Salinas Valley Basin GSA
SVBGSA Water Budgets and Modeling Workshop

Presented to SVBGSA Stakeholders
February 24, 2021

Prepared by

MONTGOMERY & ASSOCIATES

Welcome

- Moderators:
  - Staffan Schorr: Principal Hydrogeologist, Montgomery & Associates
  - Abby Ostovar, PhD: Water Policy Specialist, Montgomery & Associates
- Workshop Objective: Provide general overview of the Salinas Valley Basin water budgets

Goals of Workshop

- Provide overview of general concepts of water budgets
- Introduce stakeholders to the complexities of the water budgets for the Salinas Valley Basin, and tools used to develop them

Background

- CA CCR §354.18 & Best Management Practices document
- Three water budgets for GSP:
  1. Historical conditions
  2. Current conditions
  3. Projected conditions over the 50-year planning and implementation horizon
- Water budget must include:
  - Inventory of all inflows (supply) and outflows (demand)
  - Summary of both surface water and groundwater budgets
  - Evaluation of changes of groundwater in storage
  - Estimation of groundwater overdraft (if applicable)
  - Estimation of sustainable yield
- Each Subbasin must pump within its sustainable yield (CCR §1071(t))

What is a Water Budget?

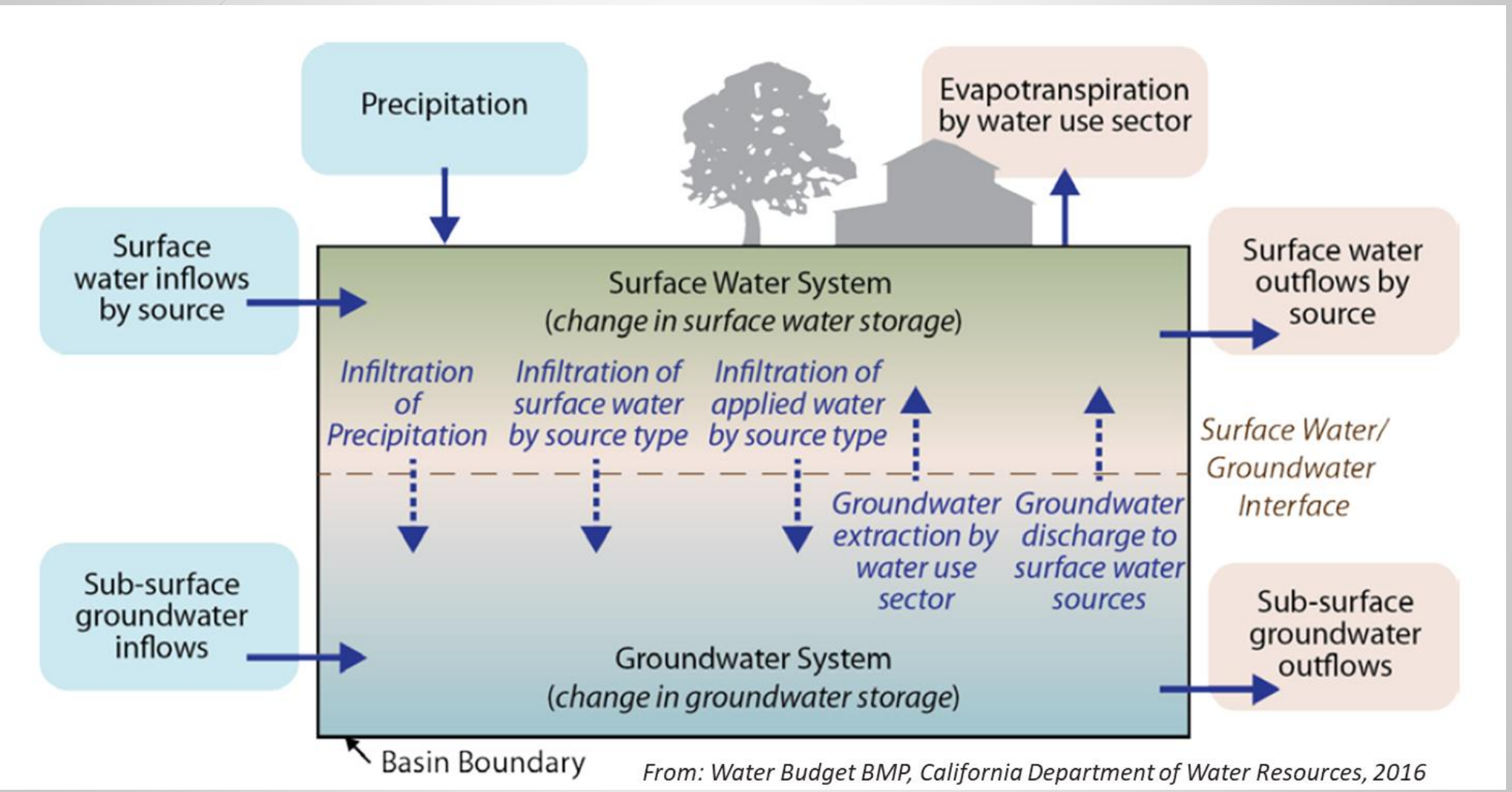
What is a Water Budget?

- An accounting of the total annual volume of surface water and groundwater entering and leaving an area and the change in the volume of groundwater in storage

- Described as:

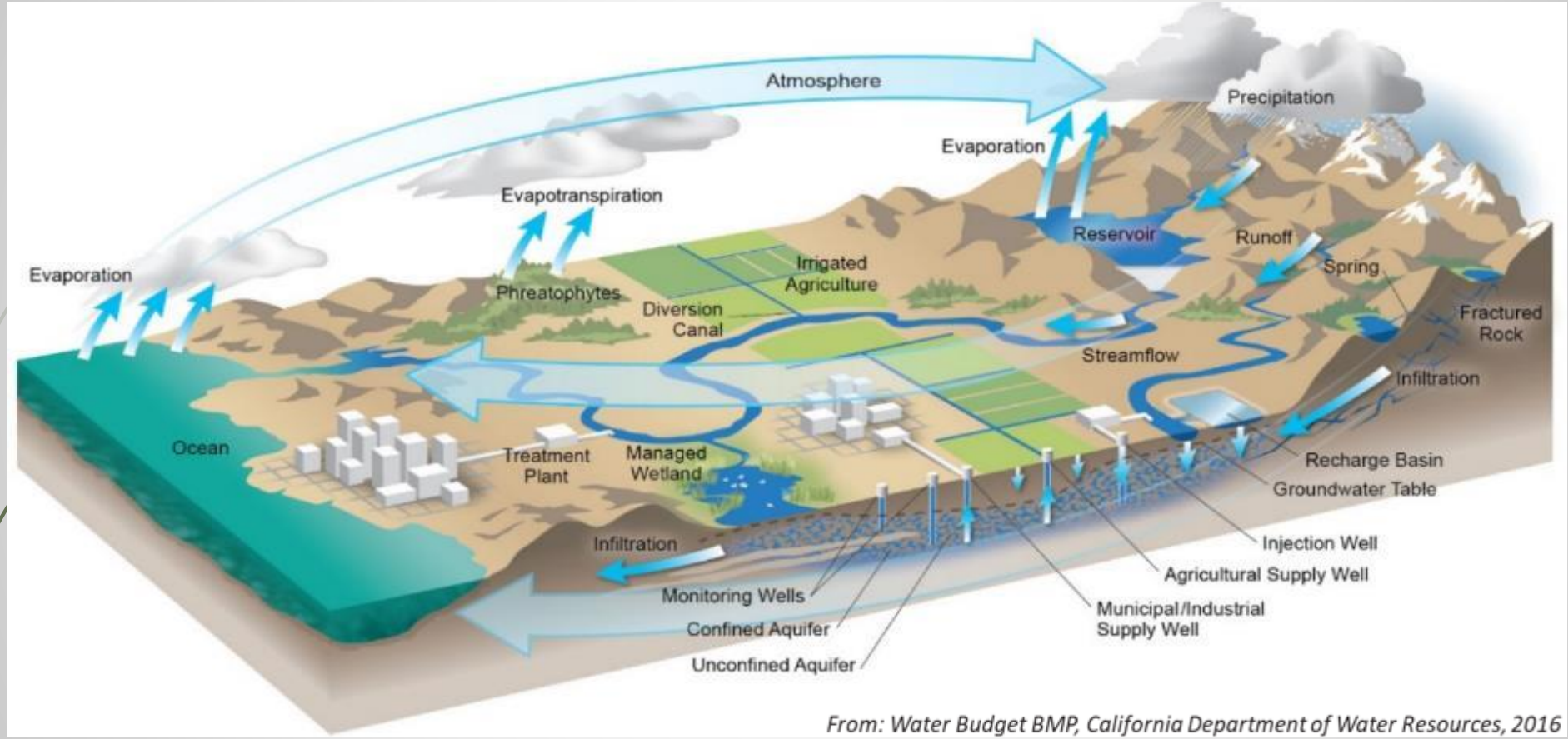
  [Inflows] – [Outflows] = [Change in Storage]

