COLUSA GROUNDWATER AUTHORITY AND GLENN GROUNDWATER AUTHORITY

Colusa Subbasin Groundwater Workshop

September 19 & 23, 2019

Program

- Welcome and Introductions
- Sustainable Groundwater Management Act (SGMA) Overview
- SGMA Basin Setting - Colusa Subbasin
  - Basin Setting Presentation
  - Small Group Discussion – Subbasin Challenges
  - Water Budget Update
  - Modelling Update
- Groundwater Sustainability Planning - Next Steps
- GSA Question and Answer Session (Comment Cards Available)
- Adjourn

Sustainable Groundwater Management Act (SGMA) Overview

Dave Ceppos – Facilitator, Sacramento State University

SGMA: Who is Affected

Agricultural

Municipal

Industrial

Environmental

Sustainable Groundwater Management Act SGMA

- Sustainable Groundwater Management Act of 2014
- **Groundwater Sustainability Agency(ies) (GSA)** by **June 30, 2017**
- **Groundwater Sustainability Plan(s) (GSP)** by **January 31, 2022**
- Annual reporting and GSP Update every 5 years, demonstrating progress towards sustainability
- 20 years to achieve Sustainability – 2042
- **SGMA is a completely different program than the Irrigated Lands Regulatory Program (Colusa Glenn Subwatershed Program)**

Groundwater Sustainability Agency Eligibility Requirements

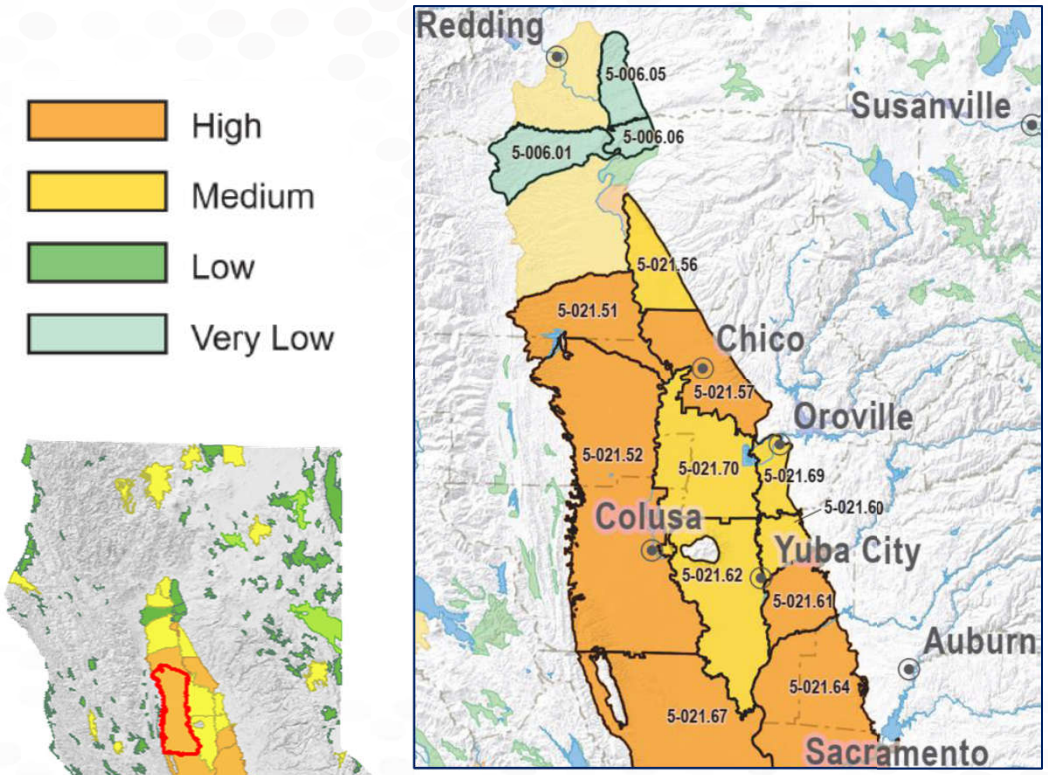
- Local Public Agencies Responsible for:
  - Water Management
  - Water Supply
  - Land Use Authority
    - *For Example: Cities, Counties, Irrigation Districts*
- One or more GSAs must be formed per Basin / Subbasin
- Formed by a single eligible agency or by legal agreement between two or more
- Counties represent / manage all groundwater conditions outside another managed area (Water Code §10724)

GSA Roles and Responsibilities

- Governance
- Outreach and Engagement
- Funding
- Information Gathering
- Plan Development and Reporting
- Projects (e.g. Groundwater Recharge)
- Groundwater Regulation and Enforcement
- Groundwater Extraction Oversight
- Property Acquisition and Management

SGMA Foundations

- 515 Groundwater Basins / Subbasins Statewide
- 98 Basins / Subbasins required to comply with SGMA*
- Compliance based on basin prioritization as mandated by State Legislature in 2009.
- Prioritization variables include (but not limited to):
  - Population
  - Socioeconomics
  - Number of wells
  - Groundwater elevations
  - Irrigated acres



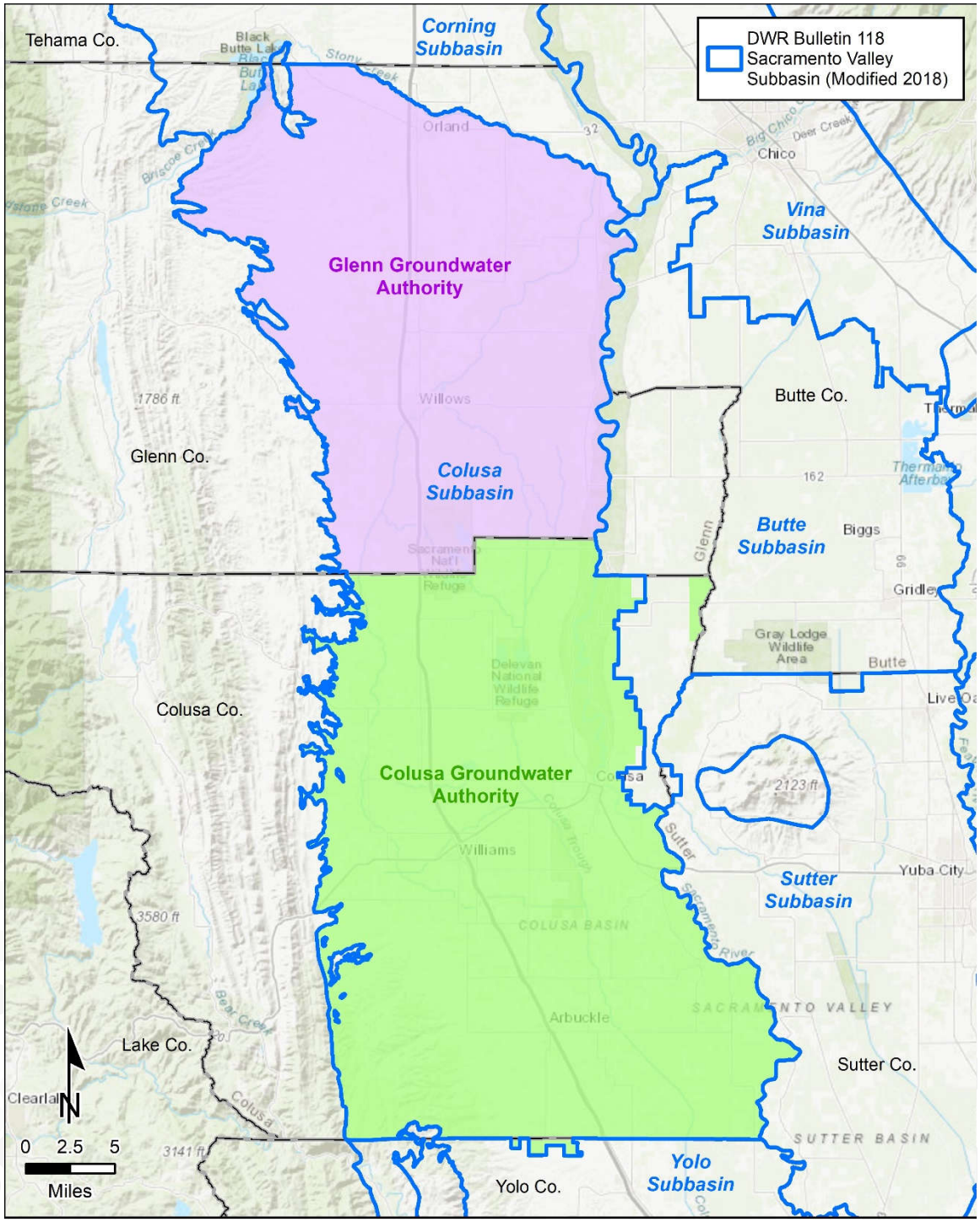
*Draft Prioritization Results as of September 2019

SGMA Foundations

Beneficial Users (Water Code §10723.2)

- All Groundwater Users
- Holders of Overlying Rights (agricultural and domestic)
- Municipal Well Operators
- Public Water Systems
- Tribes
- Local Land Use Planning Agencies
- Counties
- Local Landowners
- Disadvantaged Communities
- Businesses
- Federal Government
- Environmental Users
- Surface Water Users (*if connection between surface and groundwater*)

Colusa Subbasin Map



Colusa Groundwater Authority

Member Agencies / Board of Directors

County of Colusa
Denise Carter (Chair) / Alternate: Gary Evans

City of Colusa
Tom Reische / Alternate: Dave Markss

City of Williams
Alfred Sellers, Jr. / Alternate: Sajit Singh

Colusa County Water District
Knute Myers / Alternate: Shelly Murphy

Glenn-Colusa Irrigation District
Blake Vann / Alternate: Thad Bettner

Maxwell I.D. and Westside I.D.
Zachary Dennis / Alternate: Dan Ruiz

Princeton-Codora-Glenn I.D. and Provident I.D.
Jim Campbell / Alternate: Lance Boyd

RD 108
Hilary Reinhard, PE (Vice Chair)
Alternate: Bill Vanderwaal

RD 479
Charles Marsh / Alternate: Derick Strain

Colusa Drain Mutual Water Company
Jim Wallace / Alternate: Lynell Pollock

2 Private Pumper Representatives from the Colusa County Groundwater Commission:
Darrin Williams and Jeff Moresco

Glenn Groundwater Authority

Member Agencies / Board of Directors

County of Glenn
John Viegas / Alternate: Vince Minto

City of Orland
Bruce Roundy
Alternate: Pete Carr
2nd Alternate: Ed Vonasek

City of Willows
Gary Hansen / Alternate: Evan Markey

Glenn-Colusa Irrigation District
John Amaro / Alternate: Thaddeus Bettner

Glide Water District
George Nerli
Alternate: Leslie Nerli
2nd Alternate: Michael Alves

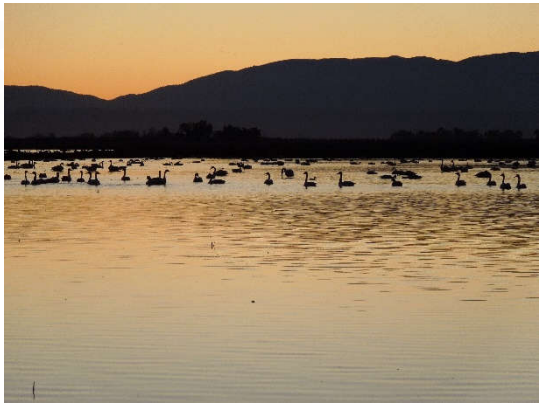
Princeton-Codora-Glenn I.D. and Provident I.D.
Gary Enos / Alternate: Lance Boyd

Kanawha Water District
Randy Hansen / Alternate: Wade Danley

Orland-Artois Water District
Charles Schonauer
Alternate: Emil Cavagnolo
2nd Alternate: Andrea Jones

Sustainability Indicators

Example GSP Section Requirements



1. **Administrative Information**
2. **Basin Setting**
3. **Sustainable Management Criteria**
4. **Monitoring Networks**
5. Projects and Management Actions
6. Technical & Reporting Standards
7. Interagency Agreements

Example GSP Section Requirements

- Administrative Information
  - –General Description of Area
    - Location, Land Uses, Well Information, Maps, etc.
  - –Notice and Communication
  - –Public Outreach
  - –Beneficial User Information and Input
  - –GSA Decision-Making

Example GSP Section Requirements

- Basin Setting
  - –Hydrogeologic Conceptual Model (HCM)
  - –Groundwater Conditions
  - –Water Budget
  - –Management Areas (if applicable and selected by the GSA)

