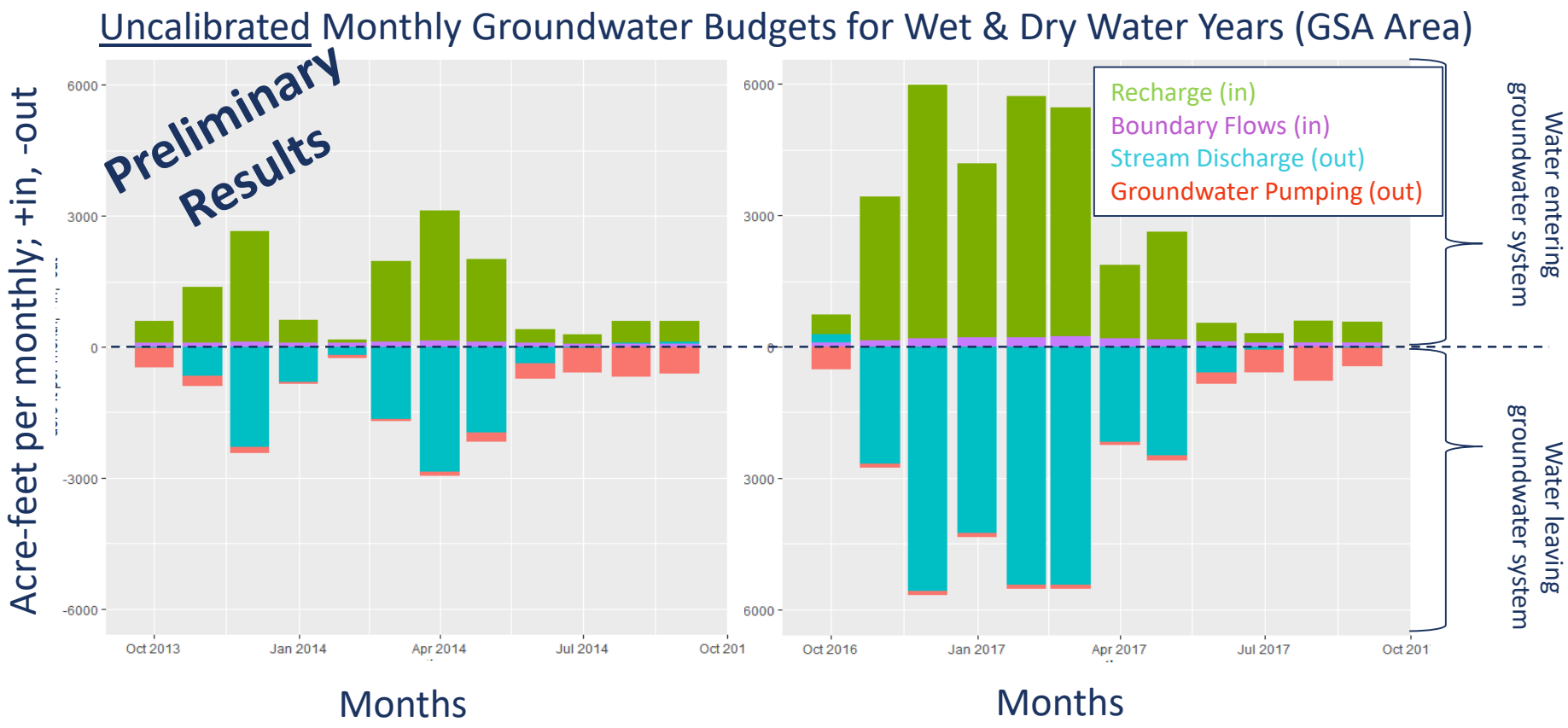

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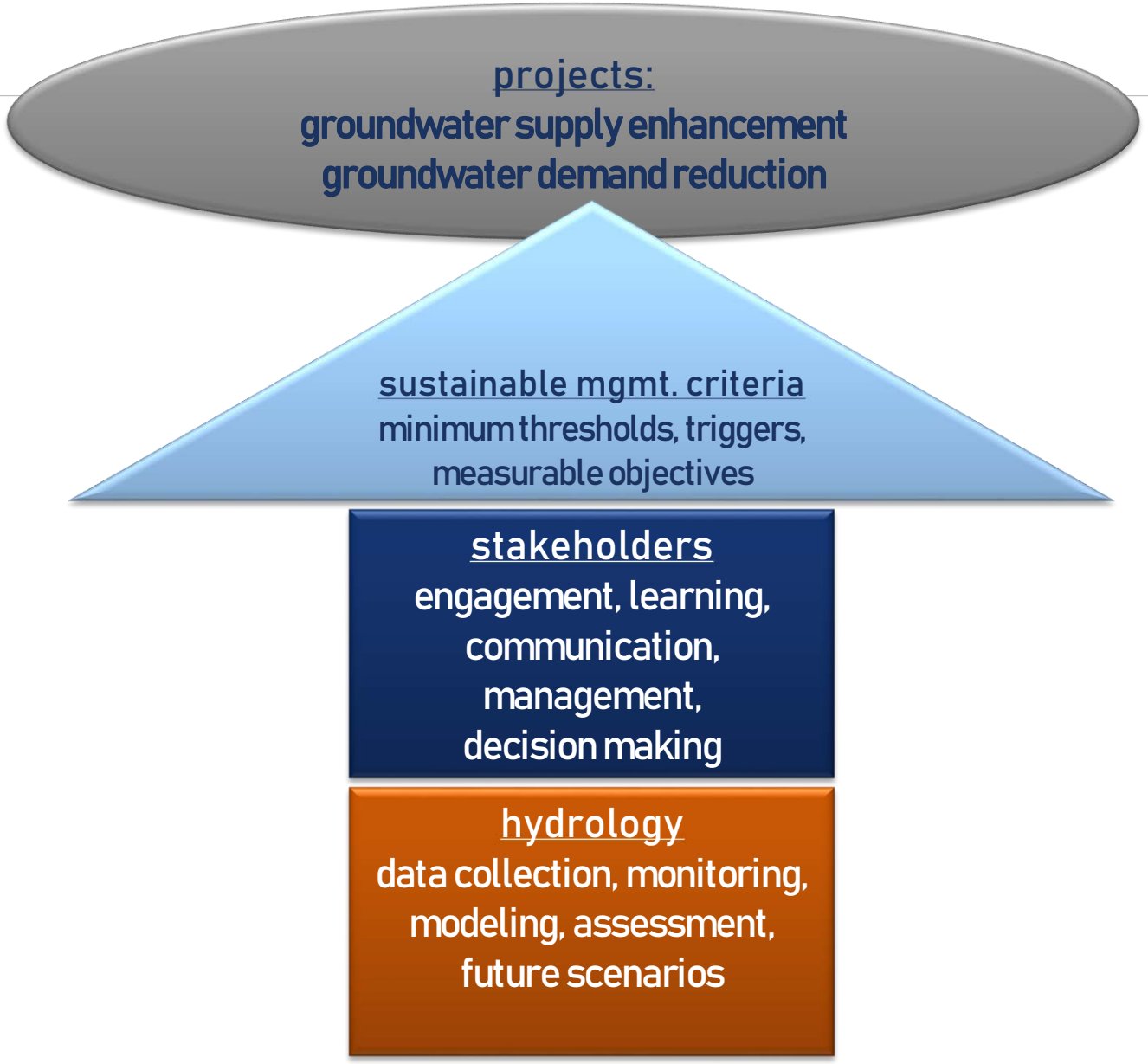
Preliminary Discussion on Sustainable Management Criteria