Diagram of Simplified Water Budget



From: Water Budget BMP, California Department of Water Resources, 2016

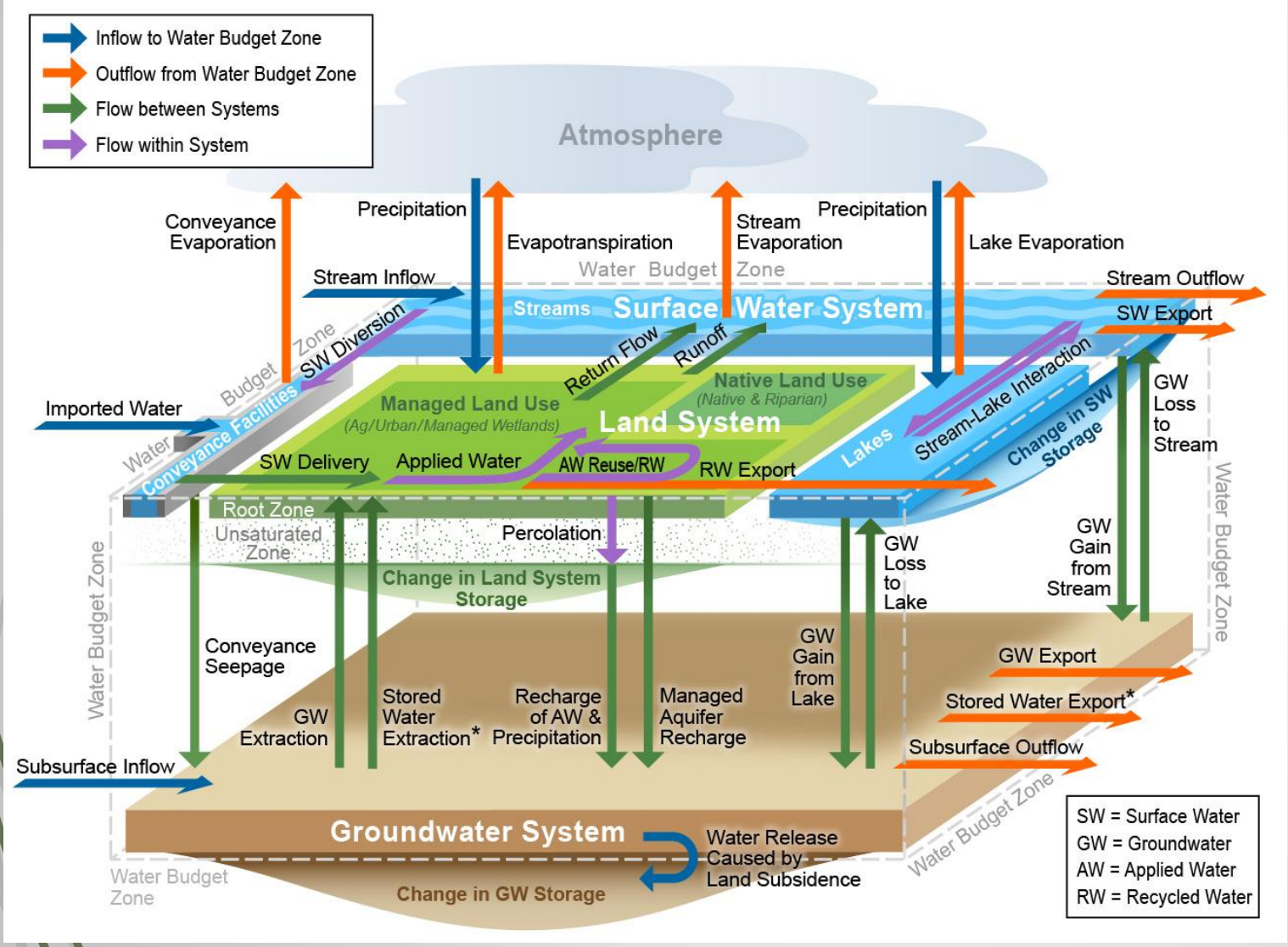
Water Budget for Watershed or Basin



From: Water Budget BMP, California Department of Water Resources, 2016

- Watershed Workshop on August 26, 2020

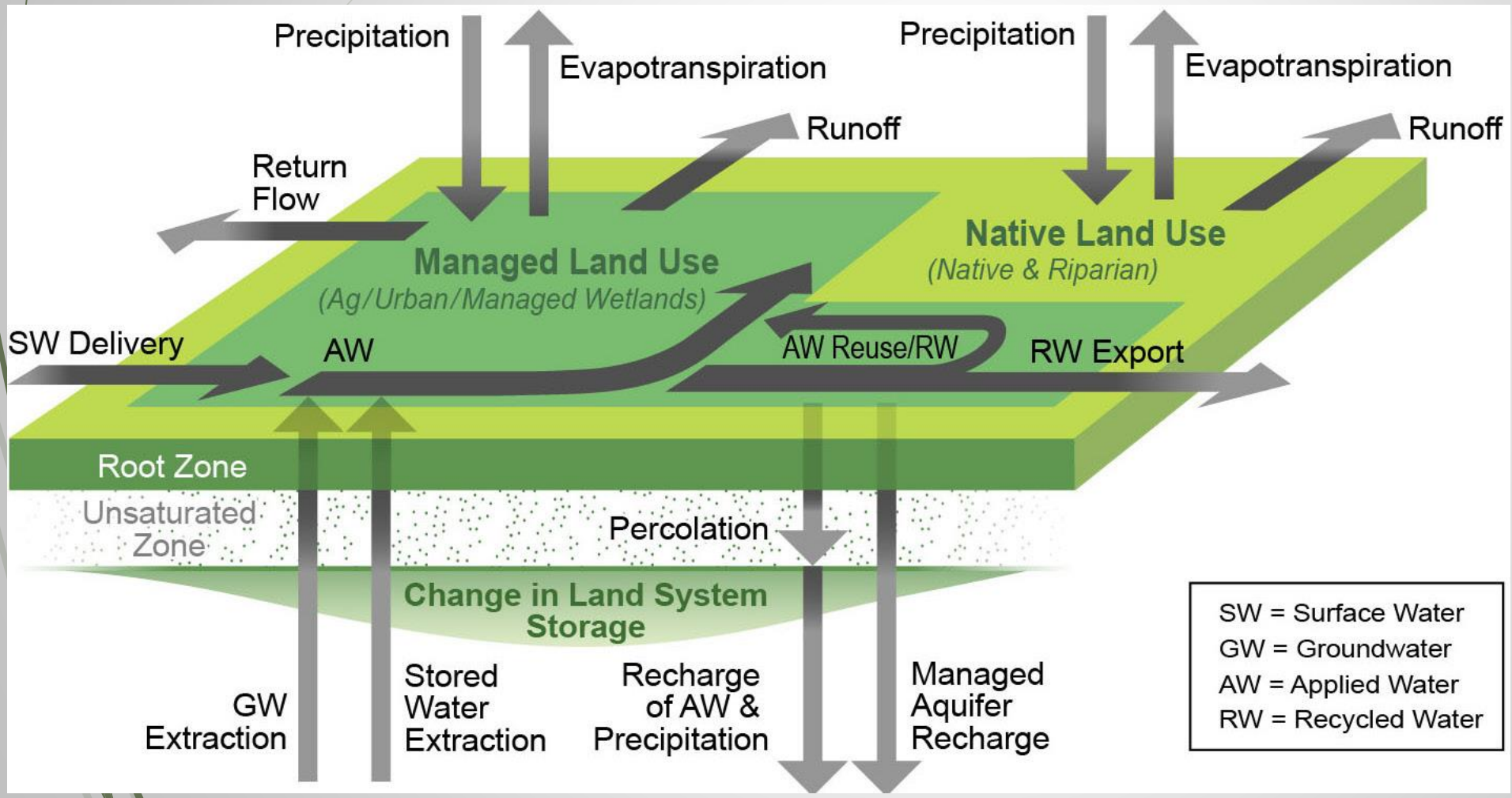
Diagram of Generalized Interrelated Water Budget