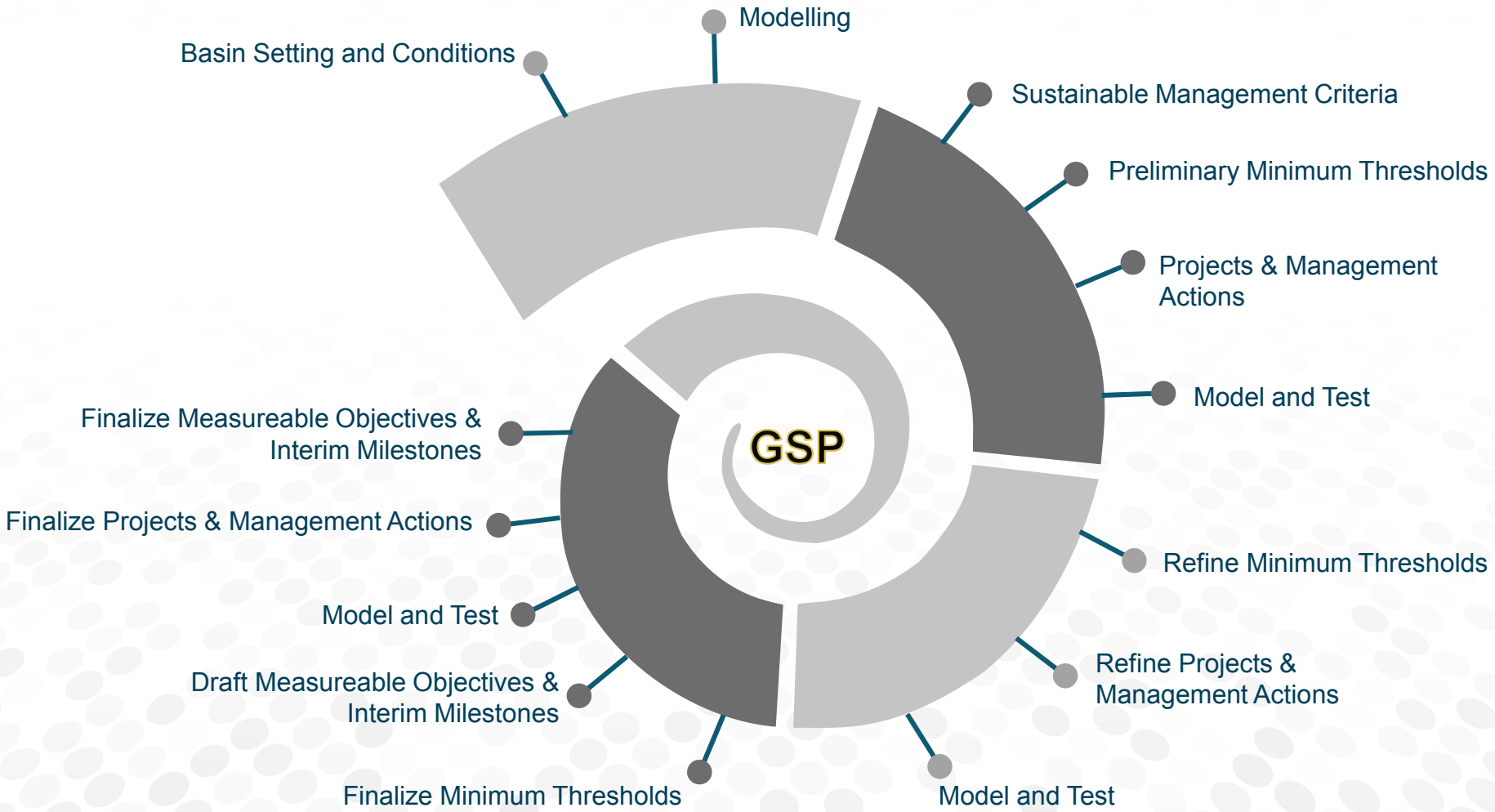
Example GSP Section Requirements

- Sustainable Management Criteria
  - –Sustainability Goal
  - –Undesirable Results
  - –Minimum Thresholds
  - –Interim Milestones
  - –Measurable Objectives

Example GSP Section Requirements

- Monitoring Networks
  - Network Objectives for each Sustainability Indicator
  - Scientific Rationale
  - Monitoring Protocols
  - Locations and Type
  - Data and Reporting Standards
  - Assessment and Improvement Methods

GSP Iterative Process



Thank You

Beneficial User input is essential to GSP development and SGMA planning and implementation.

Please visit the websites or contact Staff to get on the contact list:

Mary Fahey
Water Resources Manager, Colusa Groundwater Authority
530-458-0719
CGA Website: https://colusagroundwater.org/

Lisa Hunter
Program Manager, Glenn Groundwater Authority
530-934-6501
GGA Website: https://www.countyofglenn.net/dept/agriculture/water-resources/glenn-groundwater-authority

SGMA Basin Setting
Colusa Subbasin

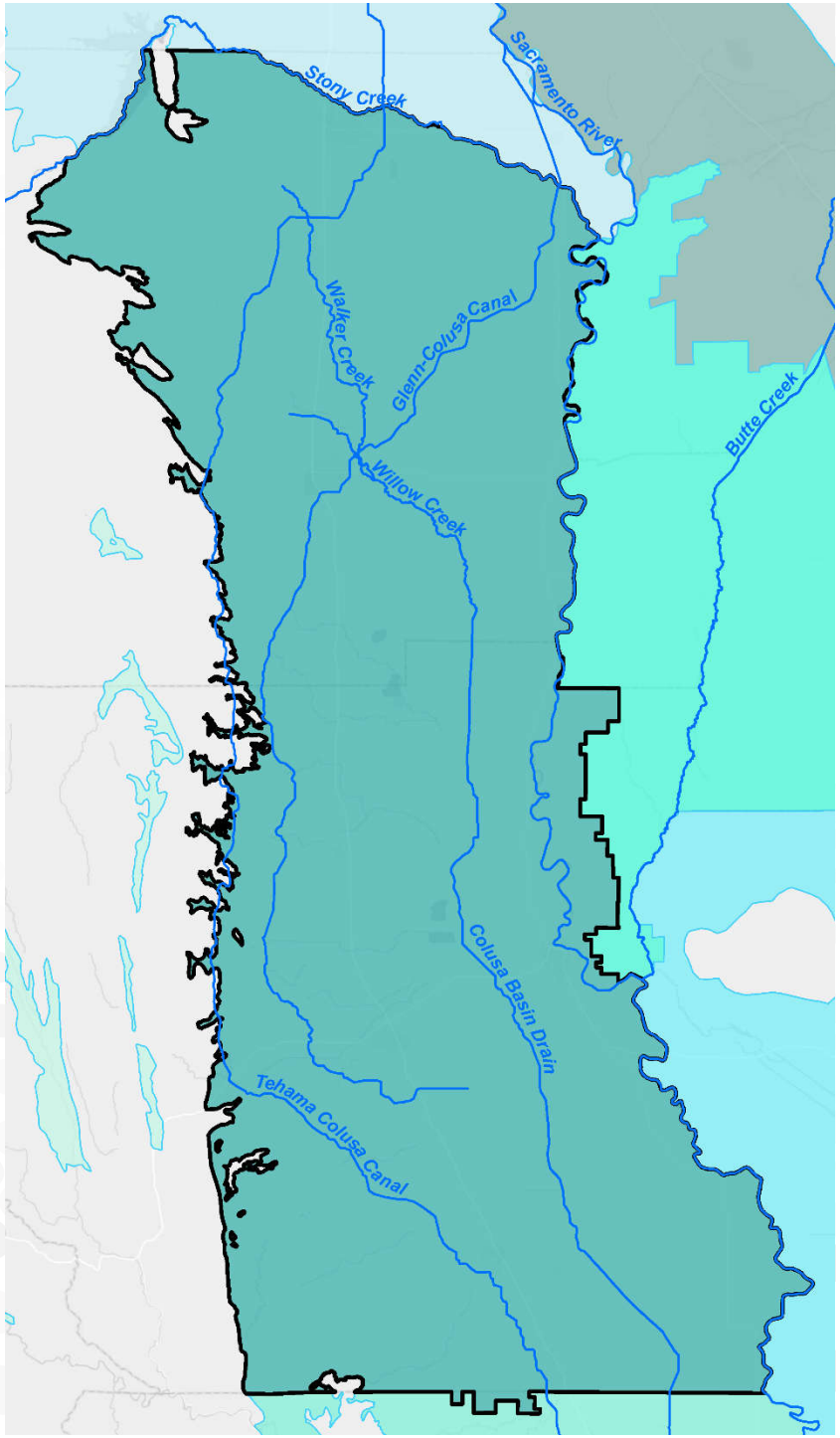
Ken Loy, CHG – West Yost Associates

Dave Ceppos – Facilitator, Sacramento State University

Byron Clark, PE – Davids Engineering

Session Agenda

- Basin Setting Presentation
  - SGMA Definitions
  - Colusa Subbasin Overview
  - Groundwater Flow in Alluvial Basins
  - Stream-Aquifer Interactions
  - Colusa Subbasin HCM
  - Colusa Subbasin Groundwater Conditions
- Small Group Discussions
- Water Budget Update
- Modelling Update



Basin Setting

"Basin Setting"

Definition

(23 CCR § 354.12)

"… physical setting ... characteristics ... and current conditions of the basin … including … **data gaps** and **levels of uncertainty** … that serve as the basis for defining and assessing reasonable **sustainable management criteria** and projects and management actions."

Includes

- Hydrogeologic Conceptual Model (HCM)
- Groundwater Conditions
- Water Budget
- Management Areas (if applicable)

Logical Progression of Basin Activities Needed to Increase Basin Sustainability

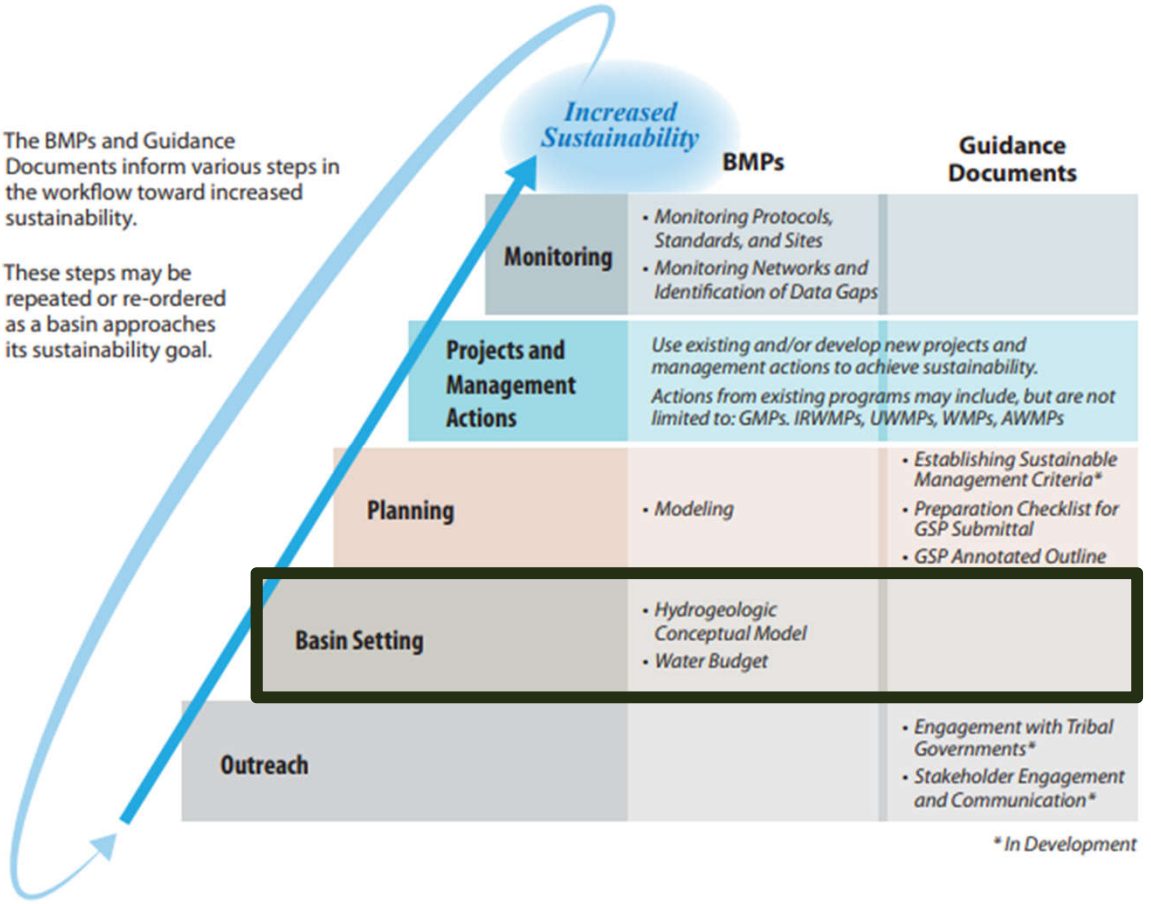


Image Source: DWR, Framework BMP, December 2016.

“Data Gaps” and “Uncertainty”

- **Data Gaps** refer to a lack of information that significantly affects the understanding of the basin setting.
- **Uncertainty** refers to a lack of understanding of the basin setting that affects an Agency's ability to develop sustainable management criteria, appropriate projects, and management actions in a Plan.
- **Data Gaps** and **Uncertainty** may limit the ability to evaluate the efficacy of Plan implementation and to assess whether a basin is being sustainably managed.

"Sustainability Indicators" and Sustainable Management Criteria

- **<u>Sustainability Indicators</u>** refer to any of the effects caused by groundwater conditions that can cause undesirable results with regard to:
  - Groundwater levels
  - Groundwater storage
  - Seawater intrusion
  - Water quality
  - Land subsidence
  - Interconnected surface water