Key Elements of Groundwater Sustainability Plans



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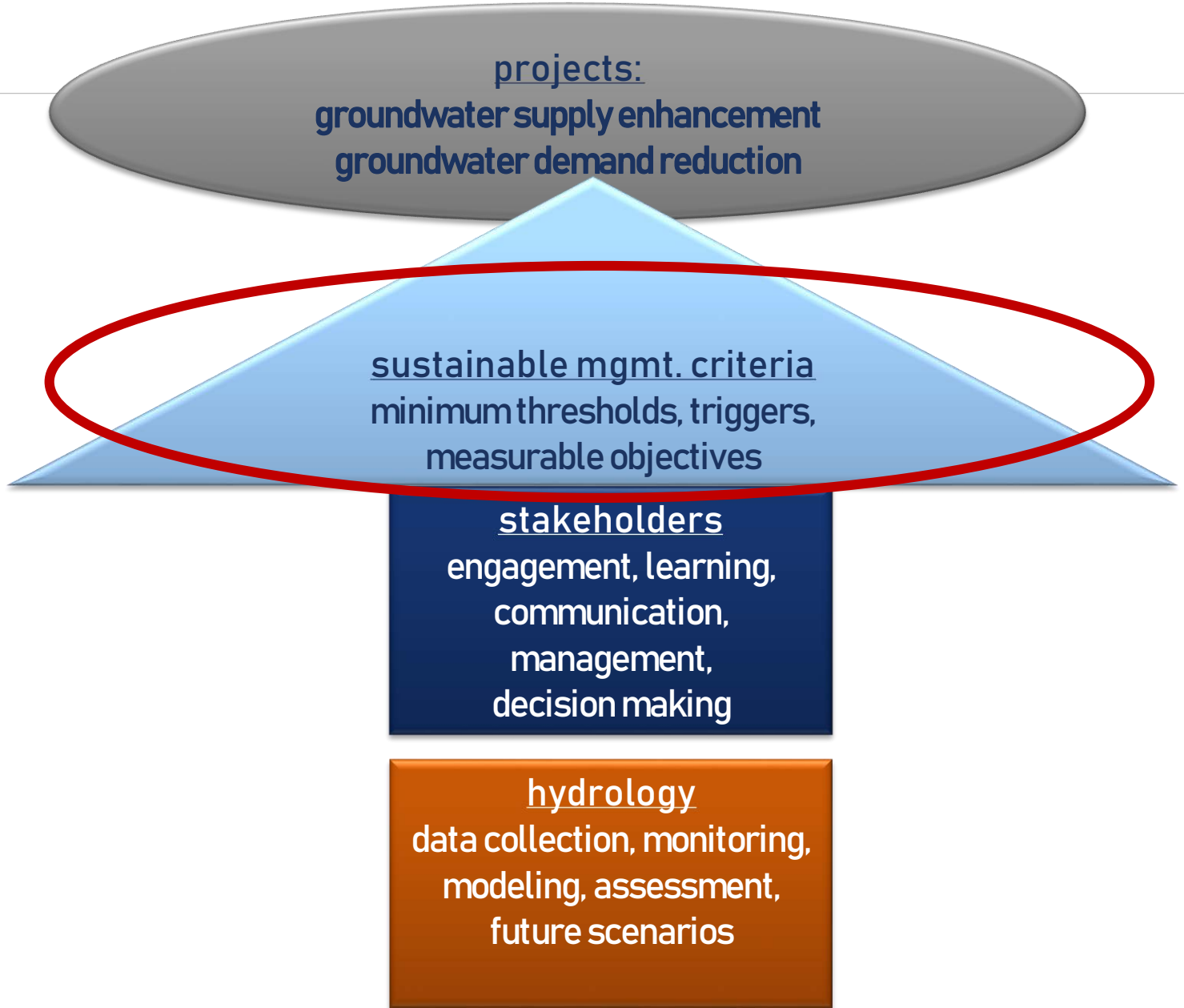
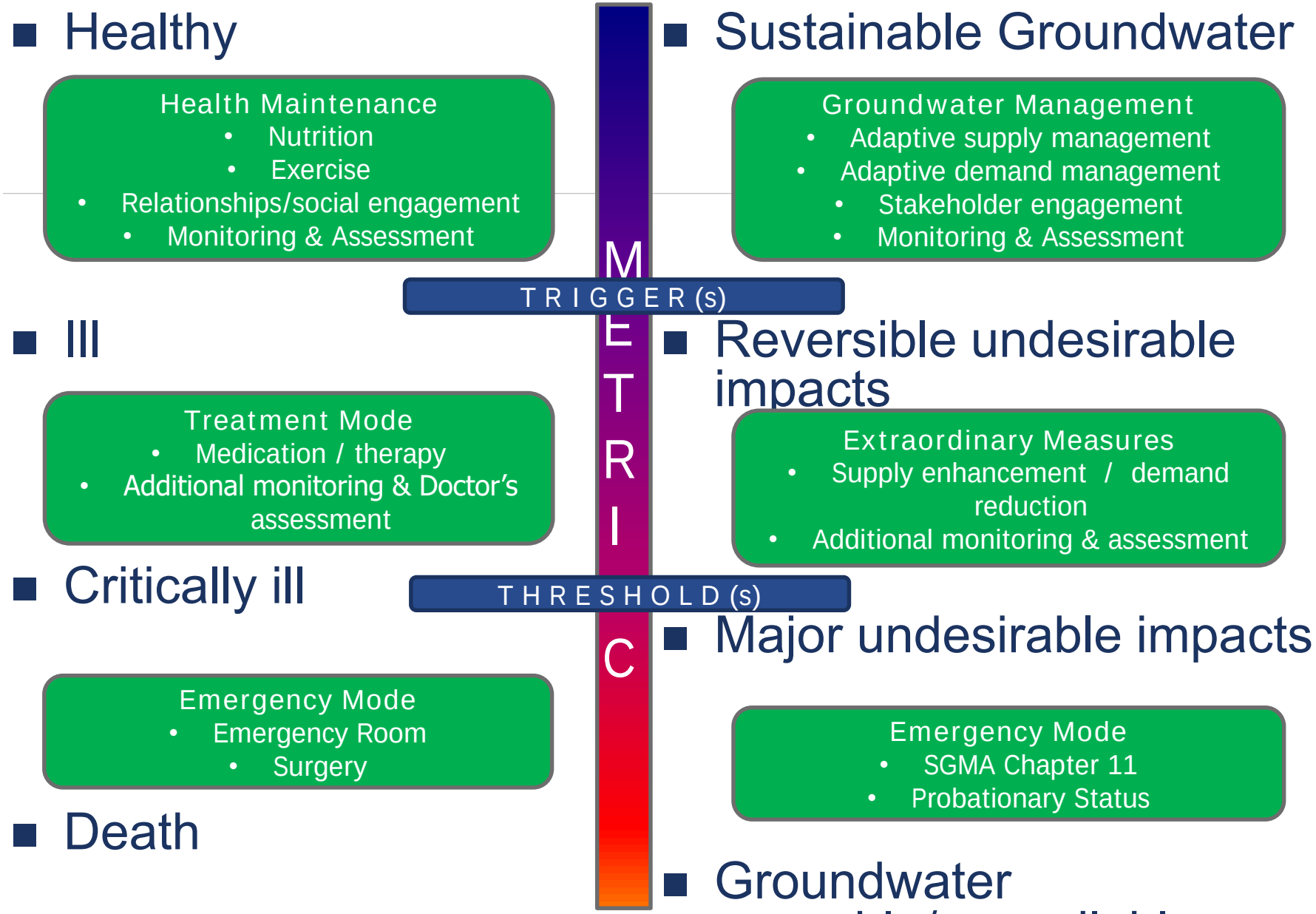
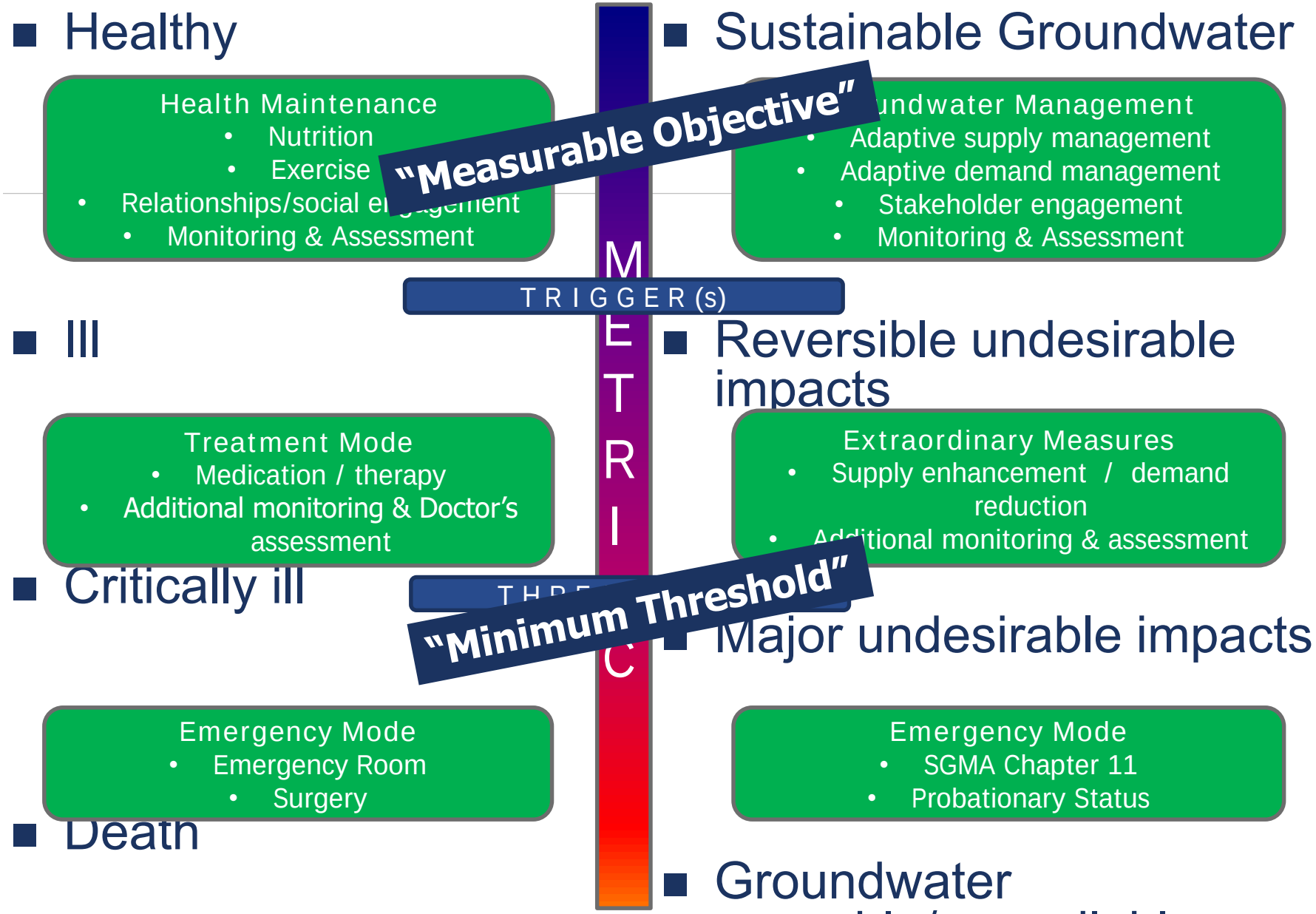