- Land system
- Surface Water system
- Groundwater system

From: Handbook of Water Budget Development, California Department of Water Resources, draft 2020

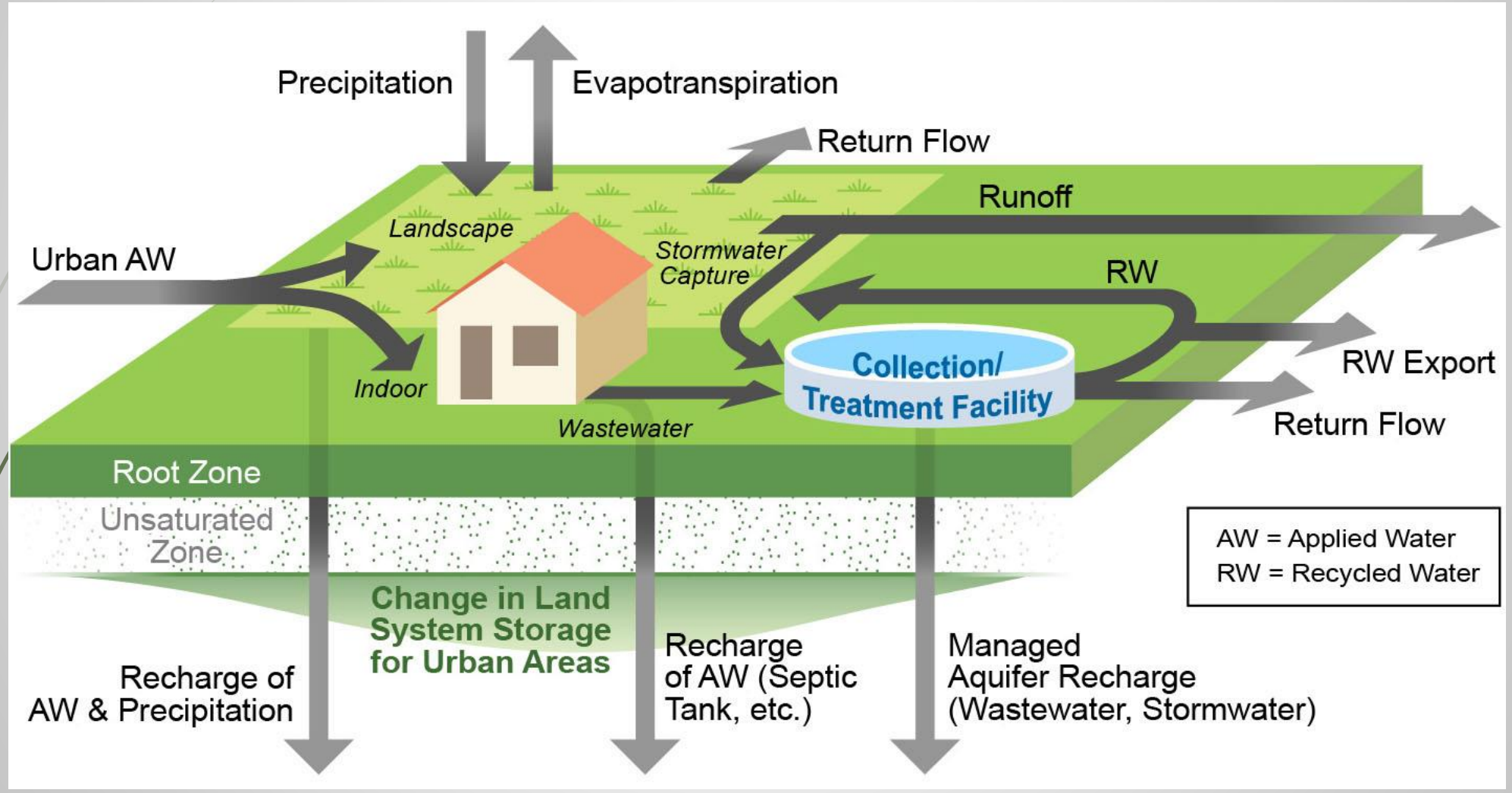
Land System



- Urban
- Agricultural
- Native

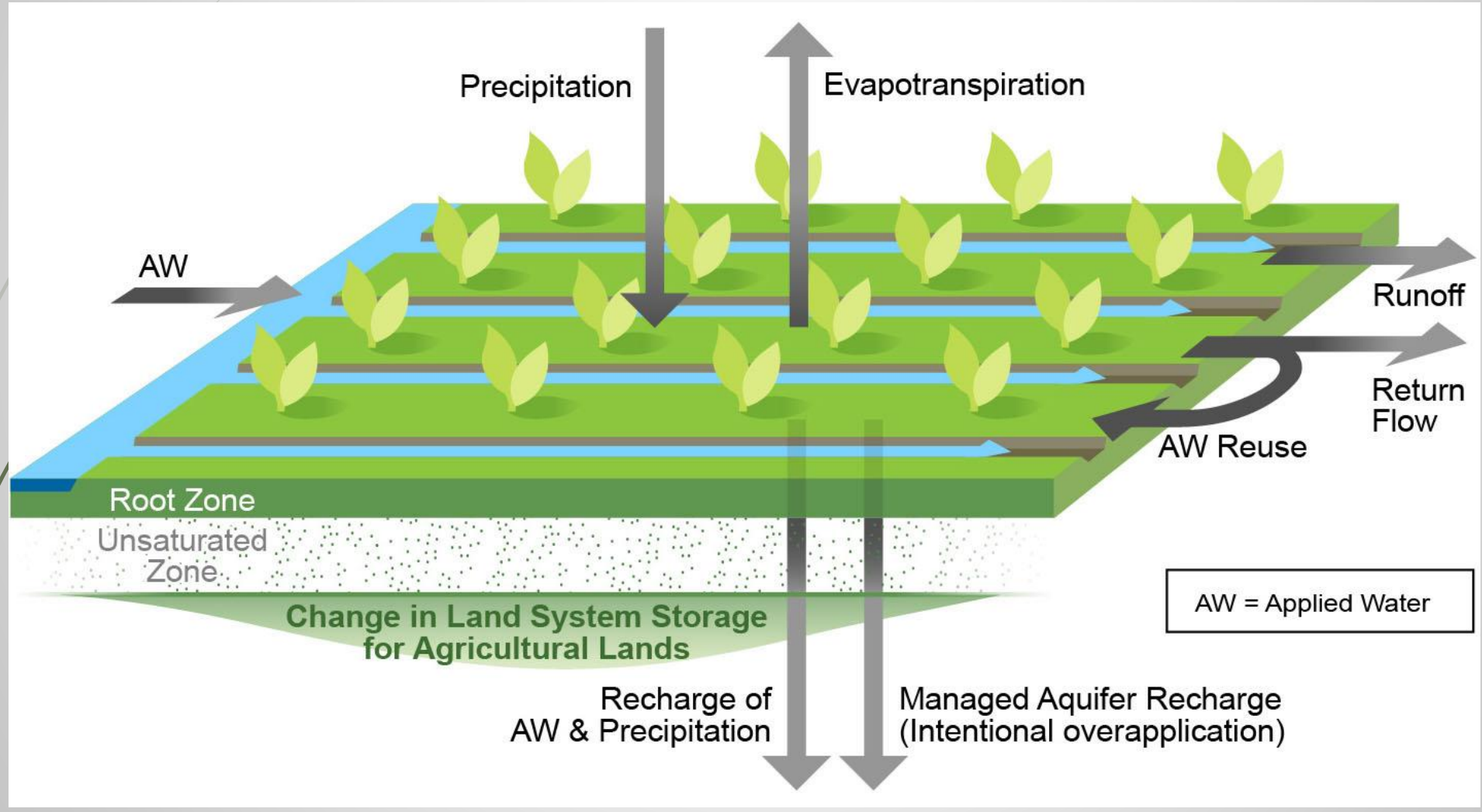
From: Handbook of Water Budget Development, California Department of Water Resources, draft 2020