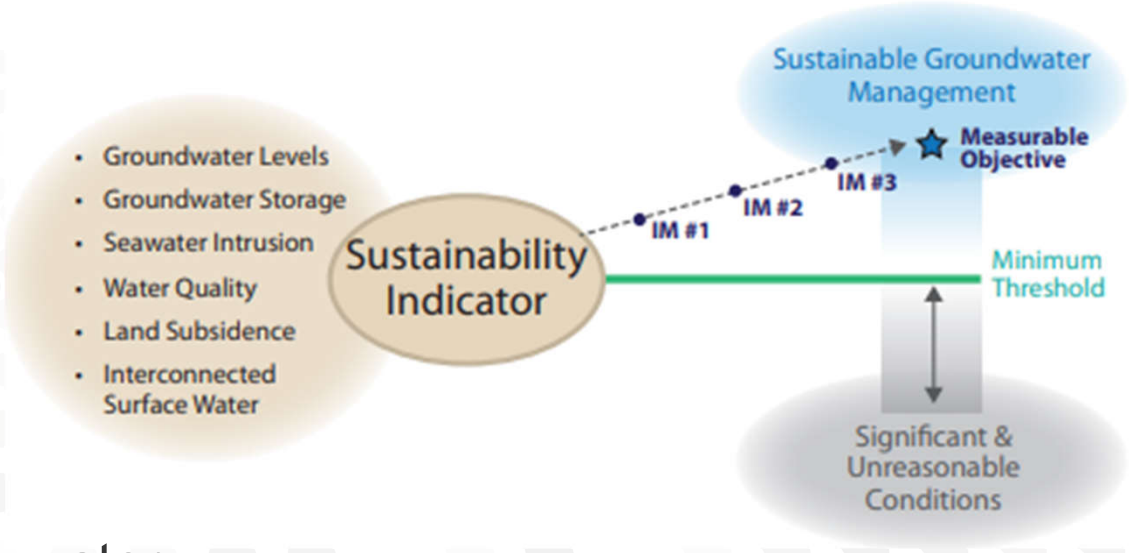
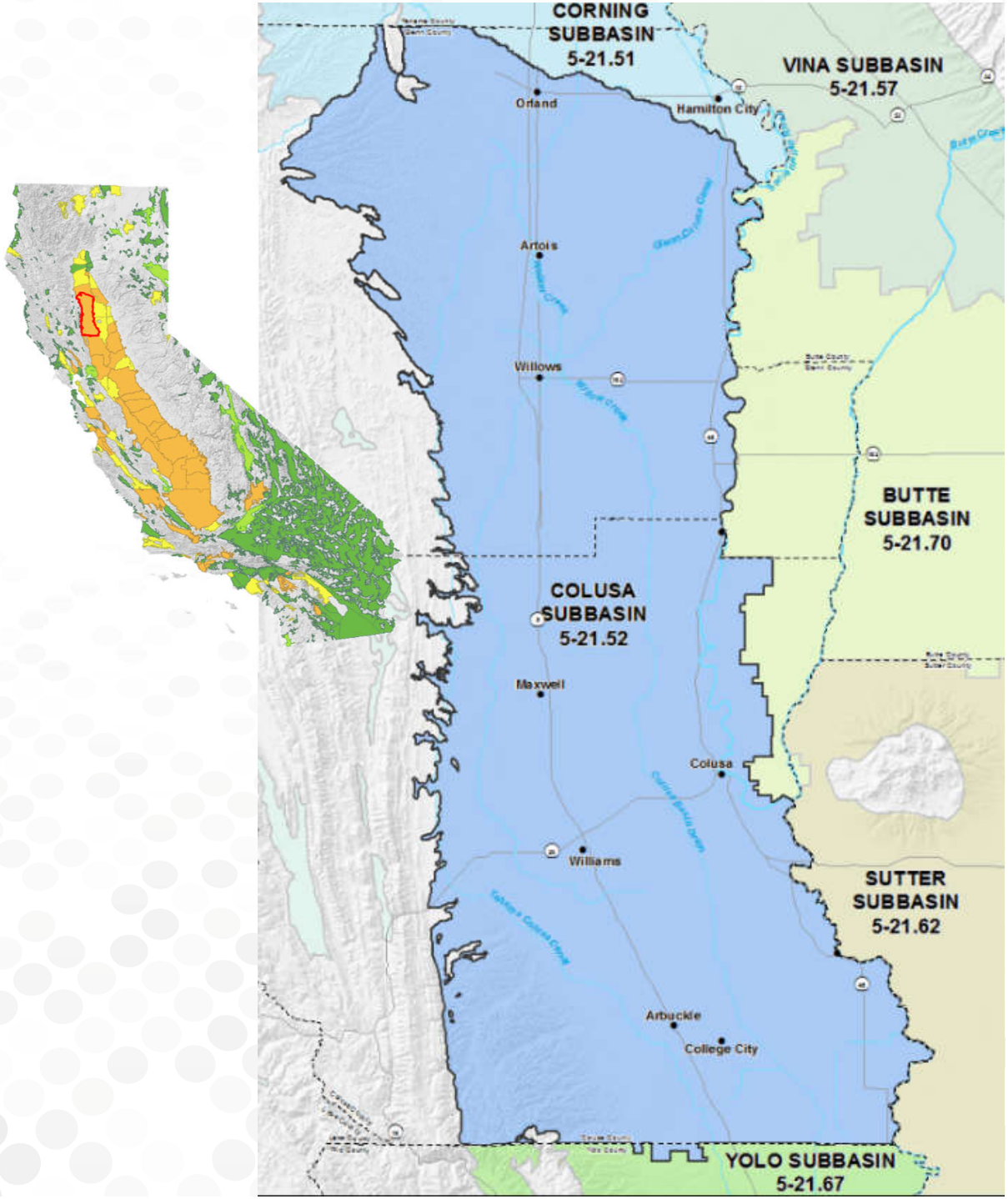


Image Sources: DWR, GSP Emergency Regulations Guide, July 2016.

Colusa Subbasin

- Largest Subbasin in the Sacramento Valley
- 724,000-acre Area
- 60 miles North-South
- 20 miles East-West
- 1,500 ft Thickness



Groundwater Flow in Alluvial Basins

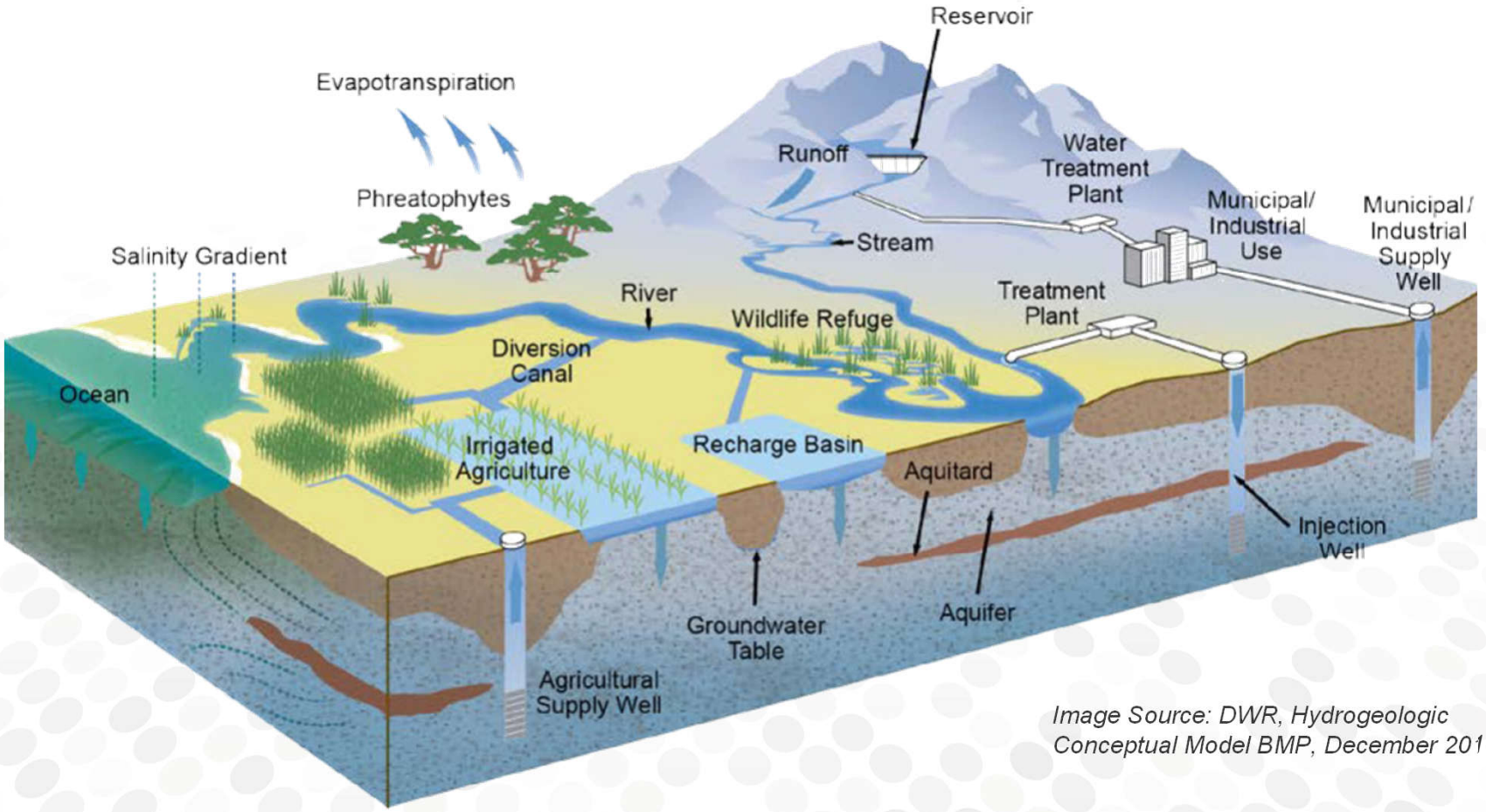
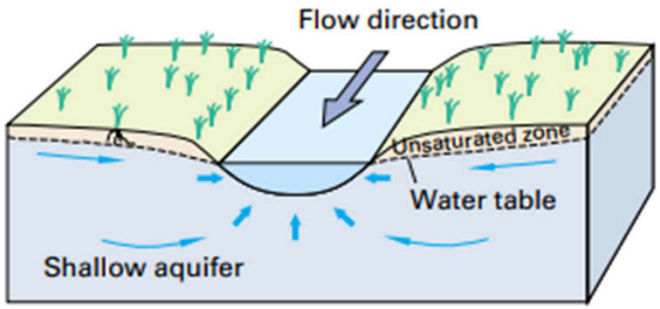


Image Source: DWR, Hydrogeologic Conceptual Model BMP, December 2016.

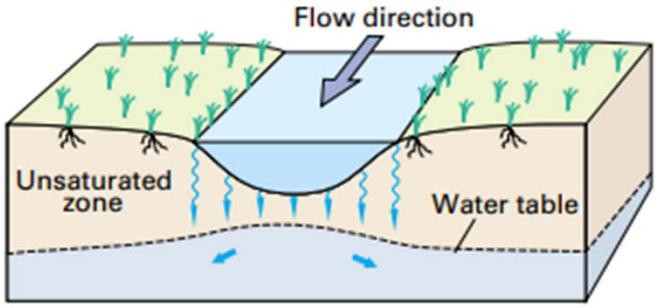
Stream – Aquifer Interactions

GAINING STREAM



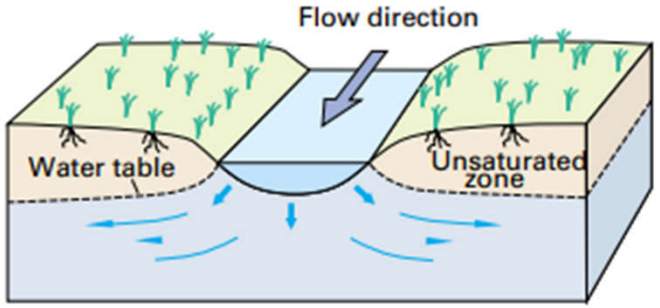
Gaining streams receive water from the groundwater system.

DISCONNECTED STREAM



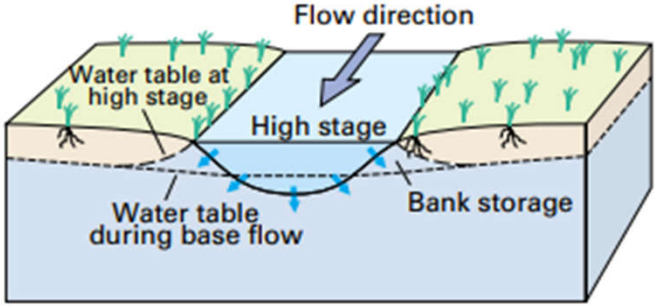
Disconnected streams are separated from the ground water system by an unsaturated zone. For disconnected streams, losses are independent of the groundwater level.

LOSING STREAM



Losing streams lose water to the groundwater system.

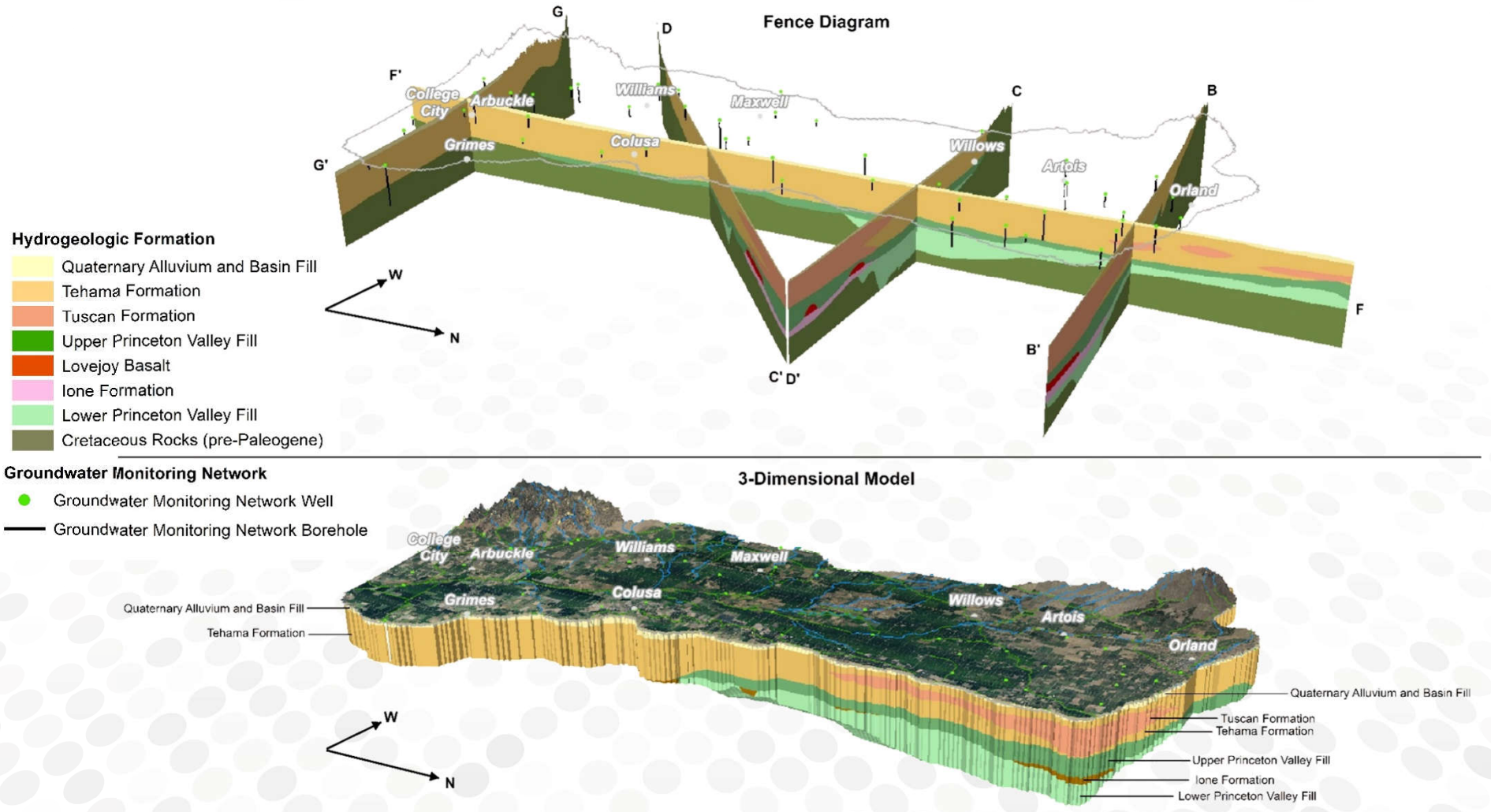
BANK STORAGE



If stream levels ride higher than adjacent groundwater levels, stream water moves into the streambanks as bank storage.