Healthy
Health Maintenance
• Nutrition
• Exercise
• Relationships/social engagement
• Monitoring & Assessment
Sustainable Groundwater
Groundwater Management
• Adaptive supply management
• Adaptive demand management
• Stakeholder engagement
• Monitoring & Assessment
METRIC
TRIGGER(s)
Ill
Treatment Mode
• Medication / therapy
• Additional monitoring & Doctor's assessment
Reversible undesirable impacts
Extraordinary Measures
• Supply enhancement / demand reduction
• Additional monitoring & assessment
Critically ill
THRESHOLD(s)
Major undesirable impacts
Emergency Mode
• Emergency Room
• Surgery
Emergency Mode
• SGMA Chapter 11
• Probationary Status
Death
Groundwater unusable/unavailable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"Measurable Objective"
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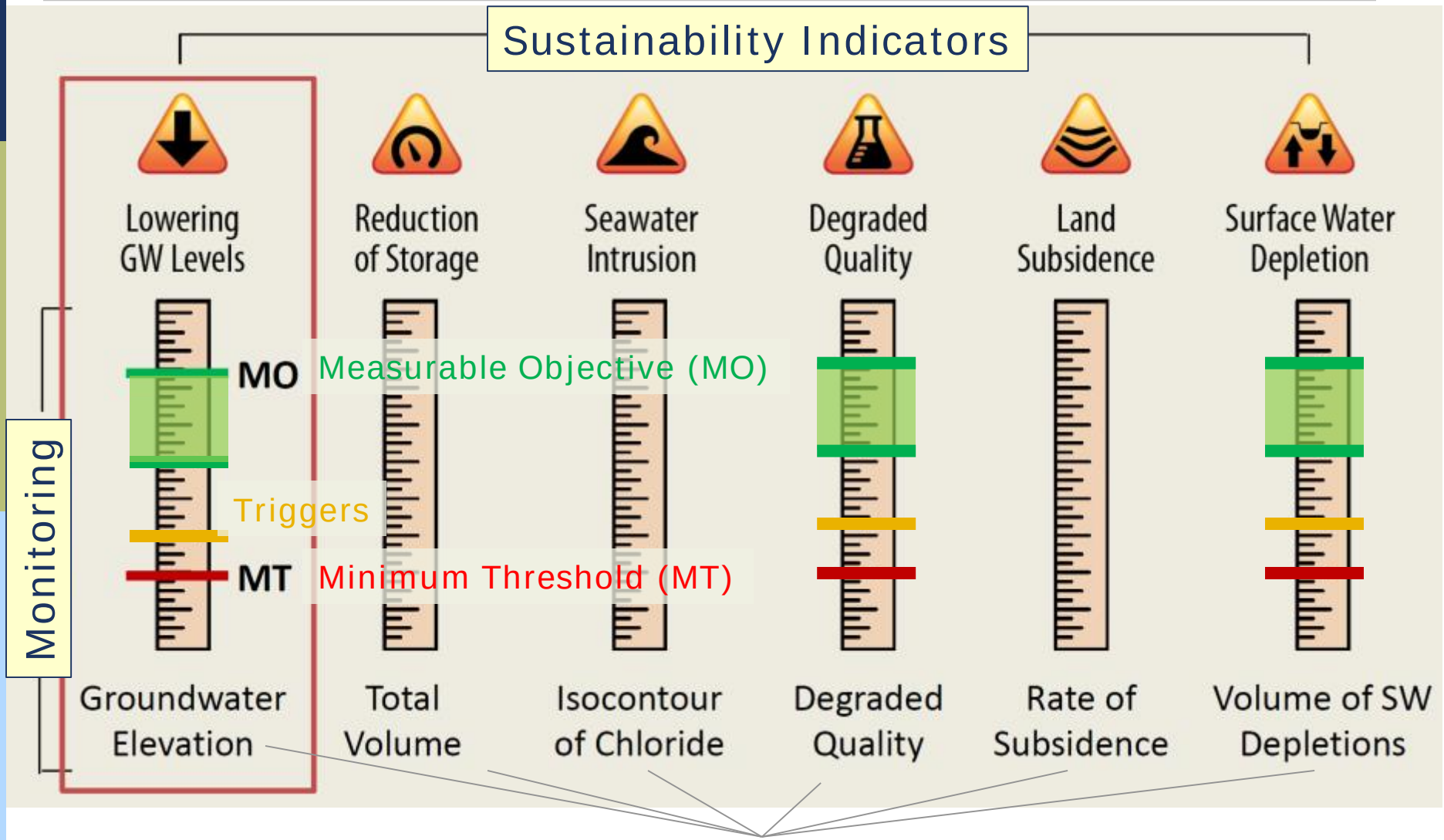
GSP: Monitoring and Managing Sustainability