Land System – Urban Components



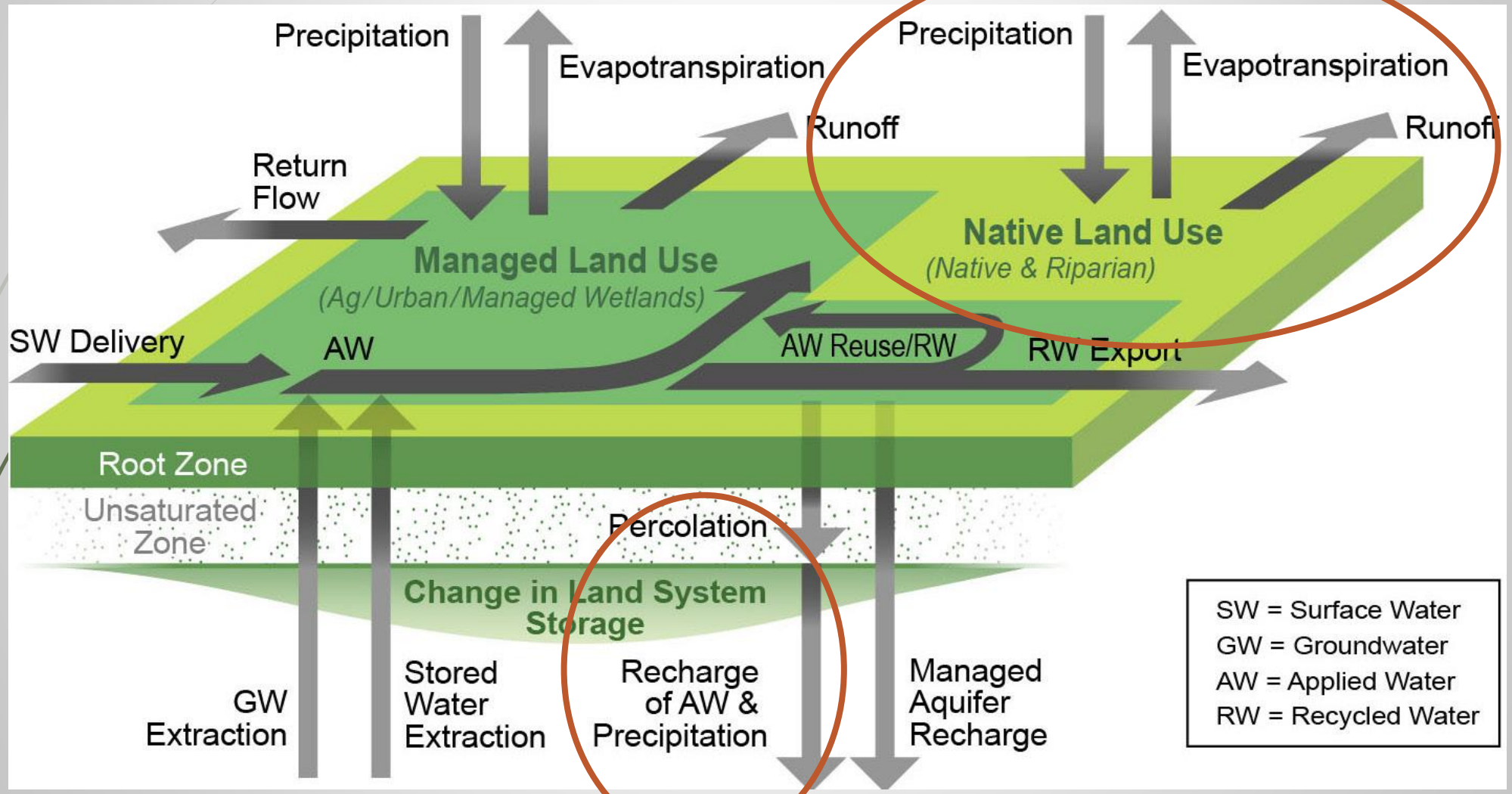
From: Handbook of Water Budget Development, California Department of Water Resources, draft 2020

Land System – Agricultural Components



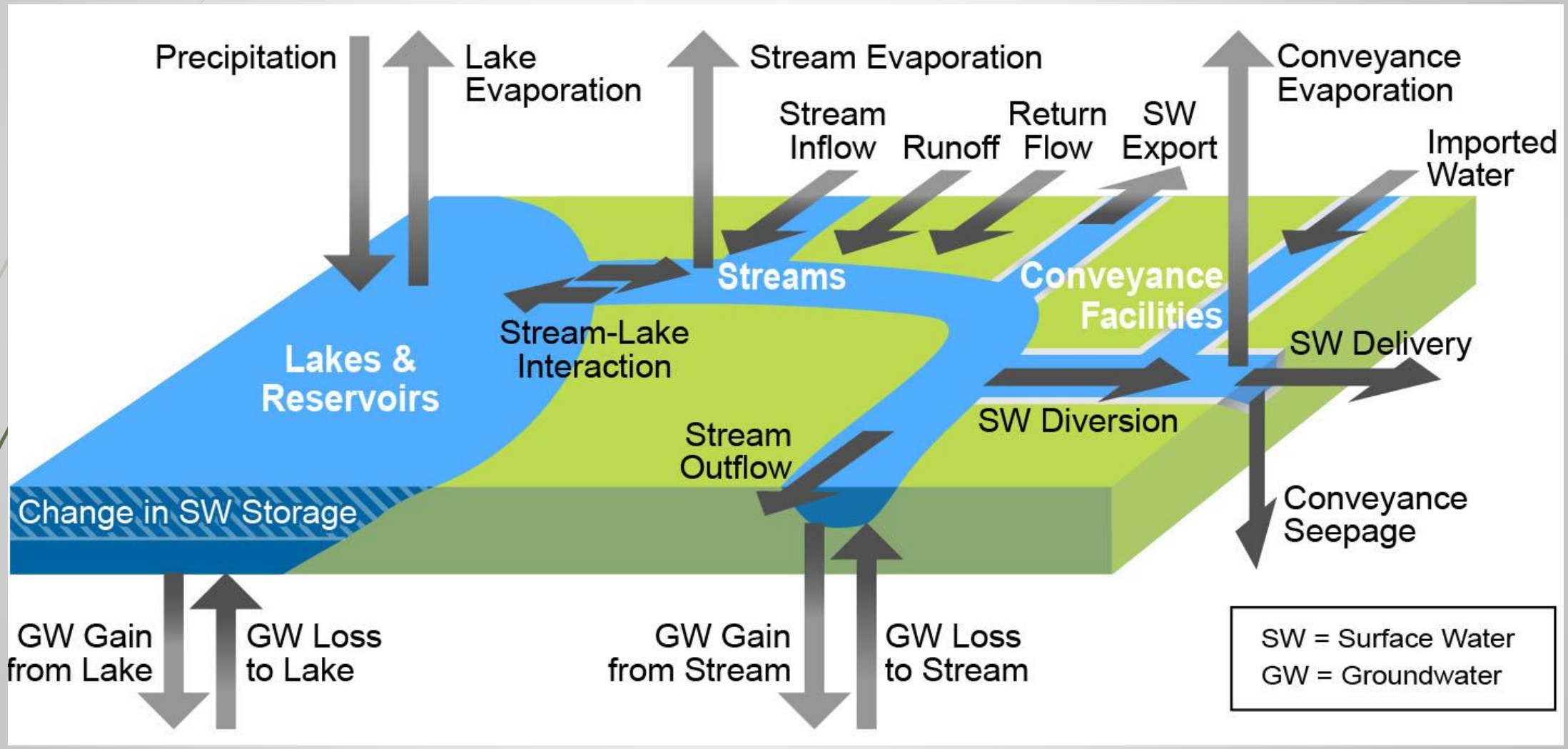
From: Handbook of Water Budget Development, California Department of Water Resources, draft 2020

Land System – Native Components



From: Handbook of Water Budget Development, California Department of Water Resources, draft 2020