Image Source: Sacramento Valley Groundwater Assessment, prepared for Northern California Water Association, June 2014.

Hydrogeologic Conceptual Model



Vertical Exaggeration=10x

Image Source: Hydrogeologic Conceptual Model Report, May 2018.

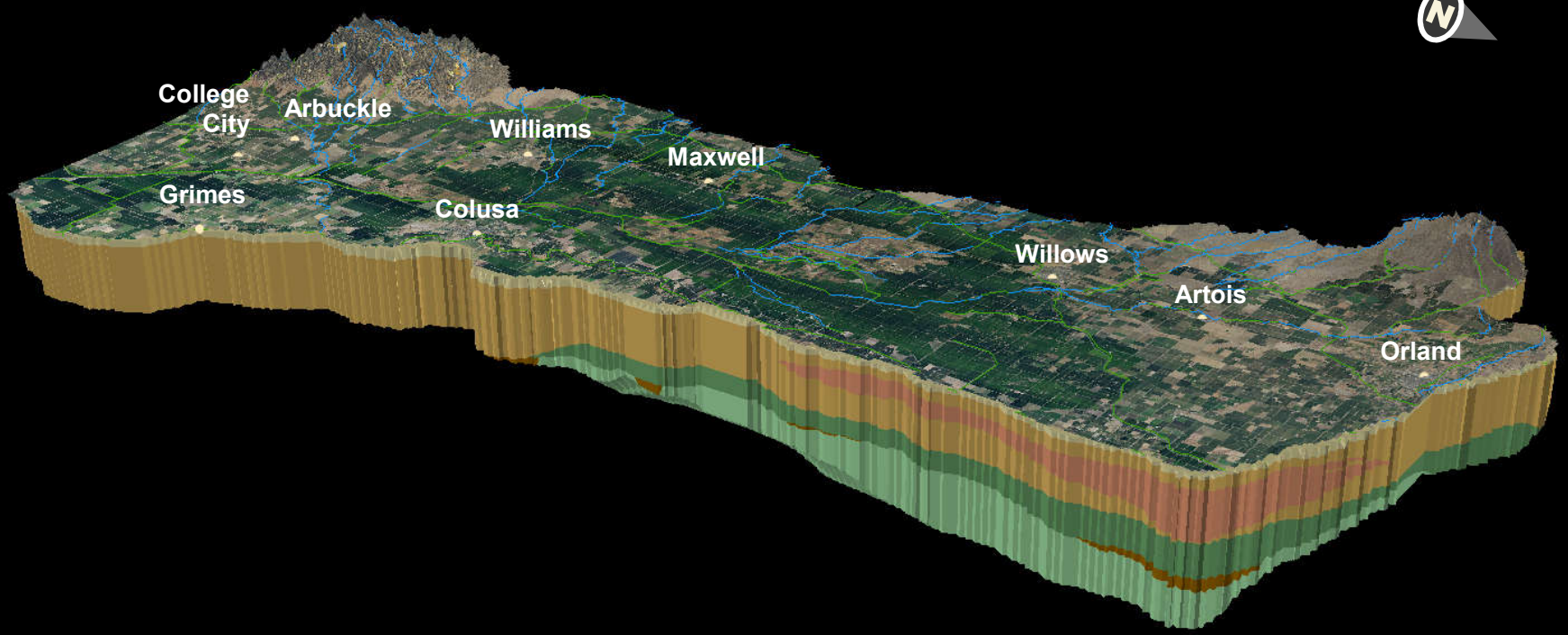
Hydrogeologic Conceptual Model

Canal / Ditch
Stream / River

Alluvium
Tehama Formation
Tuscan Formation
Upper Princeton Valley Fill
Ione Formation
Lower Princeton Valley Fill

Vertical Exaggeration=1x

Hydrogeologic Conceptual Model



Canal / Ditch
Stream / River

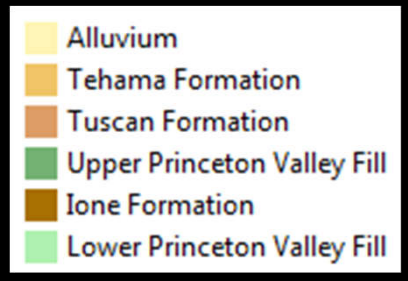
Alluvium
Tehama Formation
Tuscan Formation
Upper Princeton Valley Fill
Ione Formation
Lower Princeton Valley Fill

Vertical Exaggeration=10x

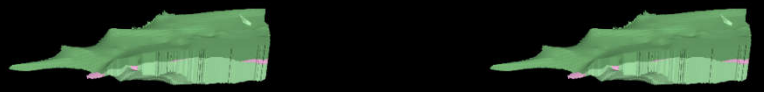
Improved Understanding of Principal Aquifers

Stacked Formations	Principal Aquifers	Geologic Formation
		Young Alluvium
		Tehama Formation
		Tuscan Formation

Vertical Exaggeration=10x

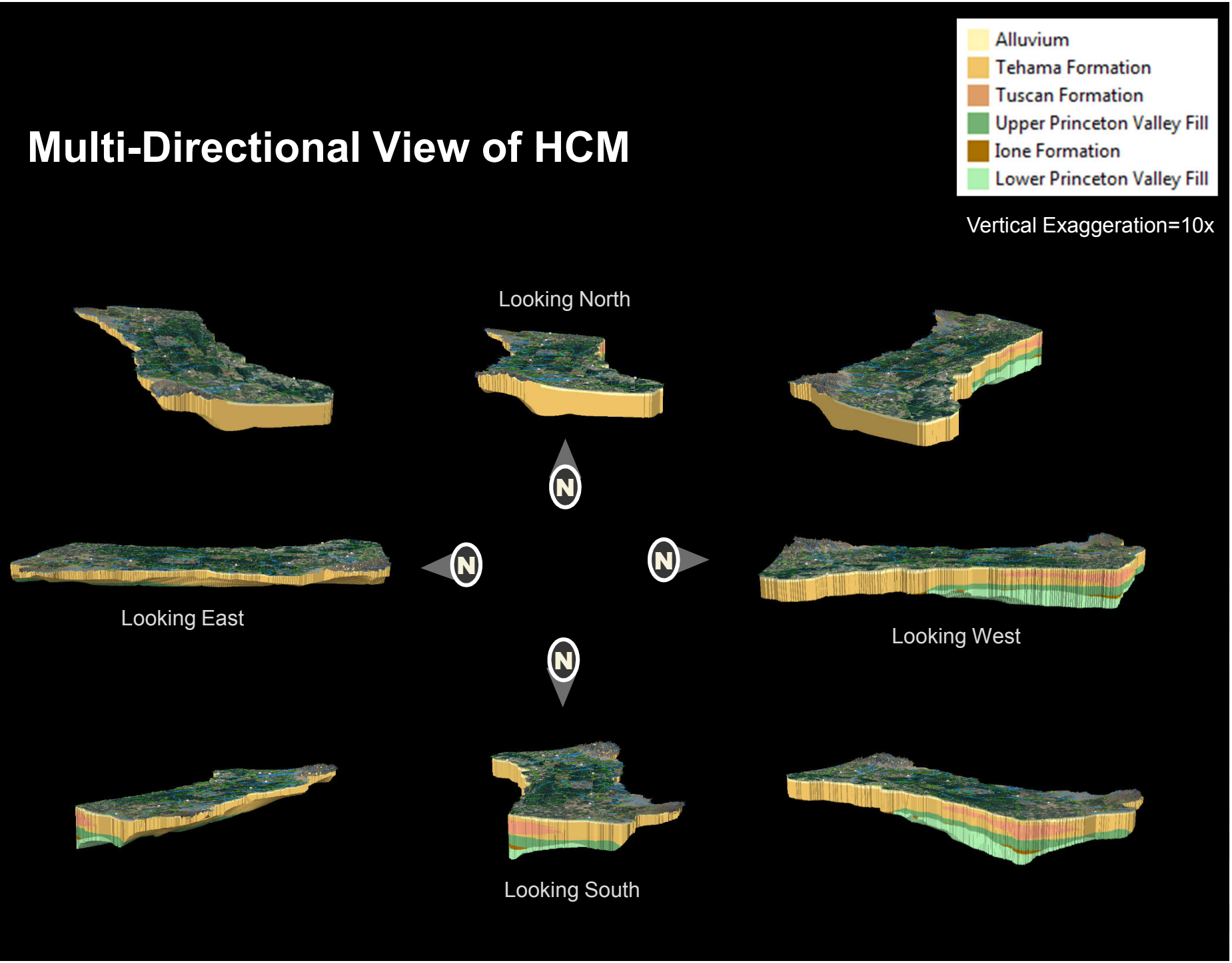


Below Geologic Base of Freshwater



Upper Princeton Valley Fill
Ione Formation
Lower Princeton Valley Fill

Multi-Directional View of HCM



Cross Section B-B’

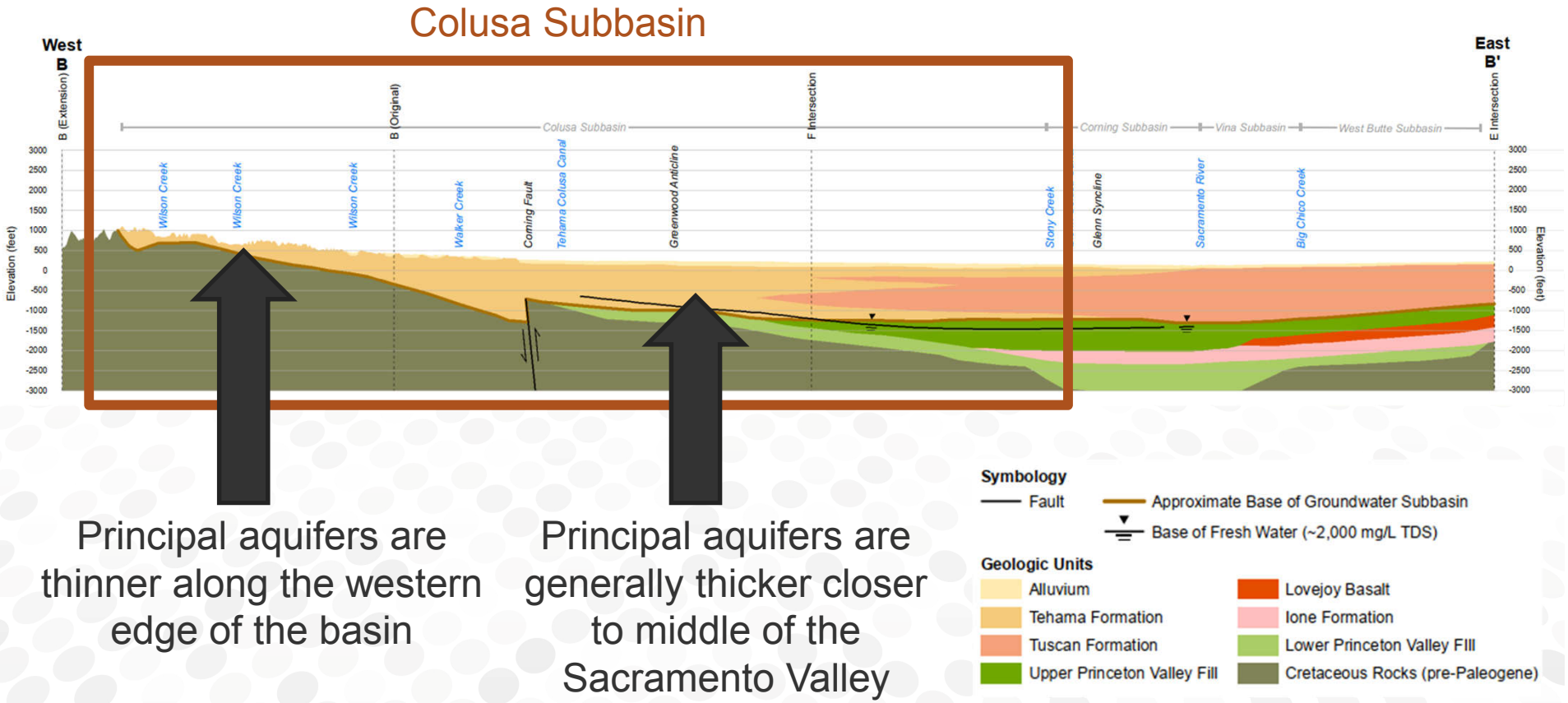
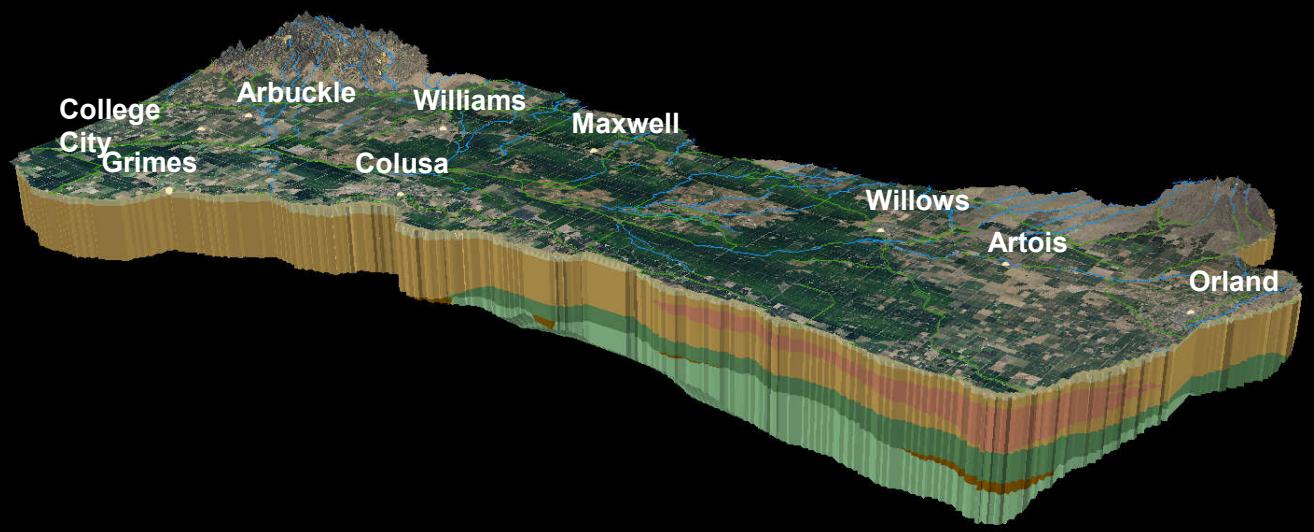


Image Source: Hydrogeologic Conceptual Model Report, May 2018.