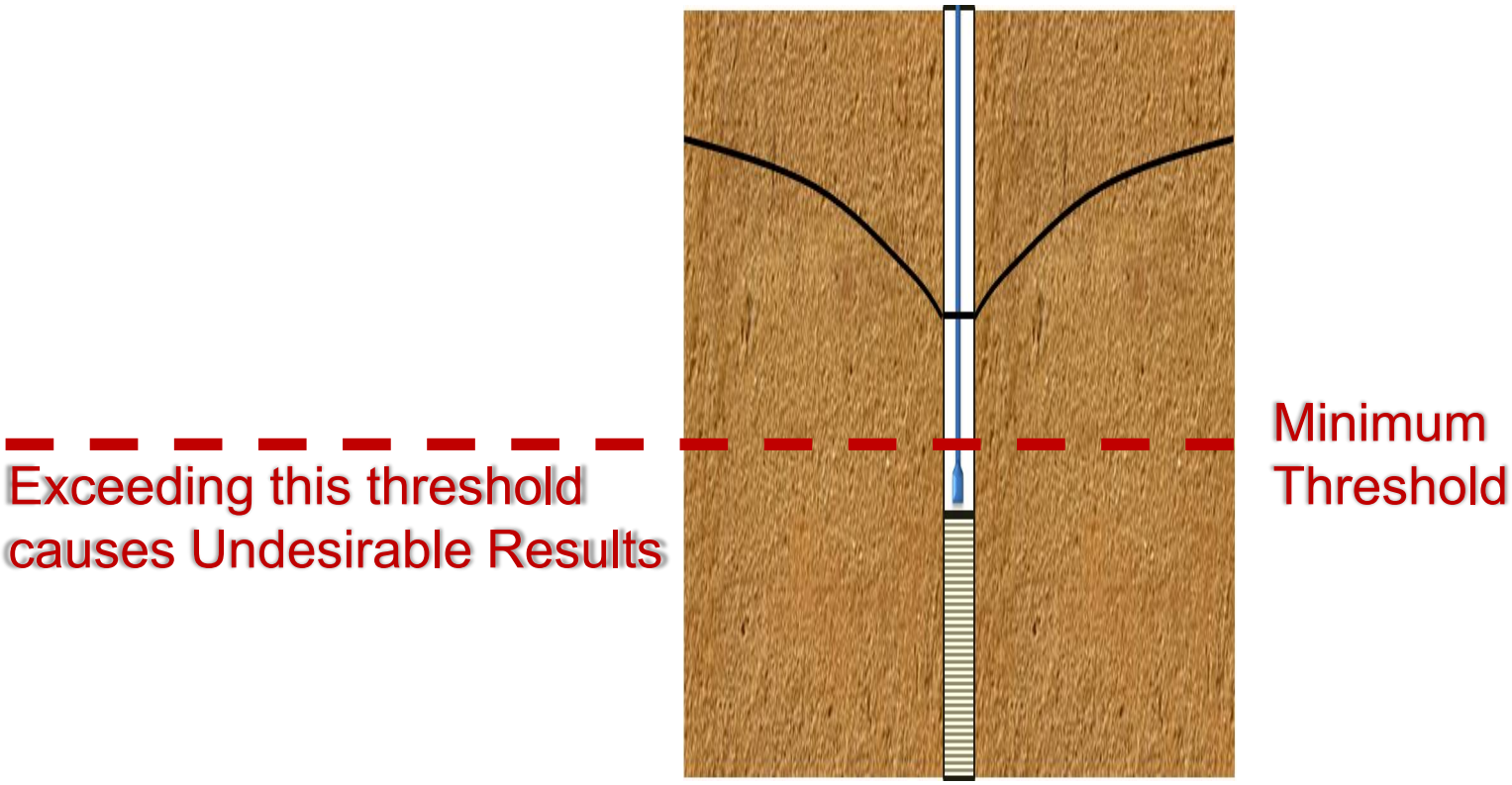


[generalized examples of what to monitor]

modified from Ca DWR 2016

Sustainable Management Criteria Components

- Sustainability Goal
- Undesirable Results (UR)
- Minimum Thresholds (MT)
- Measurable Objectives (MO)