Surface Water System



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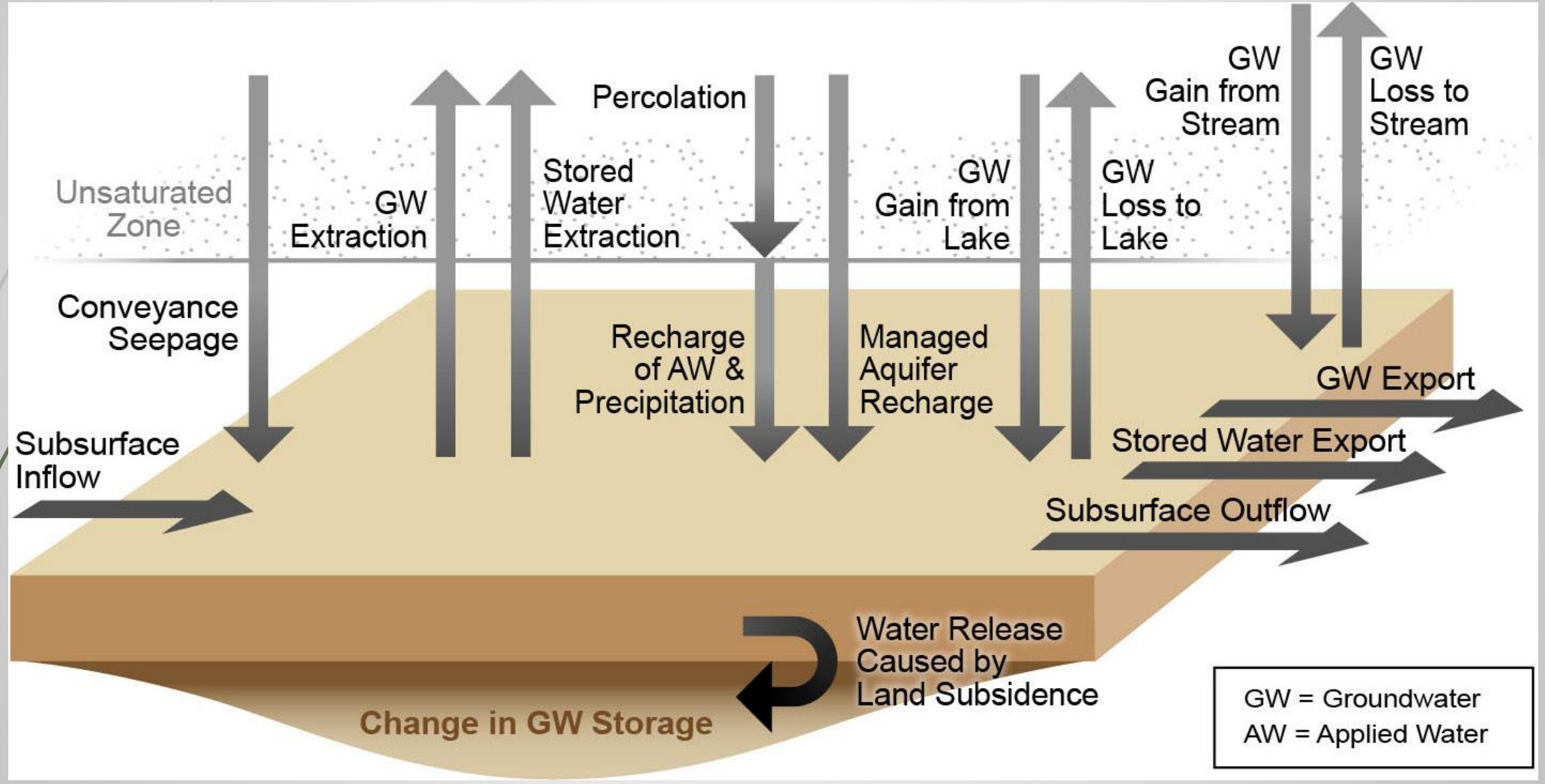
Groundwater System

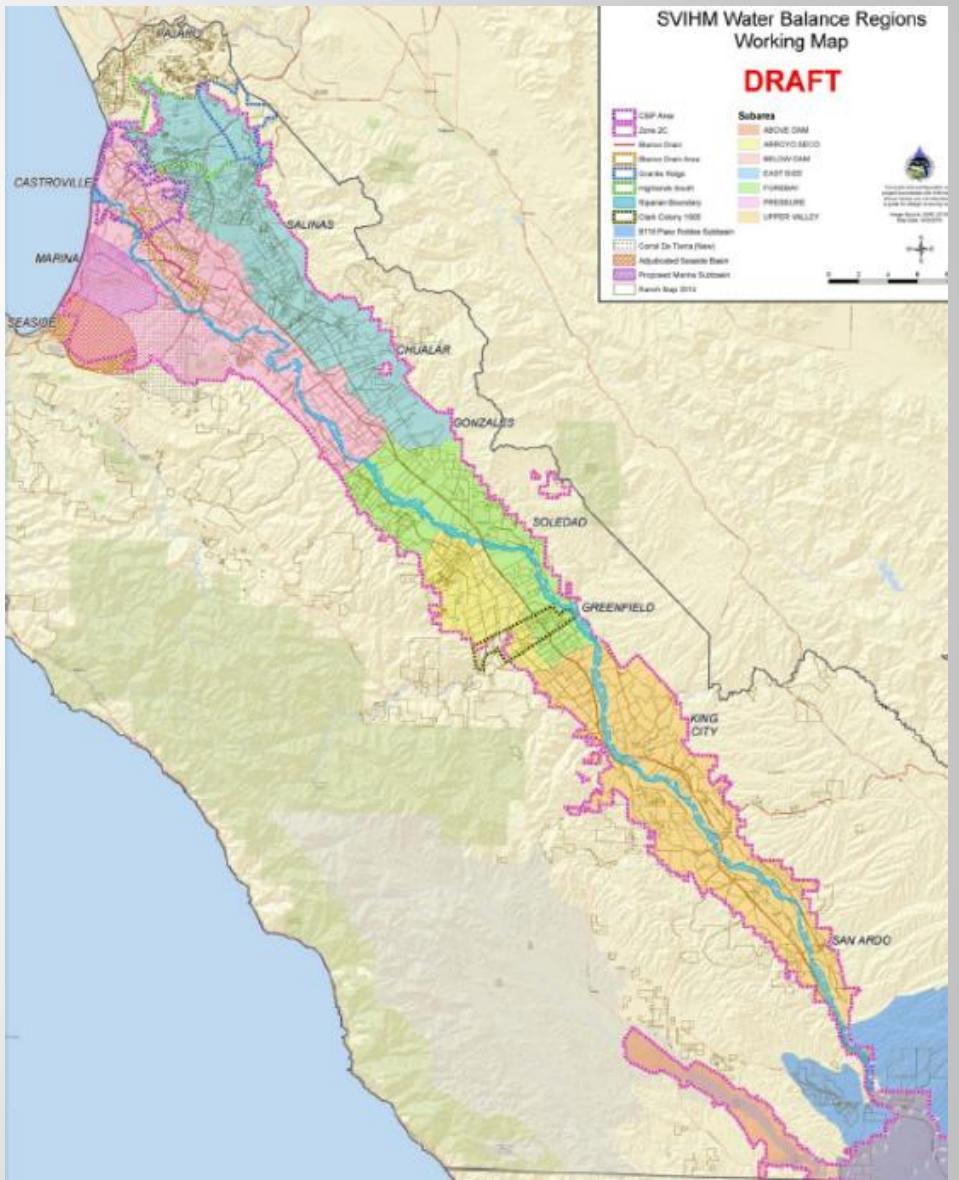


From: Handbook of Water Budget Development, California Department of Water Resources, draft 2020

Tools for Developing Water Budgets for Salinas Valley Basin

Groundwater Models Being Developed by USGS

- Two models
  - Salinas Valley Integrated Hydrologic Model (SVIHM) – historical conditions
  - Salinas Valley Operational Model (SVOM) – future conditions
- Both models will also be used by MCWRA and USBR for other studies in the Valley
- Both models are preliminary



This data (model and/or model results) are preliminary or provisional and are subject to revision. This model and model results are being provided to meet the need for timely best science. The model has not received final approval by the U.S. Geological Survey (USGS). No warranty, expressed or implied, is made by the USGS or the U.S. Government as to the functionality of the model and related material nor shall the fact of release constitute any such warranty. The model is provided on the condition that neither the USGS nor the U.S. Government shall be held liable for any damages resulting from the authorized or unauthorized use of the model.