Water Movement Through the HCM

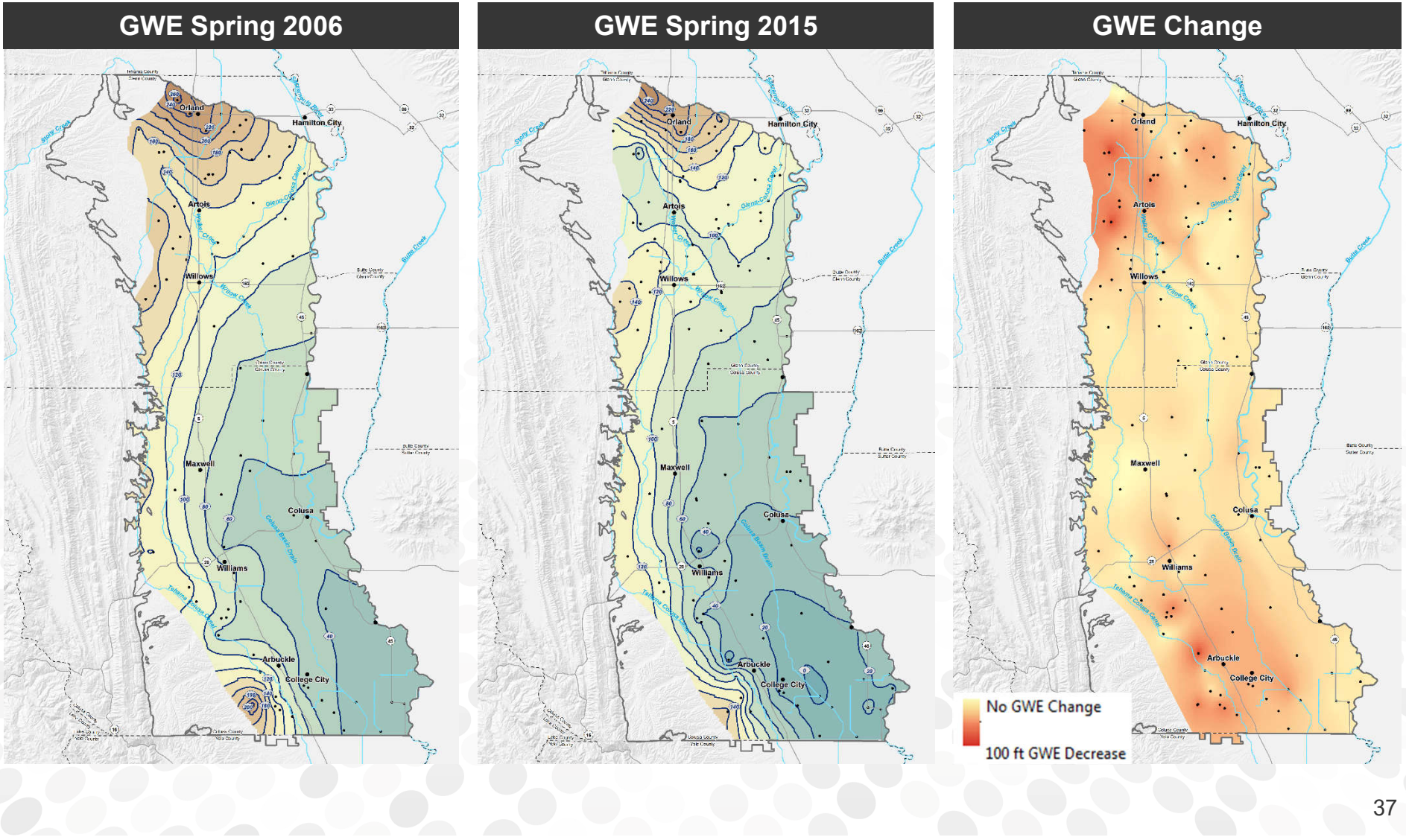


Major Water Budget Components

- Precipitation Recharge
- Applied Water Recharge
- Evapotranspiration
- Pumping & Injection
- Surface Water Inflows & Outflows
- Stream - Aquifer Interactions
- Underflow