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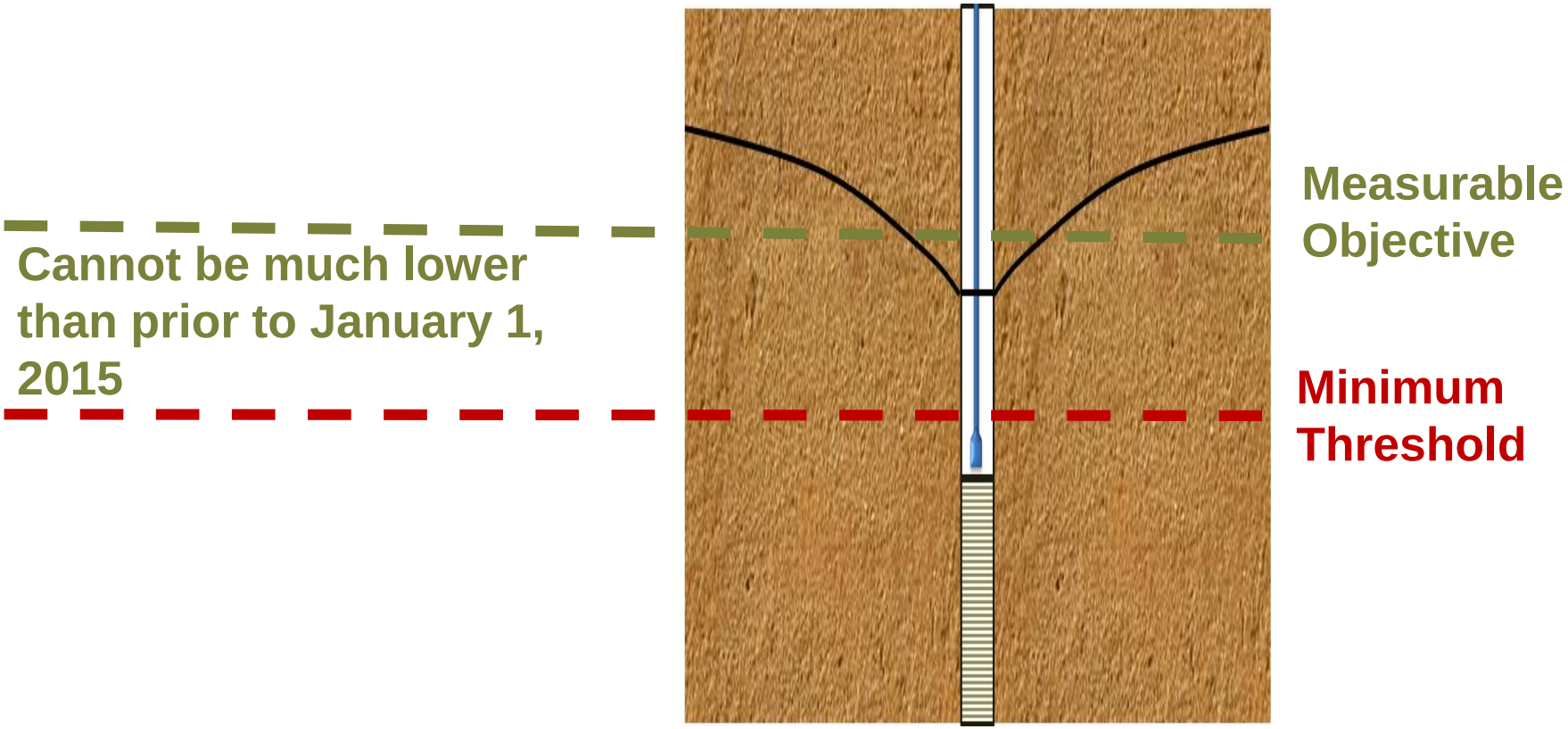

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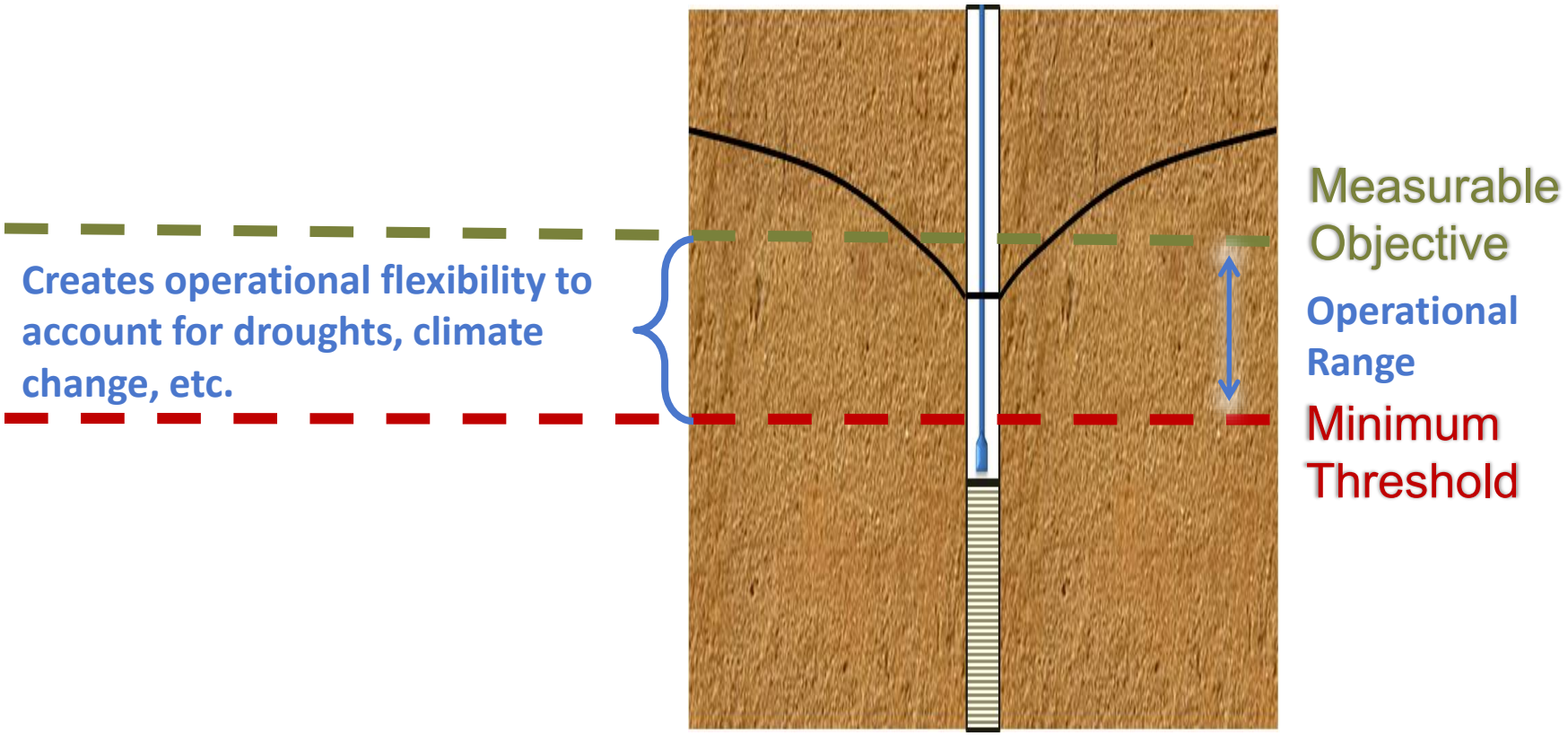
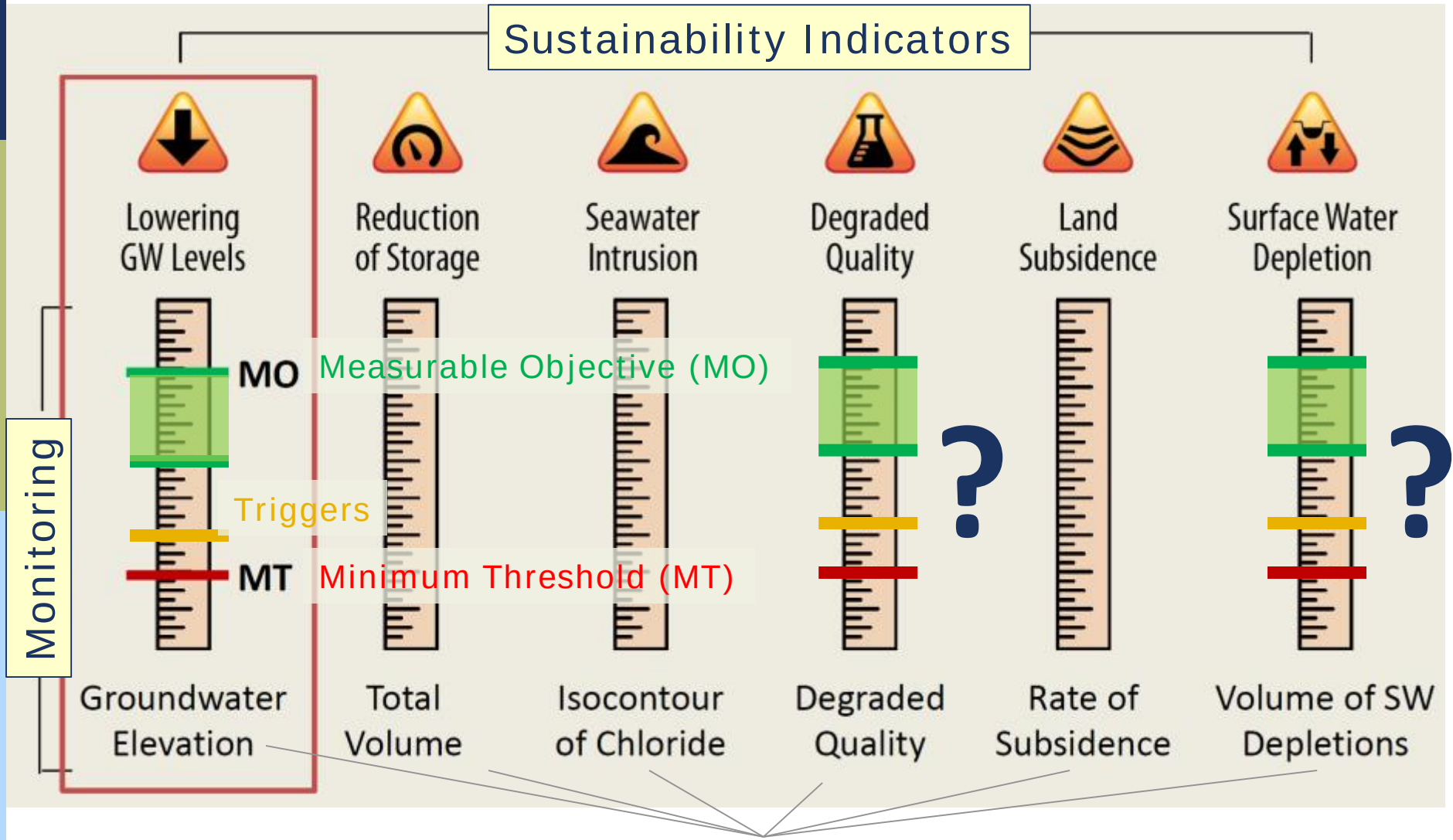