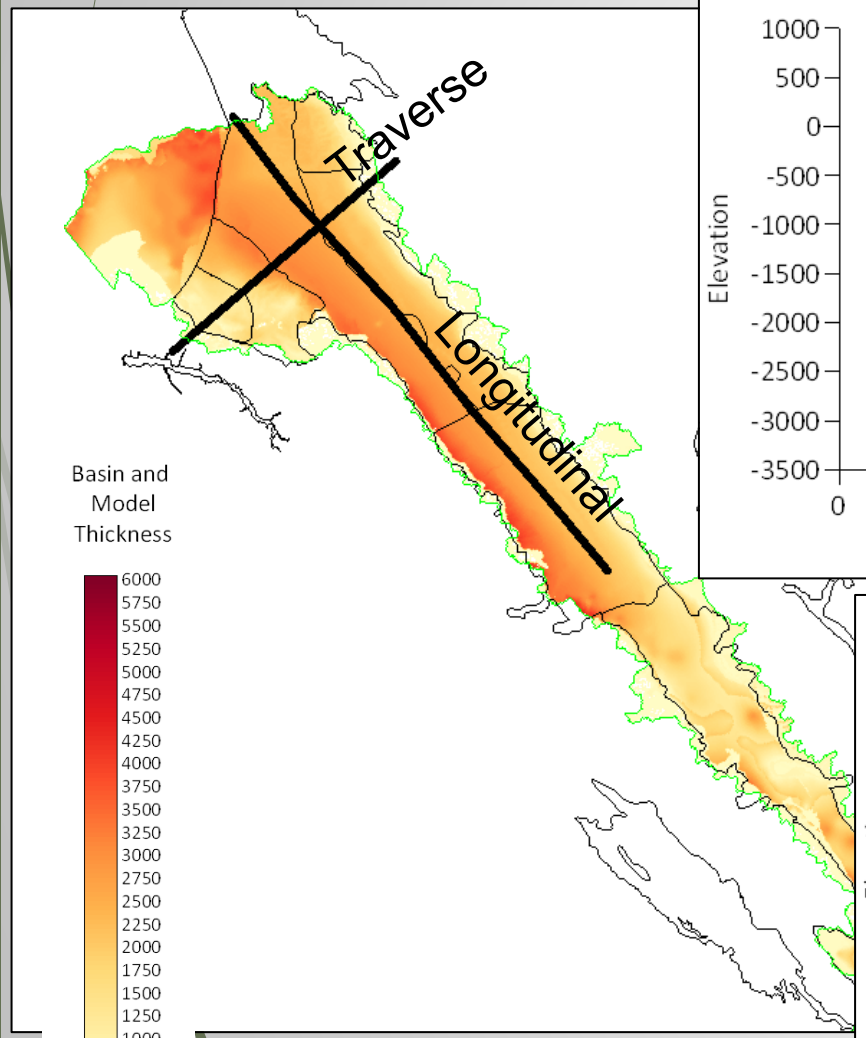
Salinas Valley Integrated Hydrologic Model (SVIHM)

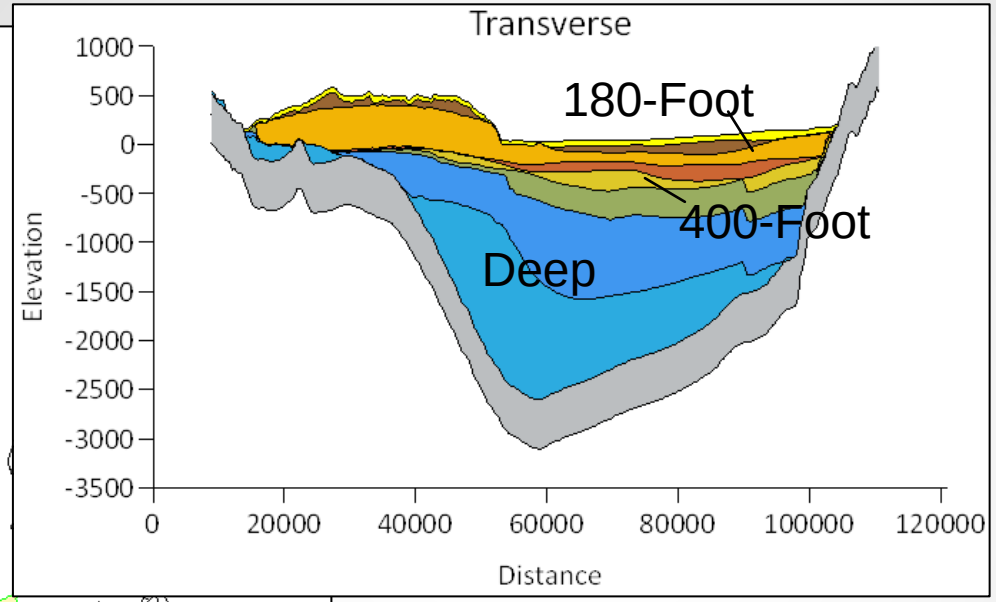
- Developed by the USGS in coordination with Monterey County and MCWRA
- A numerical groundwater-surface water model constructed using the code MODFLOW-OWHM
- Includes a focus on agricultural supply and demand system through the Farm Process
- Simulates conditions in the basin on a monthly basis for water years 1968 through 2017
- Will be the focus of future workshop

Salinas Valley Operational Model (SVOM)

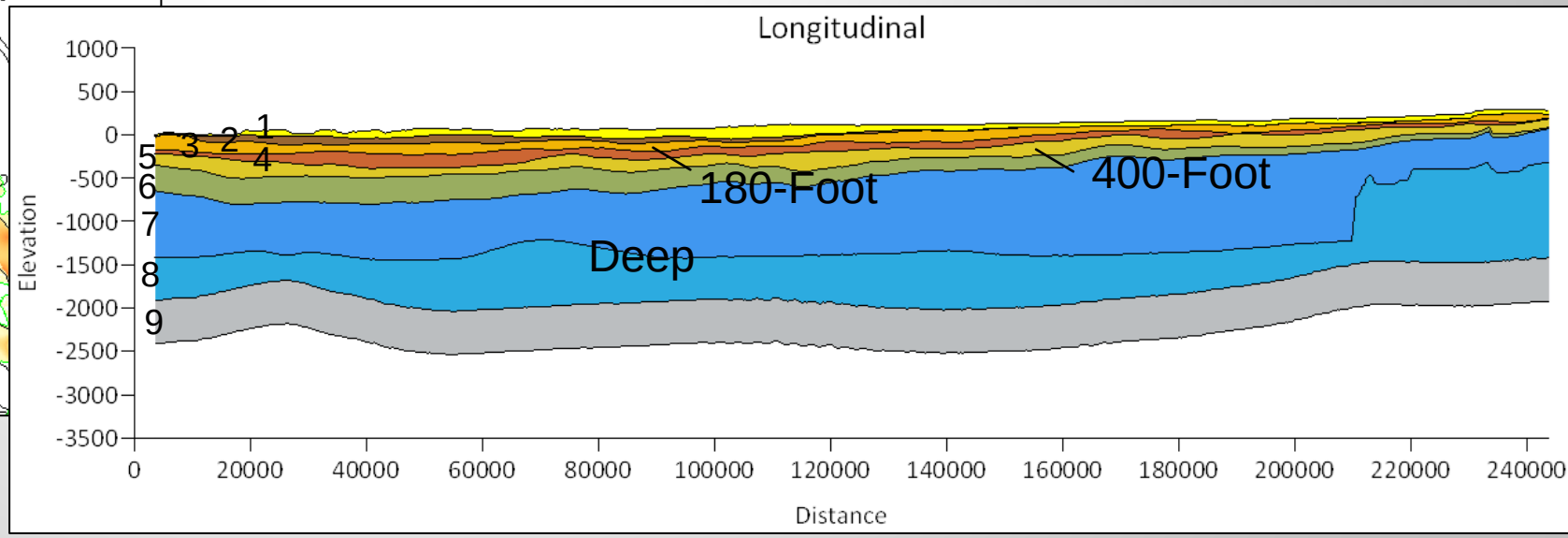
- Based on the SVIHM framework and processes
- With added Surface Water Operations (SWO) modules for simulating reservoir operations rules
- Repeats historical conditions with reservoir operations rules
- SVOM does not simulate a 50-year future, rather it simulates 50 likely hydrologic events that may occur
- Used to consider climate change's effect on future water budgets
- Will be the focus of future workshop