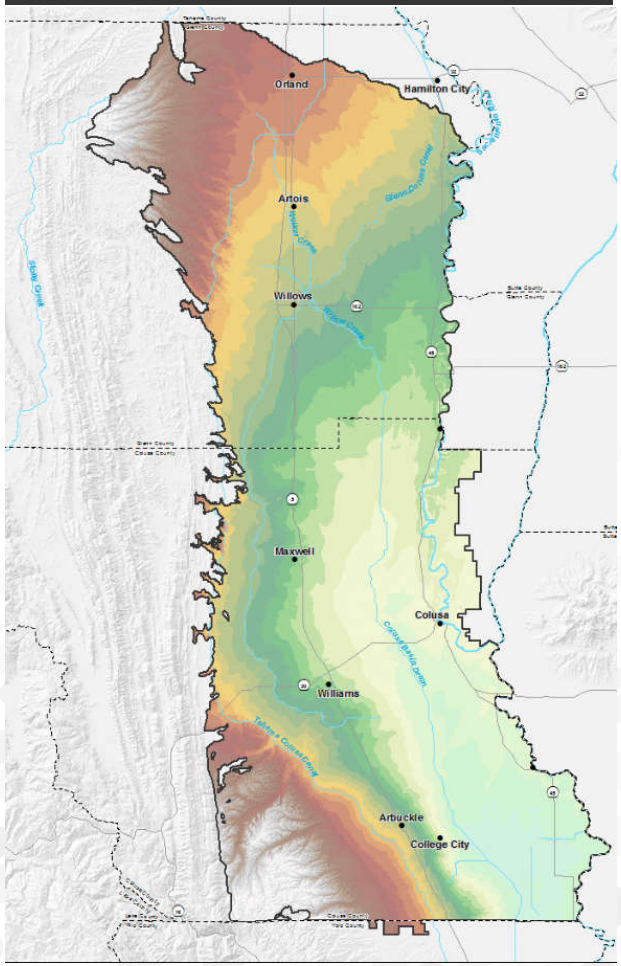
Vertical Exaggeration=10x

Groundwater Elevation - Change 2006 to 2015

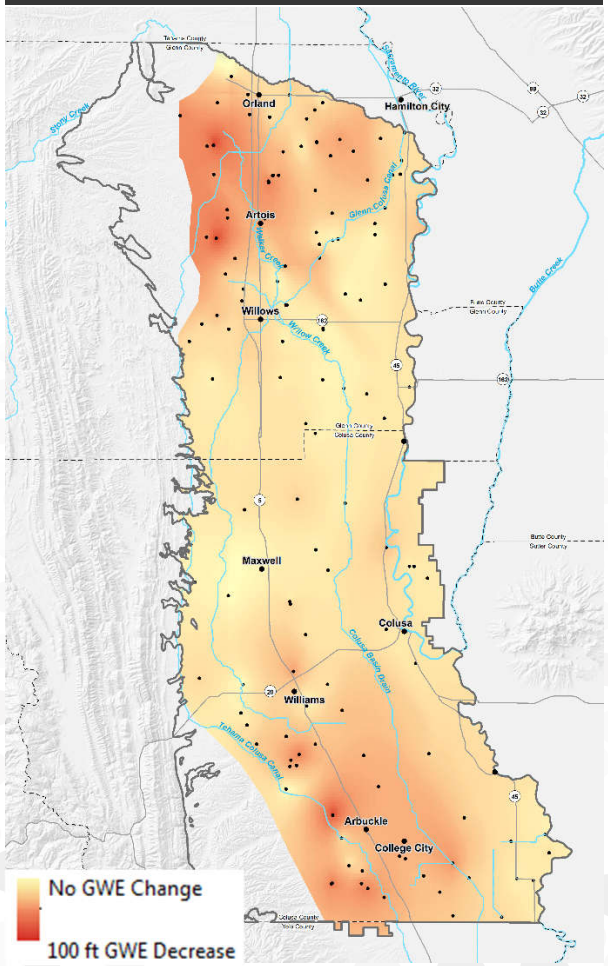


Groundwater Elevation - Change 2006 to 2015

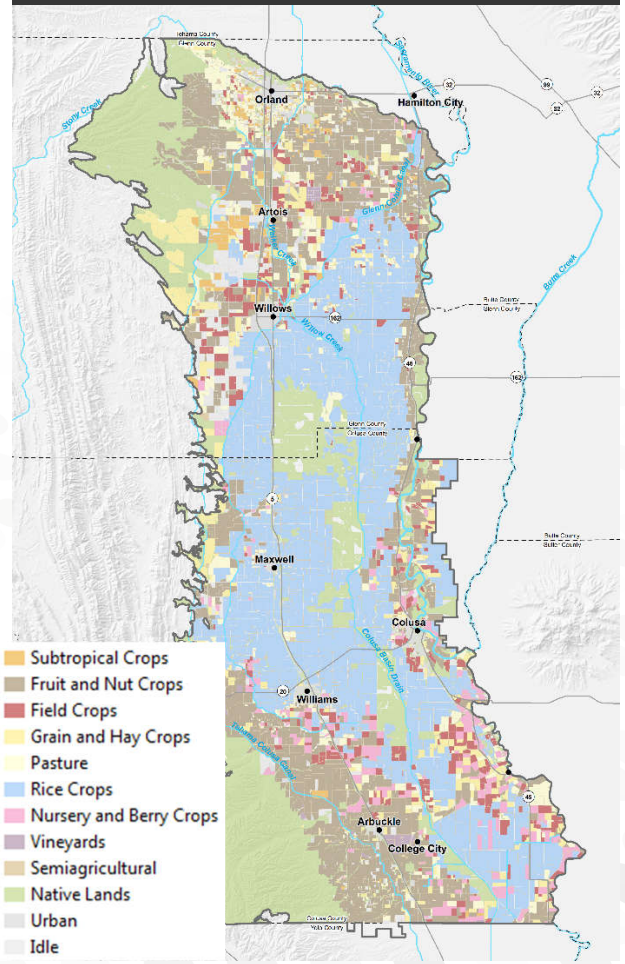
Land Surface Elevation



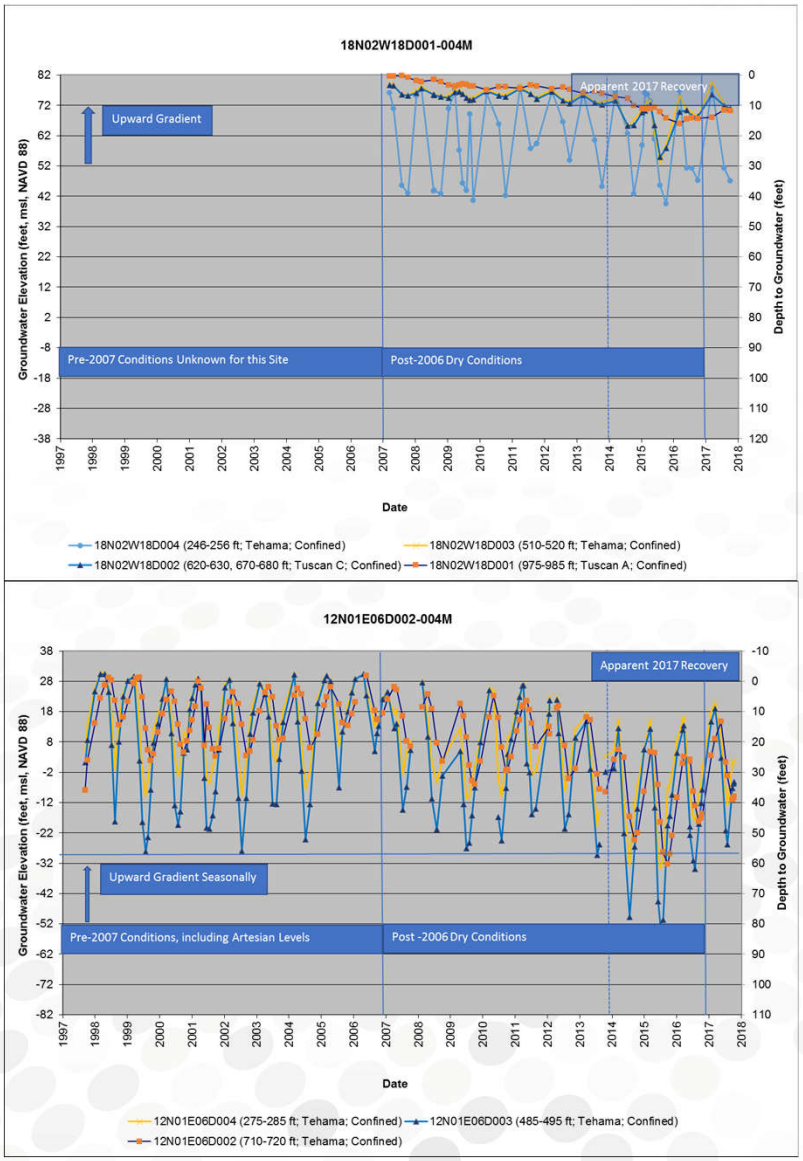
GWE Change

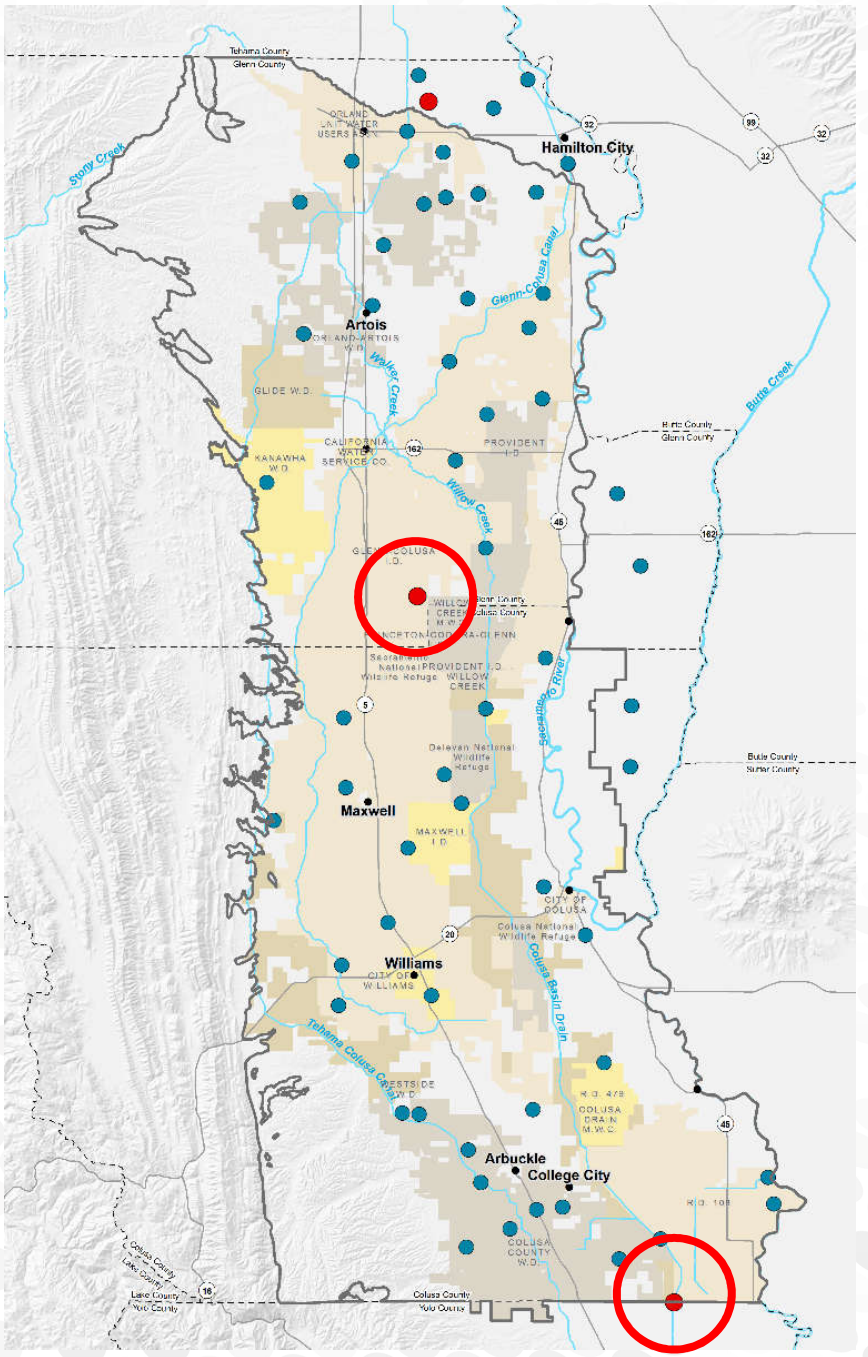


2014 Land Use



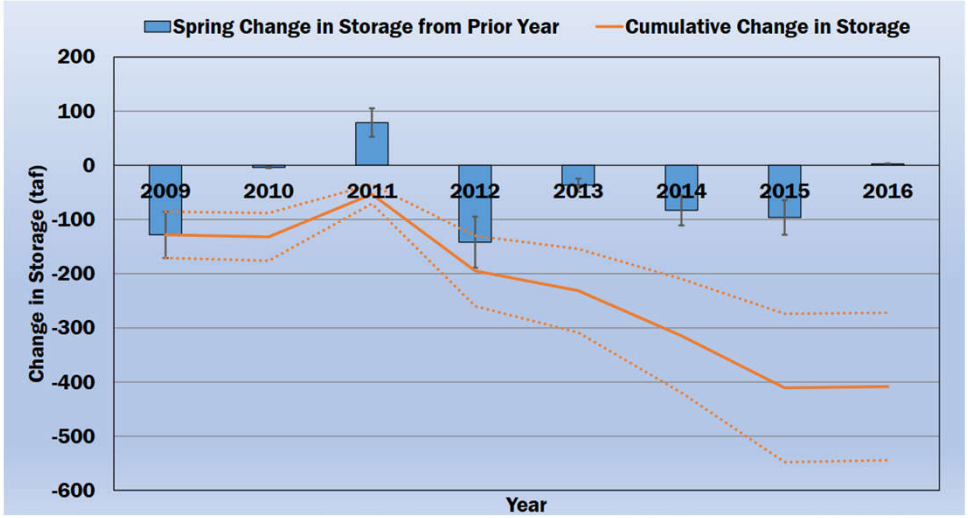
Hydrographs





Colusa Subbasin Groundwater Storage

Colusa County



Glenn County

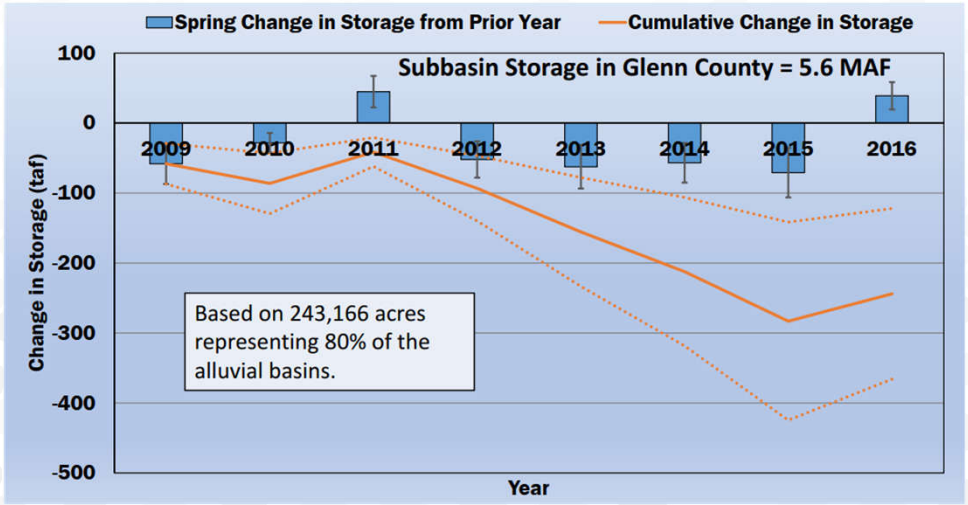


Image Sources:
Groundwater Conditions in Colusa County Relative to Final Groundwater Sustainability Plan Regulations, July 2016.
Glenn County Reconnaissance-Level Groundwater Sustainability Risk Assessment, May 2017.

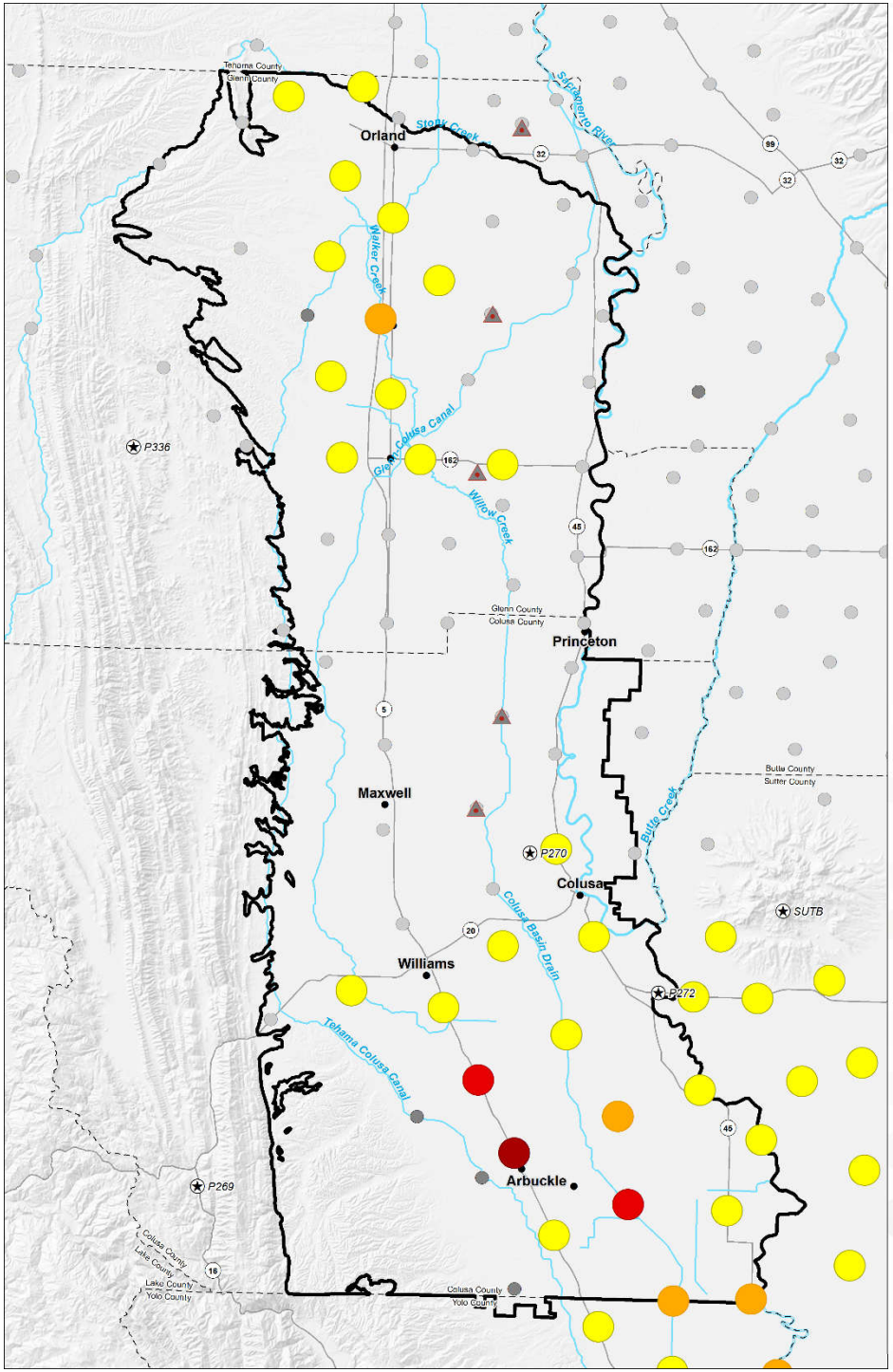
Groundwater Storage

- Storage reduced during multiple-year drought but early analysis indicates recovery.

Groundwater Quality

- Current groundwater quality is generally “good” with potential for some isolated issues.
- Focus will be on impacts to groundwater quality due to activities after implementation of Colusa Subbasin GSP.
- Existing water quality monitoring programs are sufficient and not expected to change due to GSP implementation.