GSP: Monitoring and Managing Sustainability



[generalized examples of what to monitor]

modified from Ca DWR 2016

Some Guidance on Water Quality in GSPs:

GSP: Monitoring and Managing Sustainability

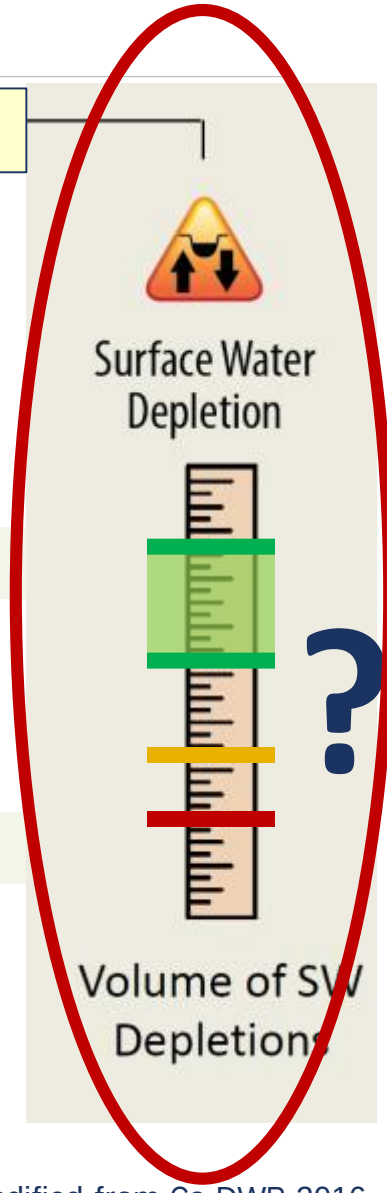
Sustainability Indicators

Monitoring

Measurable Objective (MO)

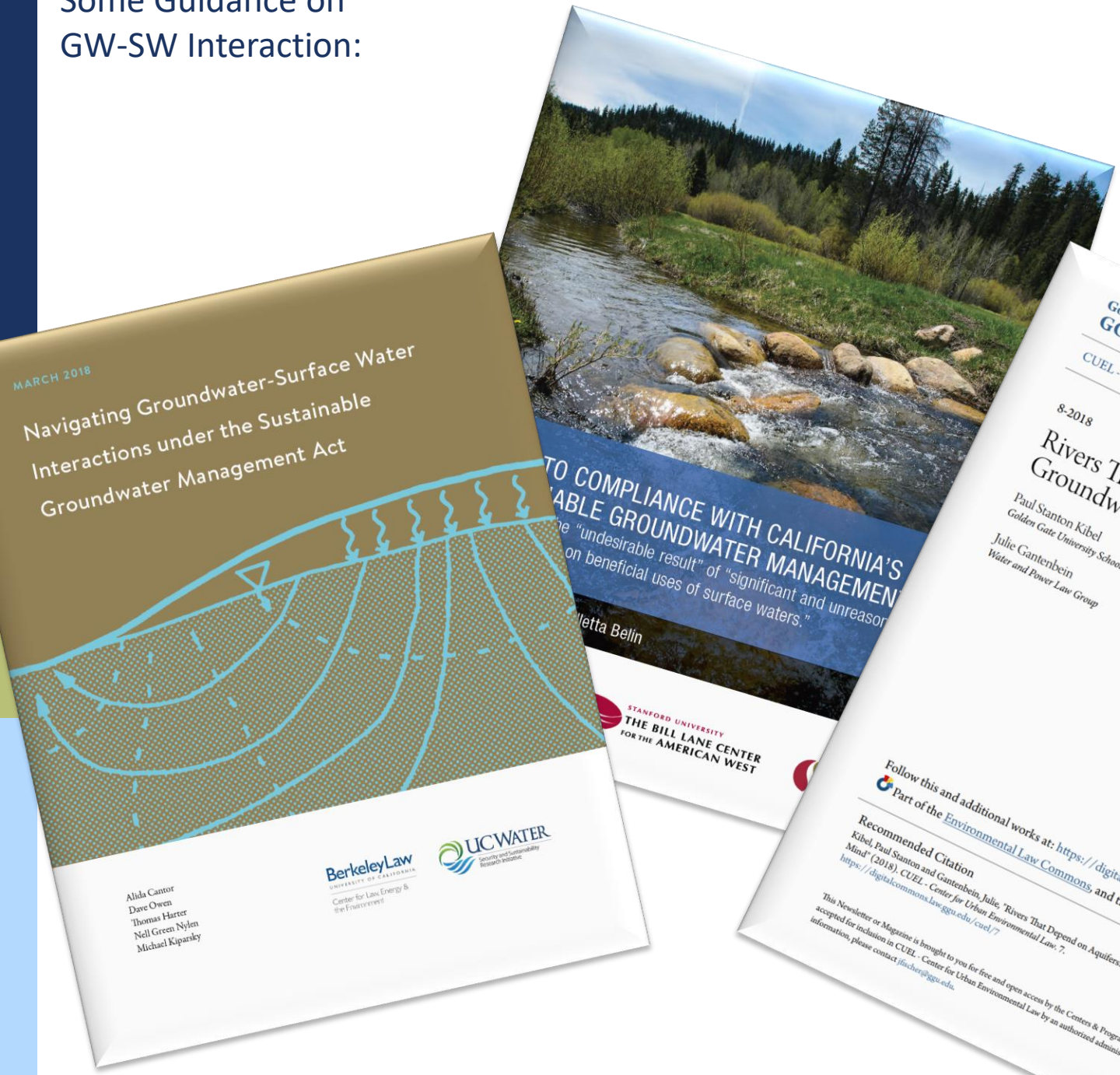
Triggers

Minimum Threshold (MT)