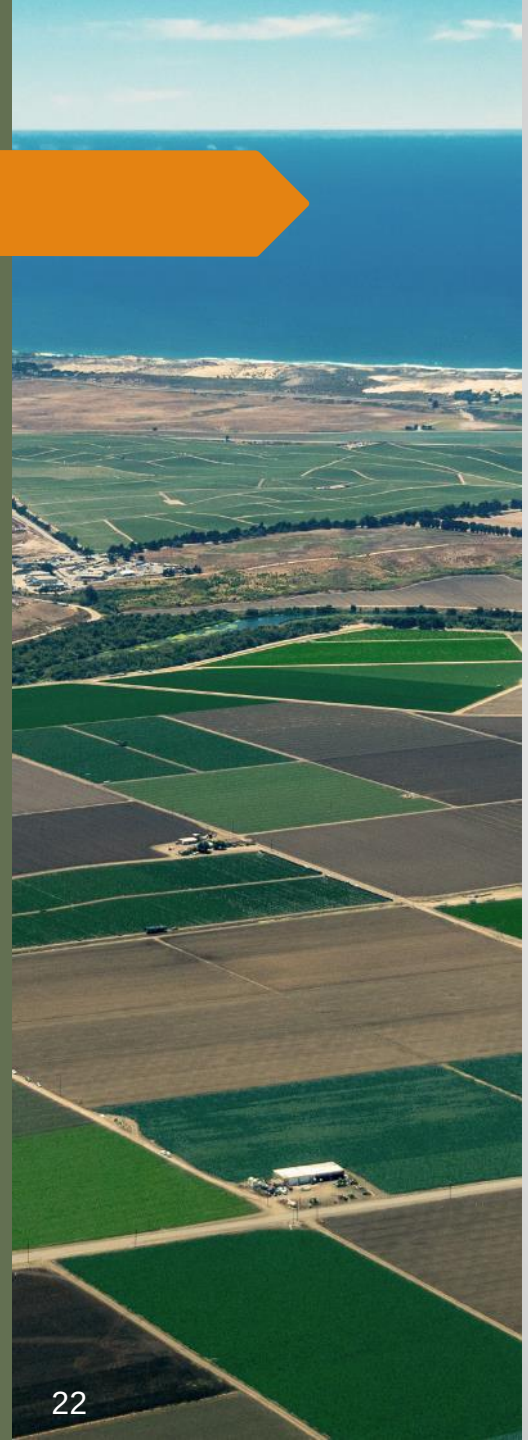
Aquifer Layering: Model Cross-Sections

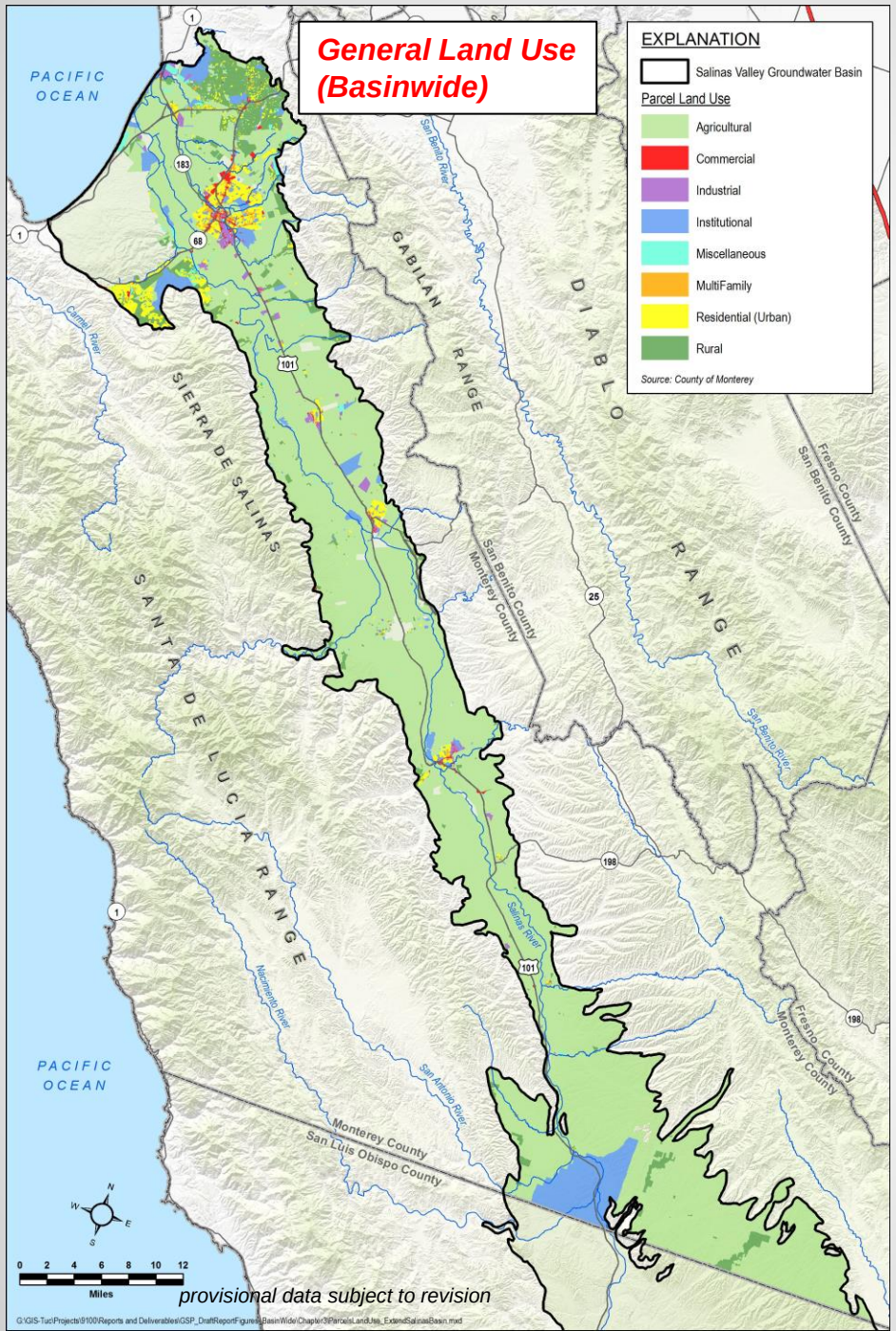




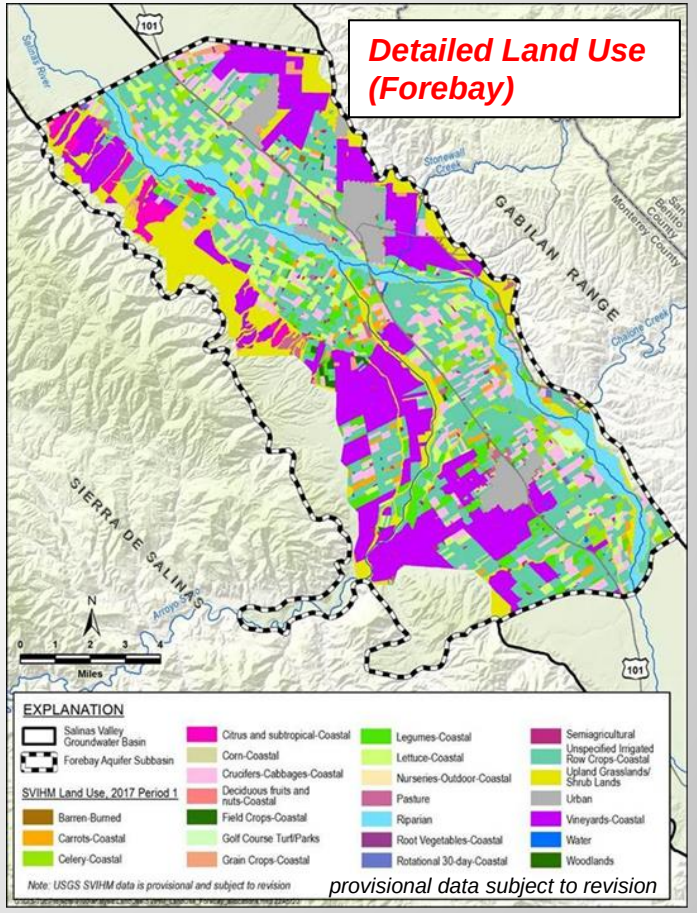
Formation	Hydrostratigraphy	SVIHM Layer
Recent Alluvium	Shallow Sediments Dune Sands	1
Valley Fill	Salinas Valley Aquitard	2
	180-Foot Aquifer	3
Aromas Sands (near coast)	180/400-Foot Aquitard	4
	400-Foot Aquifer	5
Paso Robles	400-Foot/Deep Aquitard	6
	Deep Aquifers	7
Purisima / Pancho Rico		8
Santa Margarita		
Monterey	Minimally Water-Bearing	9
Granitic Basement	Non Water-Bearing	