Land Subsidence Survey

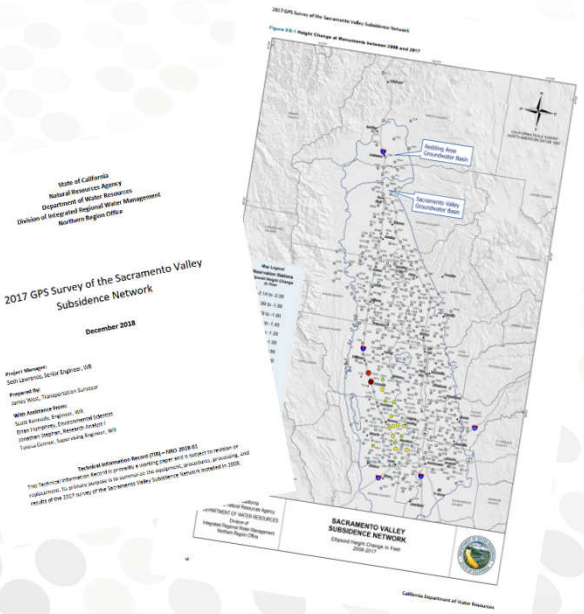


- Continuous GPS Station
- Extensometer

Sacramento Valley Subsidence Benchmarks with 2008 to 2017 Height Difference

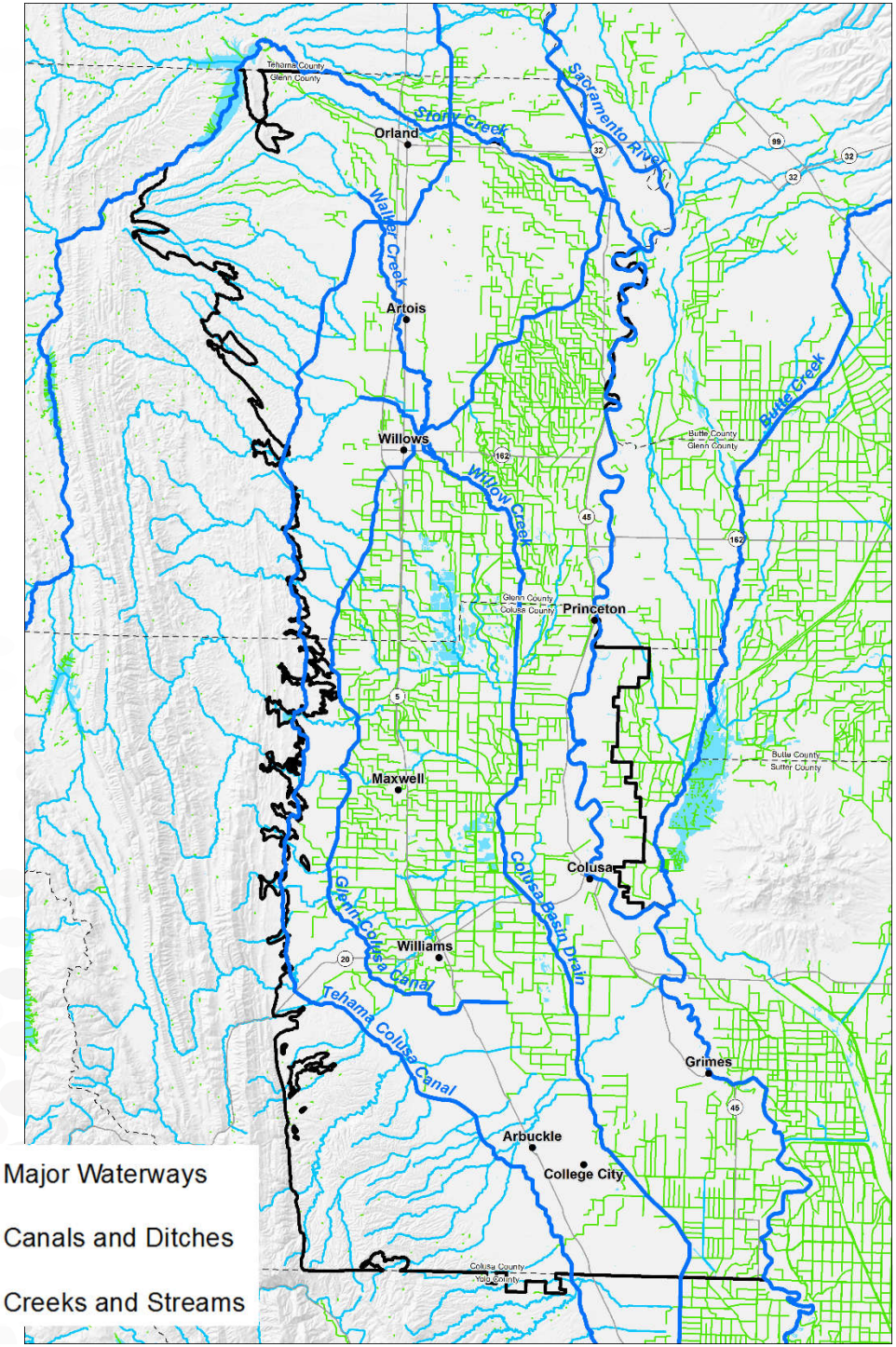
- ≥2 feet
- 1 - <2 feet
- 0.5 - <1 foot
- 2 - <6 inches
- < 2 inches
- New Benchmark or Not Surveyed

2017 GPS Survey Sacramento Valley Subsidence Network, December 2018



Interconnected Surface Waters

- Interconnected surface waters exist within Colusa Subbasin.
- There is uncertainty regarding how groundwater use under the Colusa Subbasin GSP would impact these surface waters.
- Numerical modelling will be used to evaluate impacts to interconnected surface waters.

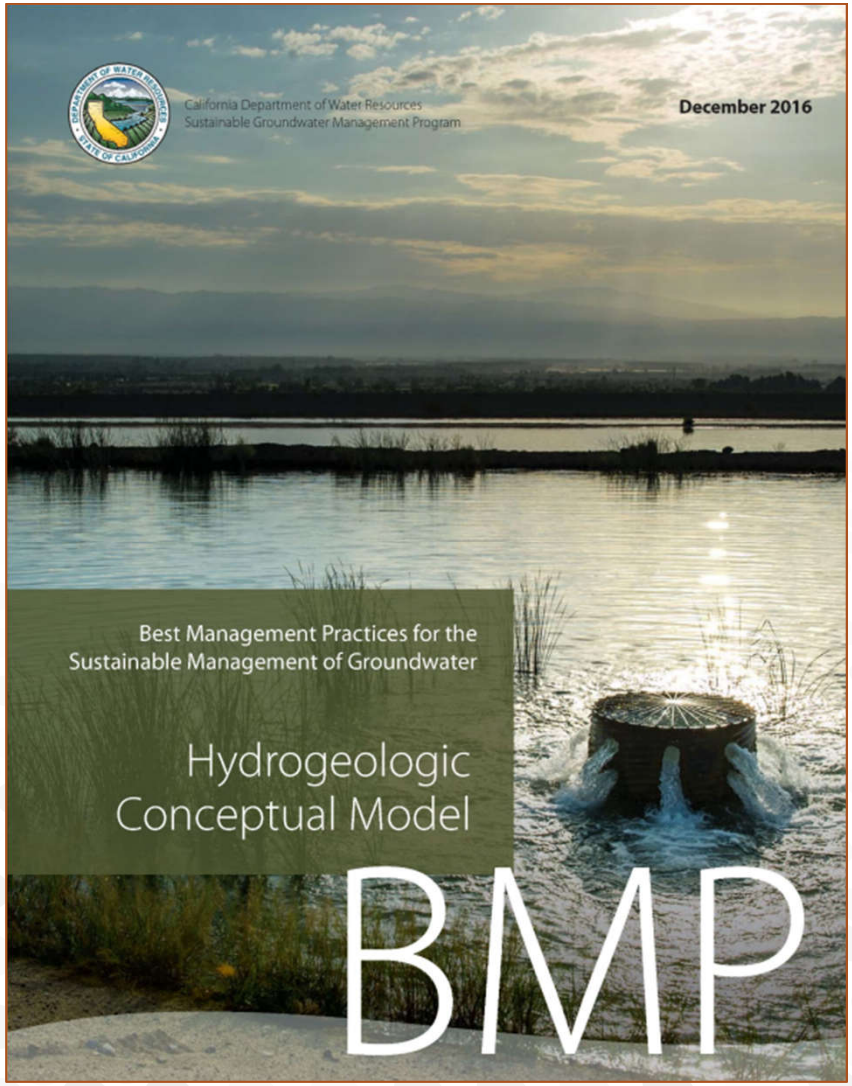


Additional HCM Information

- HCM Fundamentals
- Technical Assistance
- Key Definitions
- Related Materials

- Google:

"SGMA HCM BMP"



Questions?

Ken Loy, CHG
Principal Hydrogeologist - West Yost Associates
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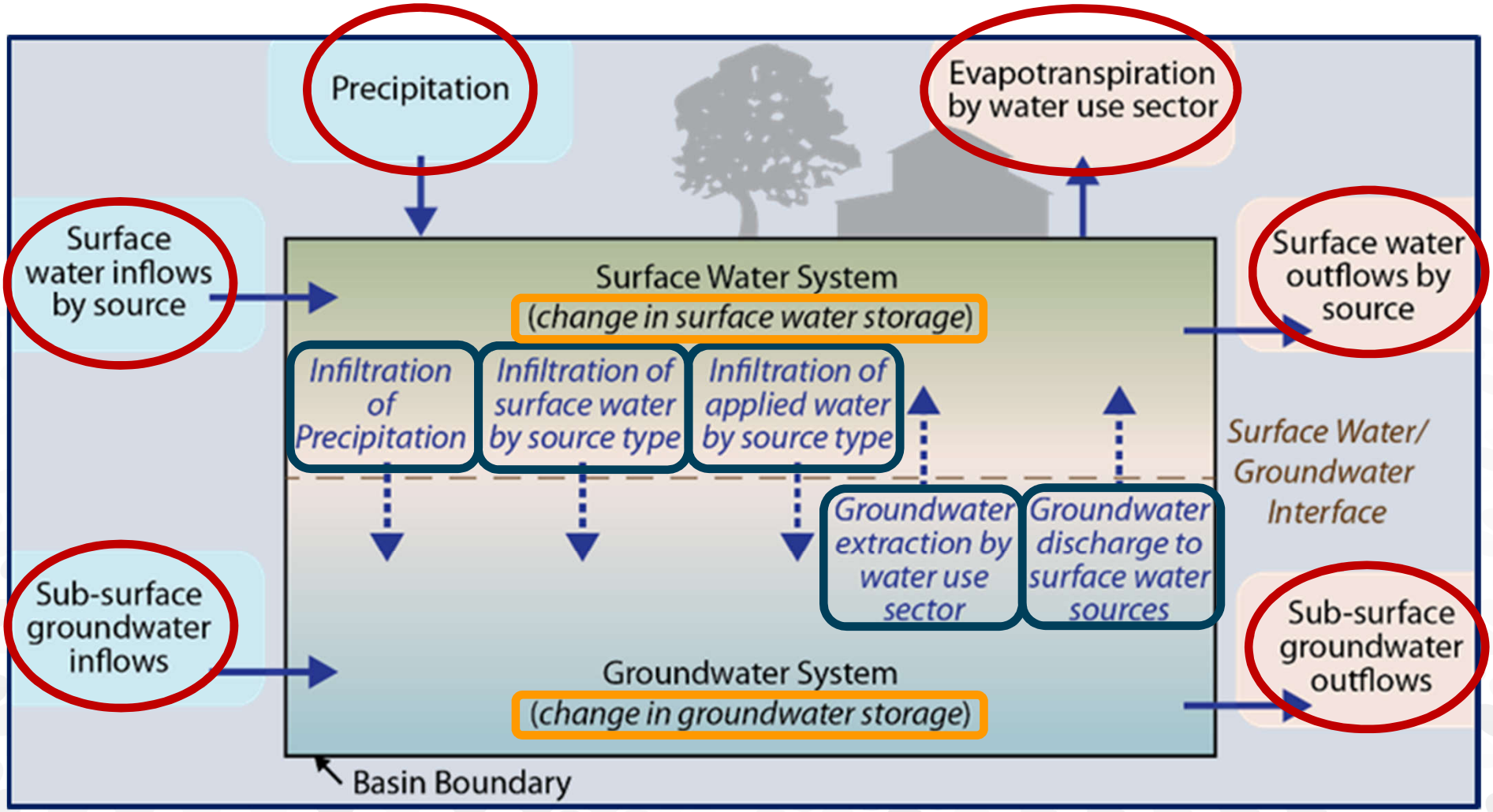
Small Group Discussions – Subbasin Challenges

Water Budget Update

Water Budget Overview

- Explicitly required for inclusion in the GSP (§354.18)
- Complete accounting of inflows, outflows, and change in storage
- Just like a checking account:
  - Deposits – Withdrawals = Balance Change, or
  - Inflows – Outflows = Change in Storage
- Grounded in data
- Must be developed for historical, current, and potential future conditions
- Supported by development of an Integrated Hydrologic Model

Water Budget Components



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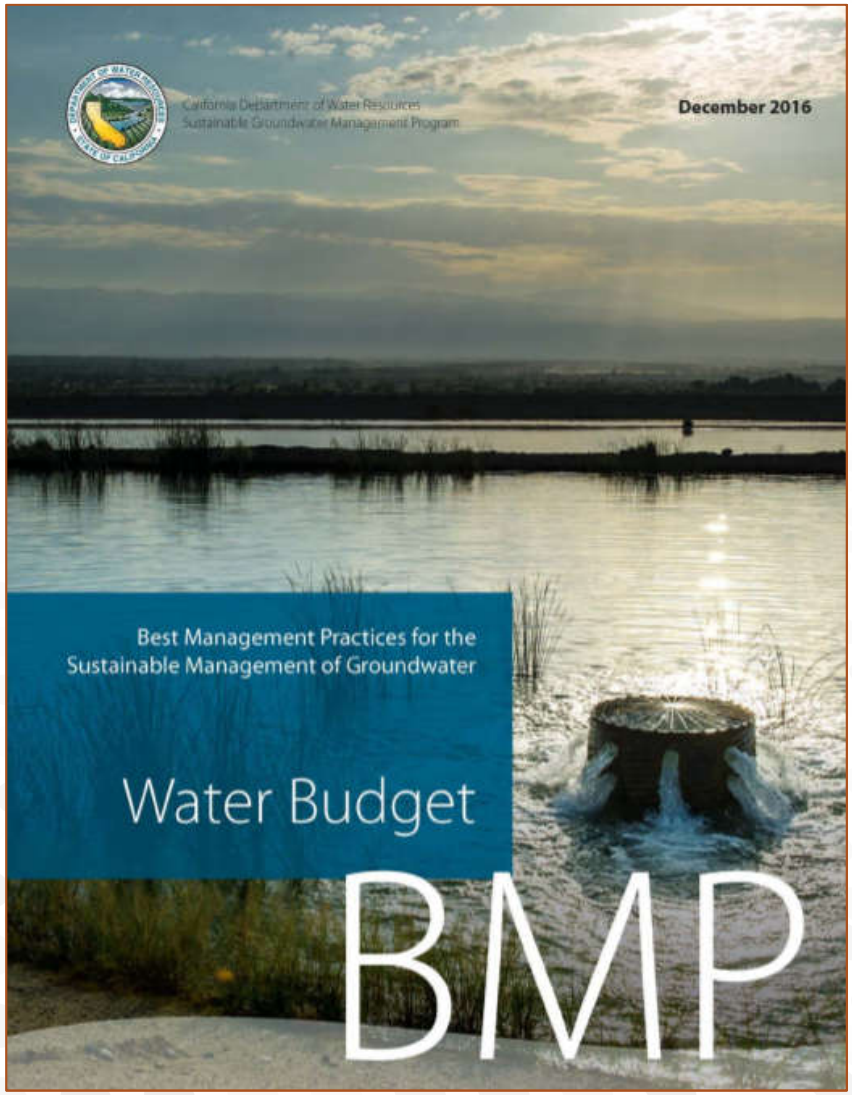
"SGMA Water Budget BMP"