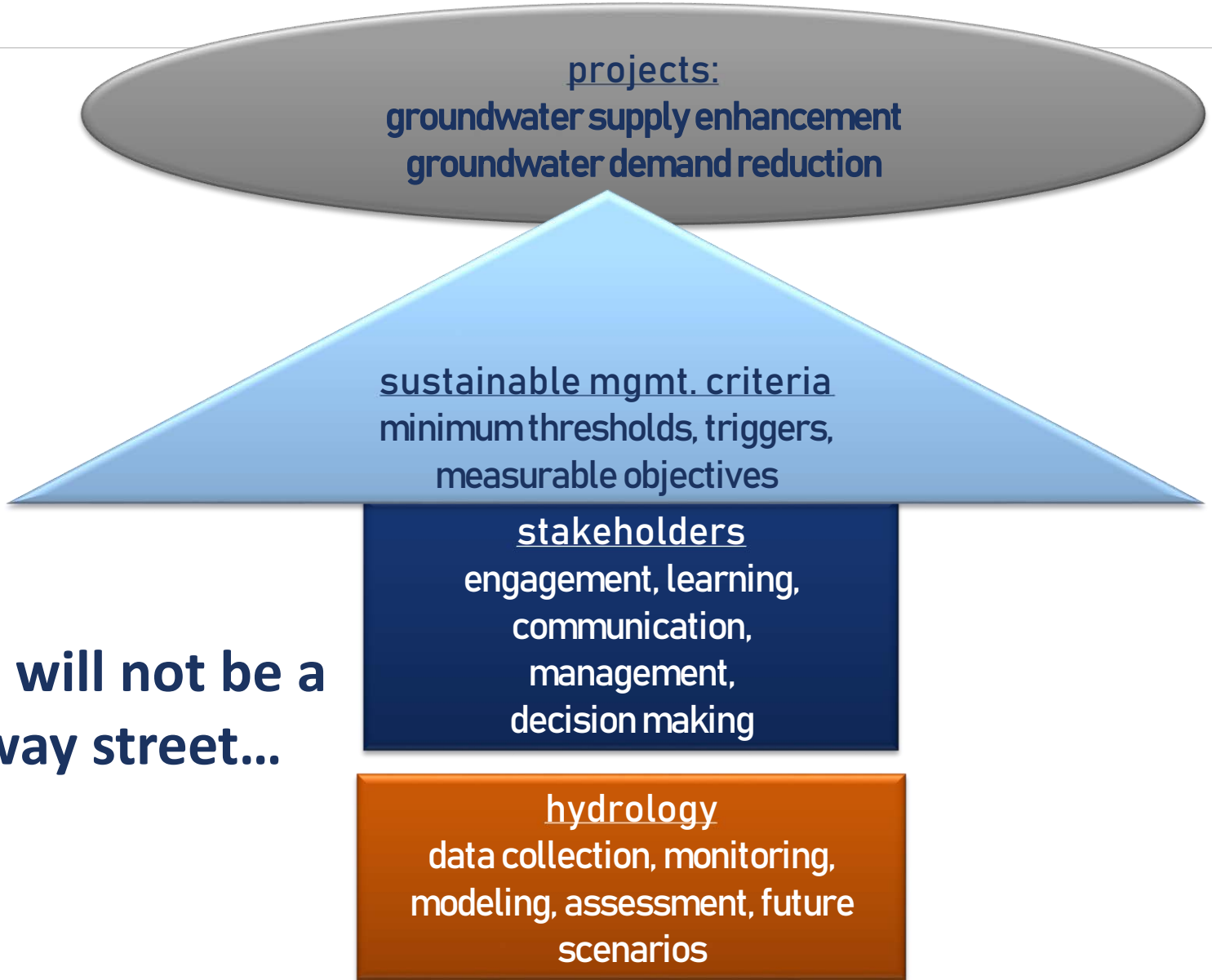


modified from Ca DWR 2016

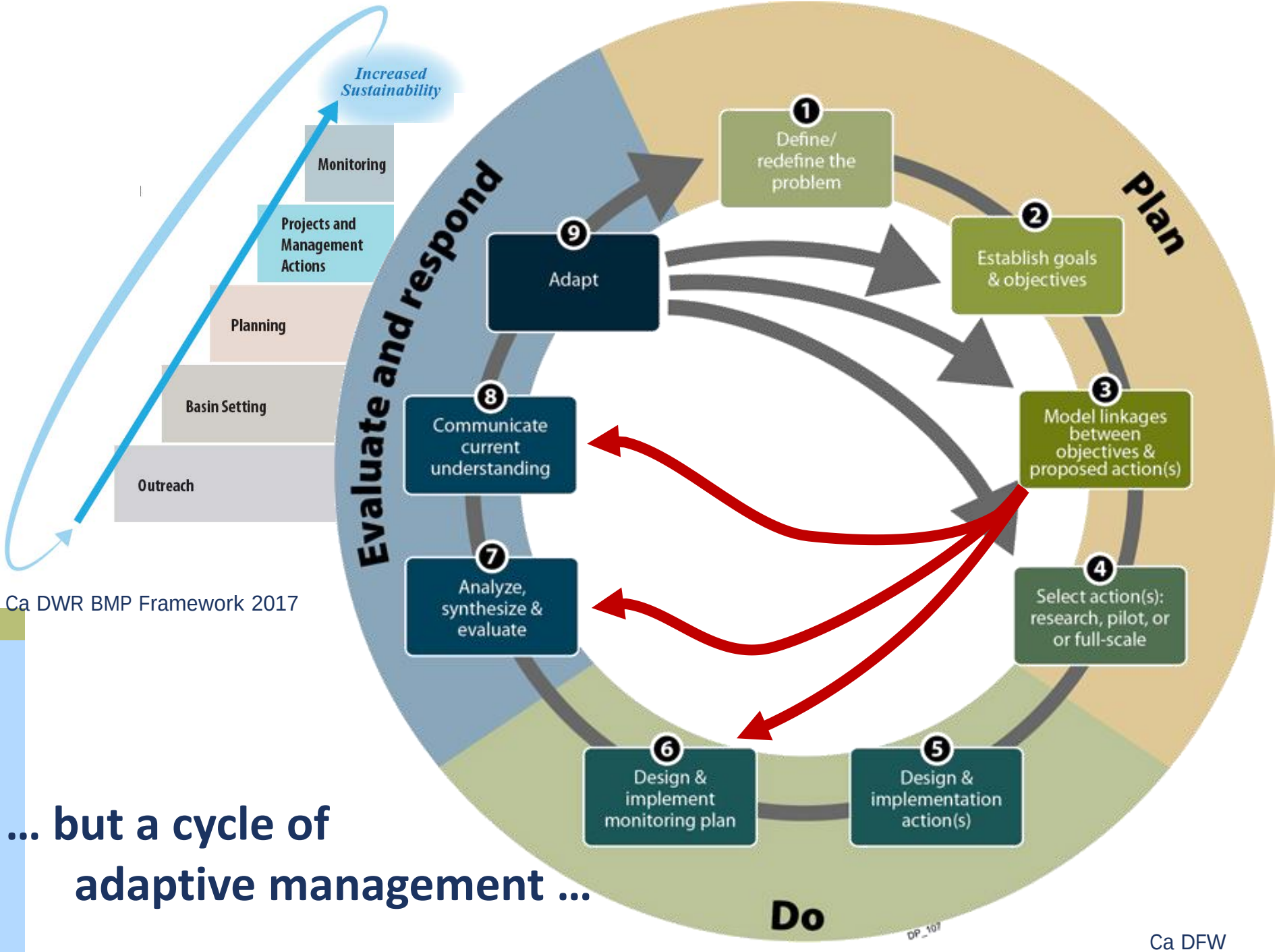
Some Guidance on GW-SW Interaction:



Key Elements of Groundwater Sustainability Plans



...this will not be a one way street...



Ca DWR BMP Framework 2017

… but a cycle of adaptive management …

Ca DFW

Surface water/GDE sections of the GSP

- What is needed for the GDEs sections?
- Starting point for discussion
- Based on:
  - GSP Annotated Outline
  - Other GSP examples
  - TNC mapping tool (limited utility)
- **Note:** GSP will also include other beneficial uses of surface water

Surface water and GDEs

Ch. 2, Groundwater Conditions

- Identification of interconnected surface water systems
- Identification of groundwater-dependent ecosystems
    - Including potentially related factors such as instream flow requirements, threatened and endangered species, and critical habitat.

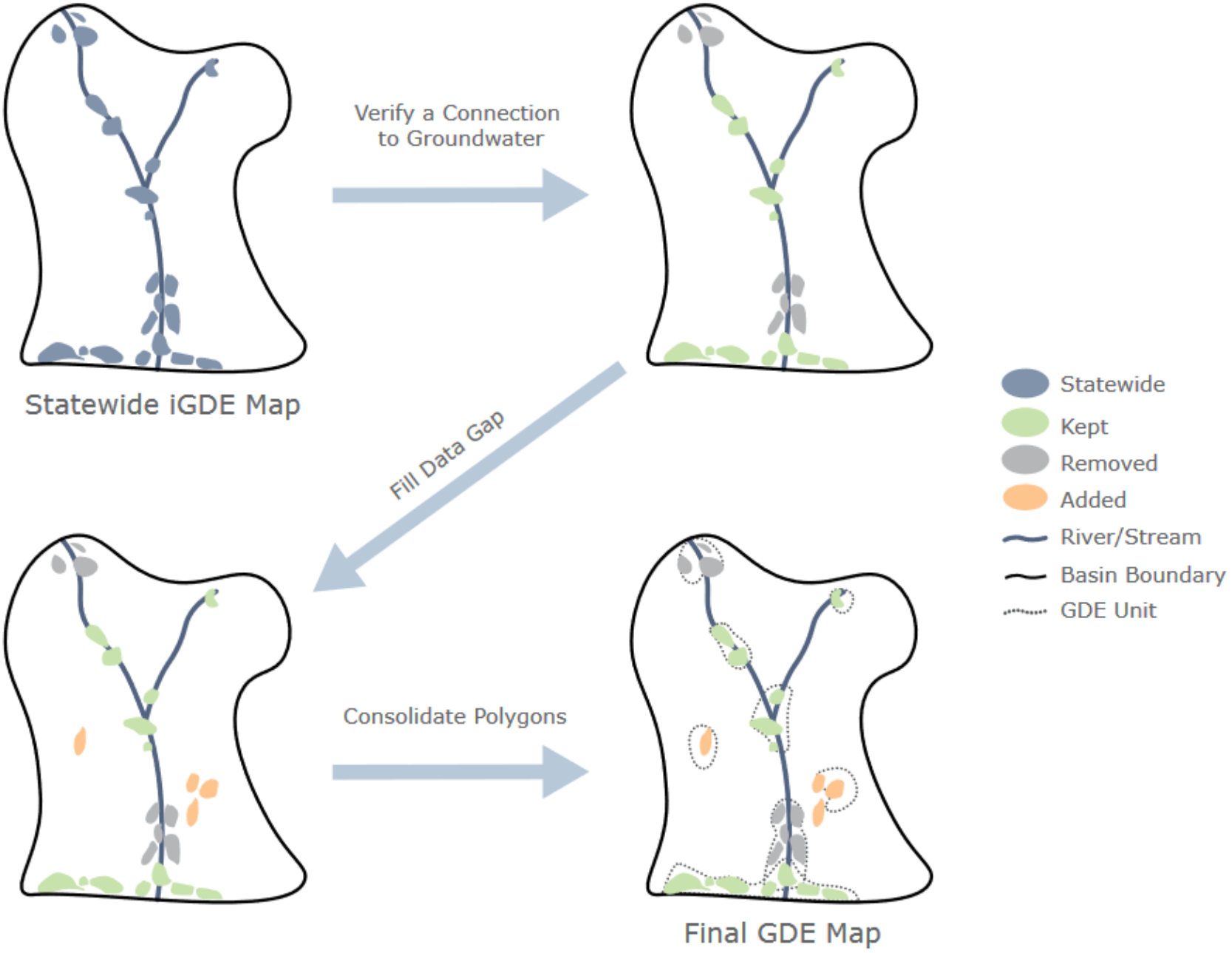


Figure 2. Creating a local GDE map using local information (Step 1.1).

Source: TNC GDE Guidance document
https://www.scienceforconservation.org/assets/downloads/GDEsUnderSGMA.pdf

Surface water and GDEs

Ch. 2, Groundwater Conditions

1. Identify and characterize (and prioritize?) GDEs

2. What flows and water quality are needed to maintain GDEs?

3. Identify a) the role of groundwater and b) factors outside the purview of the GSA

Ch. 3, Sustainable Management Criteria

3.4 Undesirable Results *(Reg. § 354.26)*

- Description of undesirable results for any of the sustainability indicators
- Cause of groundwater conditions that would lead to undesirable results
- Criteria used to define undesirable results based on minimum thresholds
- 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

Ch. 3, Sustainable Management Criteria

Based on data and stakeholder deliberations

Simulate with model; will involve uncertainty

3.4 Undesirable Results *(Reg. § 354.26)*

- Description of undesirable results for any of the sustainability indicators
- Cause of groundwater conditions that would lead to undesirable results
- Criteria used to define undesirable results based on minimum thresholds
- 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

Ch. 3, Sustainable Management Criteria

1. Define undesirable results

2. Define minimum thresholds to avoid undesirable results

3. Identify necessary monitoring

Ch. 4, Projects and Management Actions

1. Identify projects that could foster groundwater conditions that would avoid undesirable results

2. Prioritize projects

3. Describe any coordination with other, non-groundwater-based projects

Questions?

Thank you!