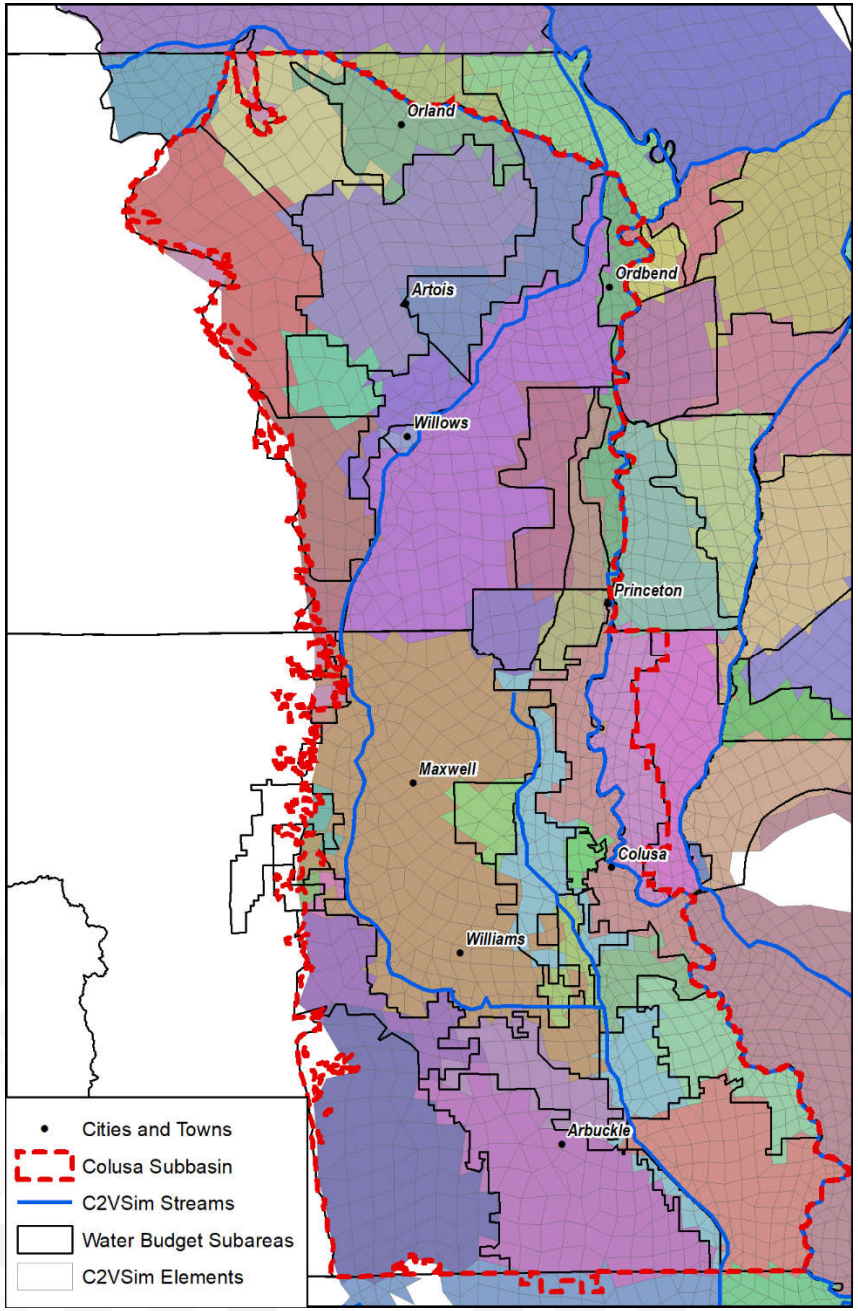
Questions?

Byron Clark, PE
Supervising Engineer – Davids Engineering
byron@davidsengineering.com

Modelling Update

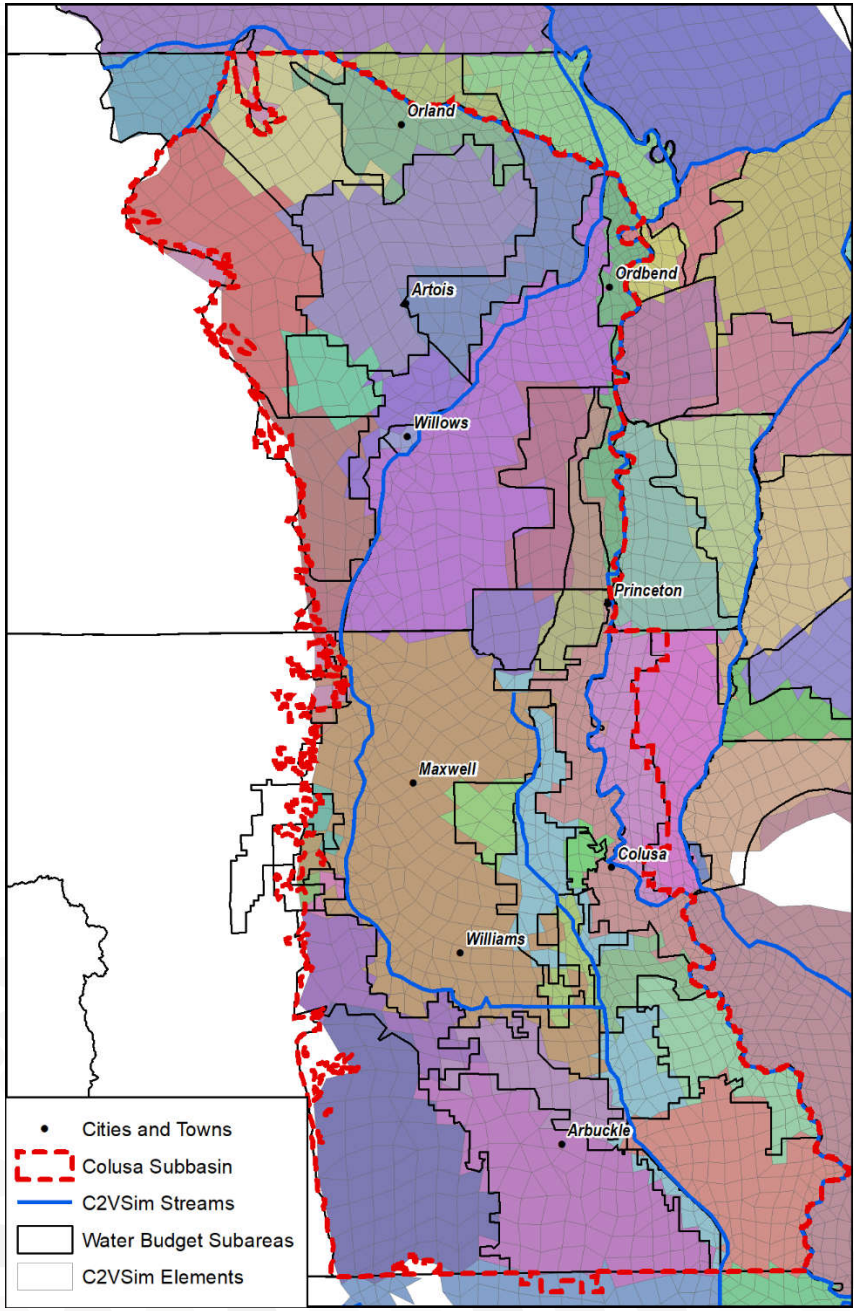
Integrated Hydrologic Model Overview

- Simulates movement of water in the basin over time
- Based on DWR's California Central Valley Groundwater-Surface Water Simulation Model (C2VSim)
- Refined for Local Use
  - Land Use
  - Surface Water Diversions
  - Aquifer Parameters
- Calibrated Based on Measured Data
  - Groundwater levels
  - Streamflows



Integrated Hydrologic Model Uses

- Water Budgets
  - Historical
  - Current
  - Projected
- Sustainable Management Criteria
  - Groundwater levels and storage
  - Stream gains and losses
- Projects and Management Actions
  - Level and storage changes
  - Area of benefit

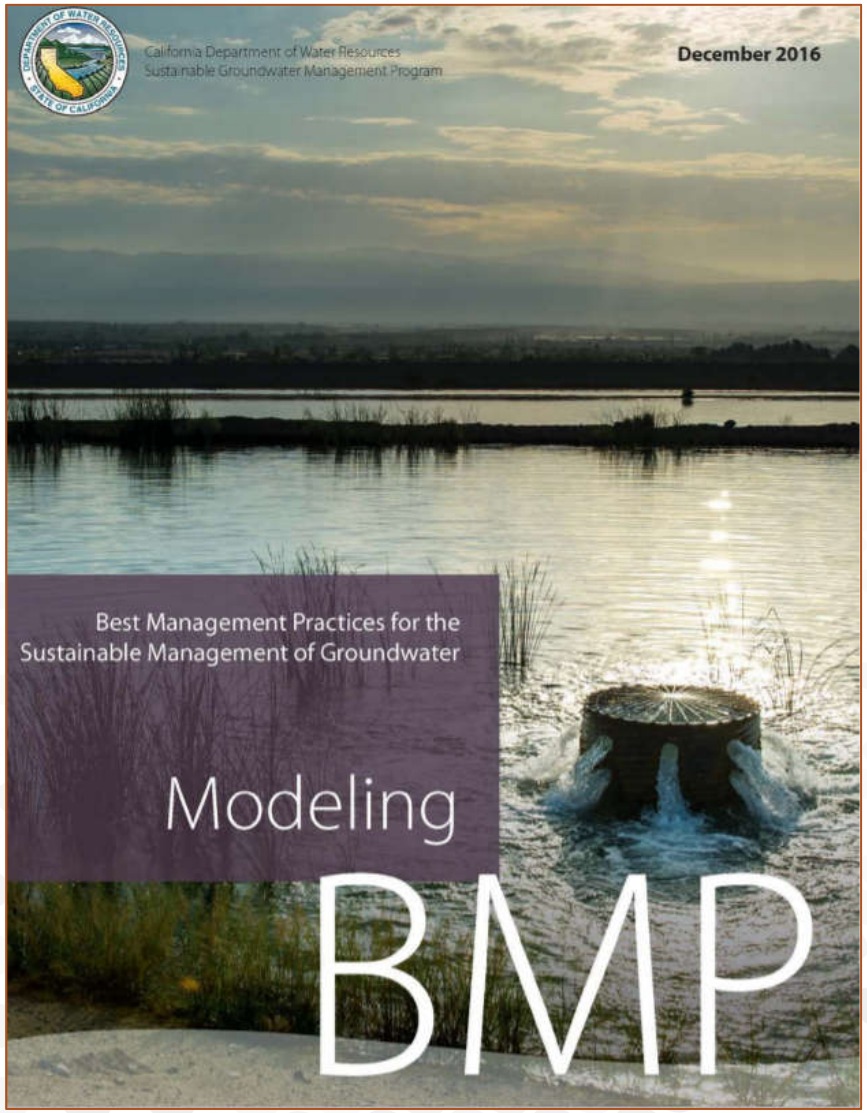


Additional Modeling Information

- Modeling Fundamentals
- Technical Assistance
- Key Definitions
- Related Materials

- Google:

"SGMA Modeling BMP"



Questions?

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Groundwater Sustainability Planning
Next Steps

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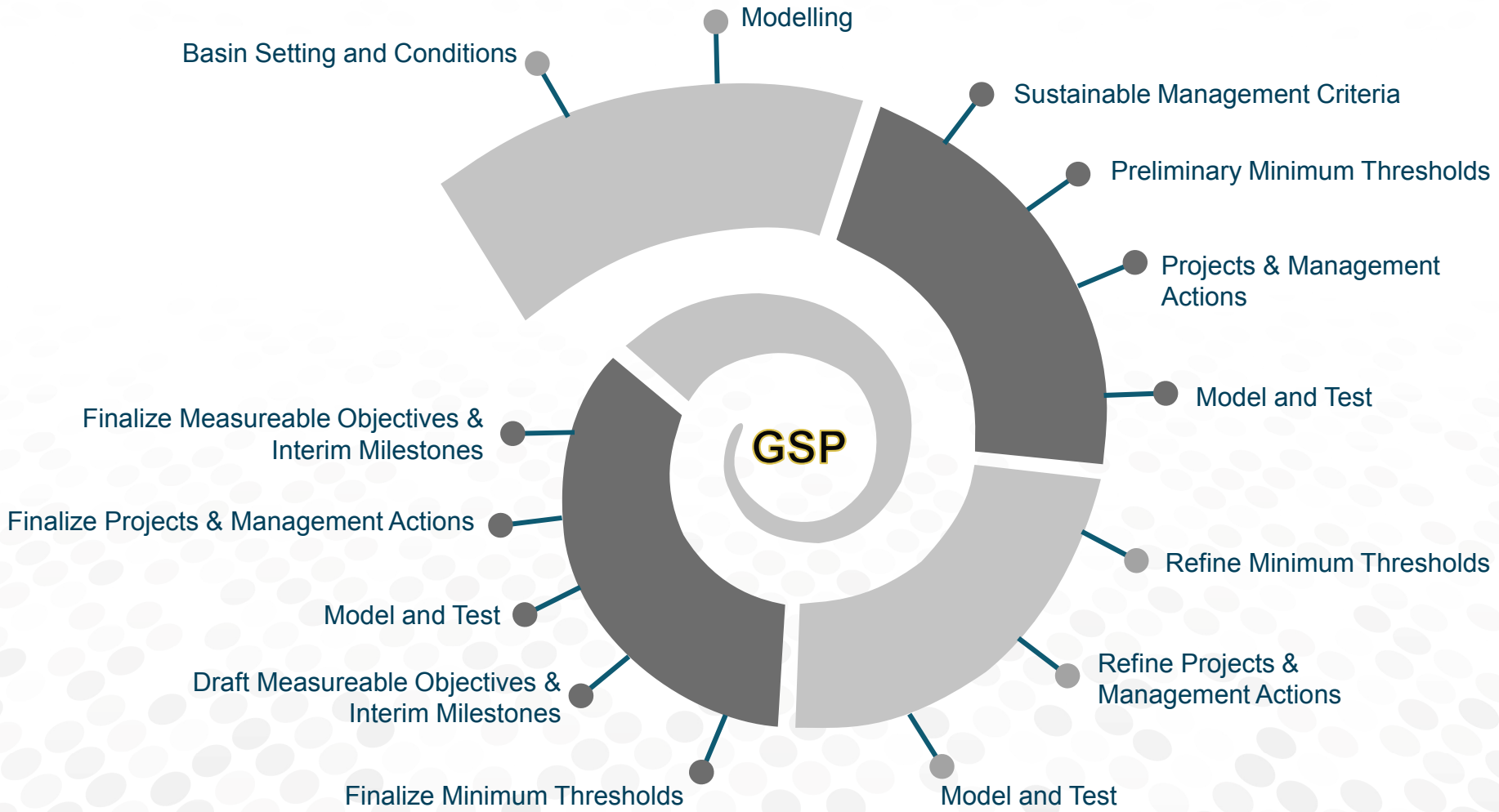
GSP Iterative Process



GSA Question and Answer Session

Closing Remarks