- Land use incorporated into model



Data Sources

Some data are measured directly and are incorporated in the model:

- Precipitation
- Streamflow
- Surface water diversions
- Groundwater pumping

The models are used to estimate parameters that cannot be easily measured:

- Evapotranspiration
- Recharge
- Surface water/groundwater exchange
- Change in groundwater storage

Data Sources

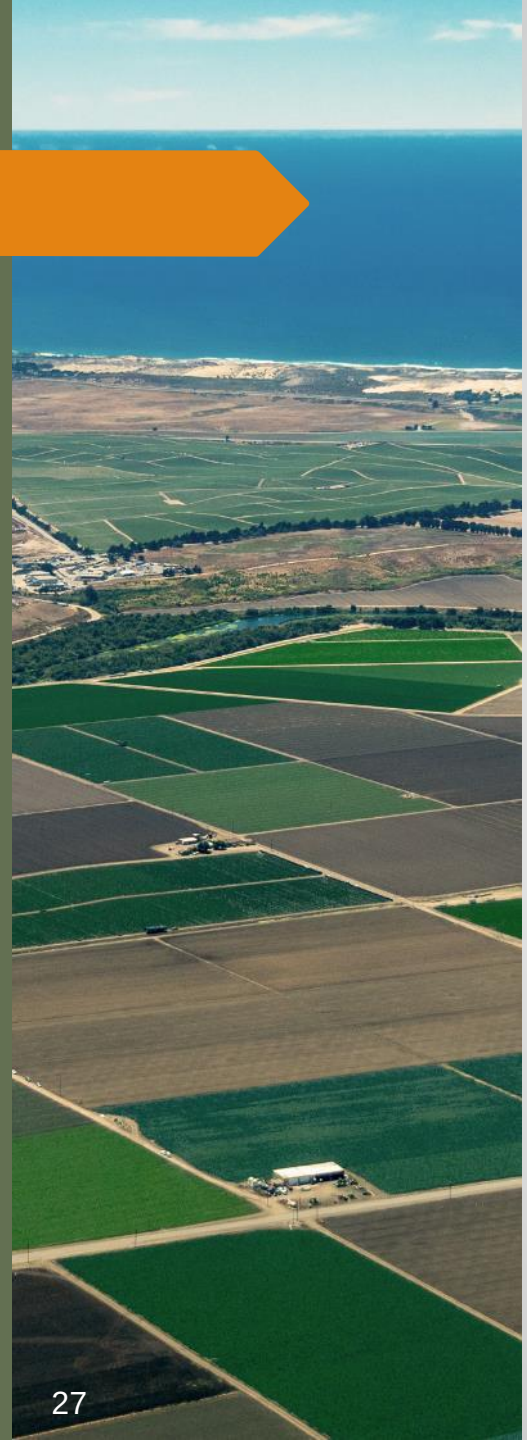
- SVIHM is calibrated to historical measurements, including:
  - Groundwater levels
  - Streamflows

Current Status

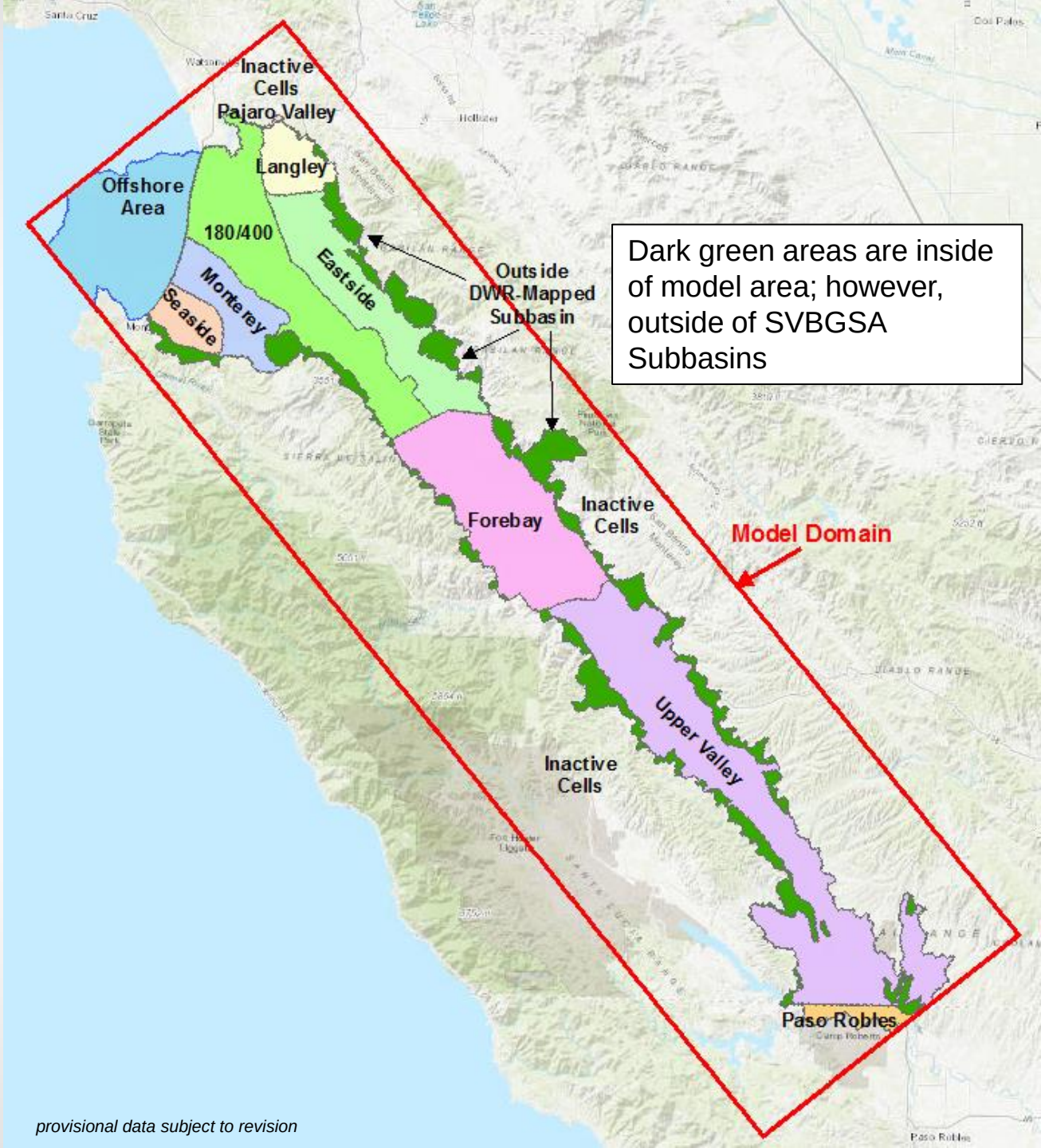
- SVBGSA has received a preliminary evaluation copy of the SVIHM and is evaluating model output to guide estimates of historical water budgets.
- MCWRA has received a preliminary evaluation copy of the SVOM and is running simulations for SVBGSA.

- Both models will be made public after USGS finishes its internal review.
- Budgets developed by these model are preliminary and subject to change.

Salinas Valley Basin Water Budgets

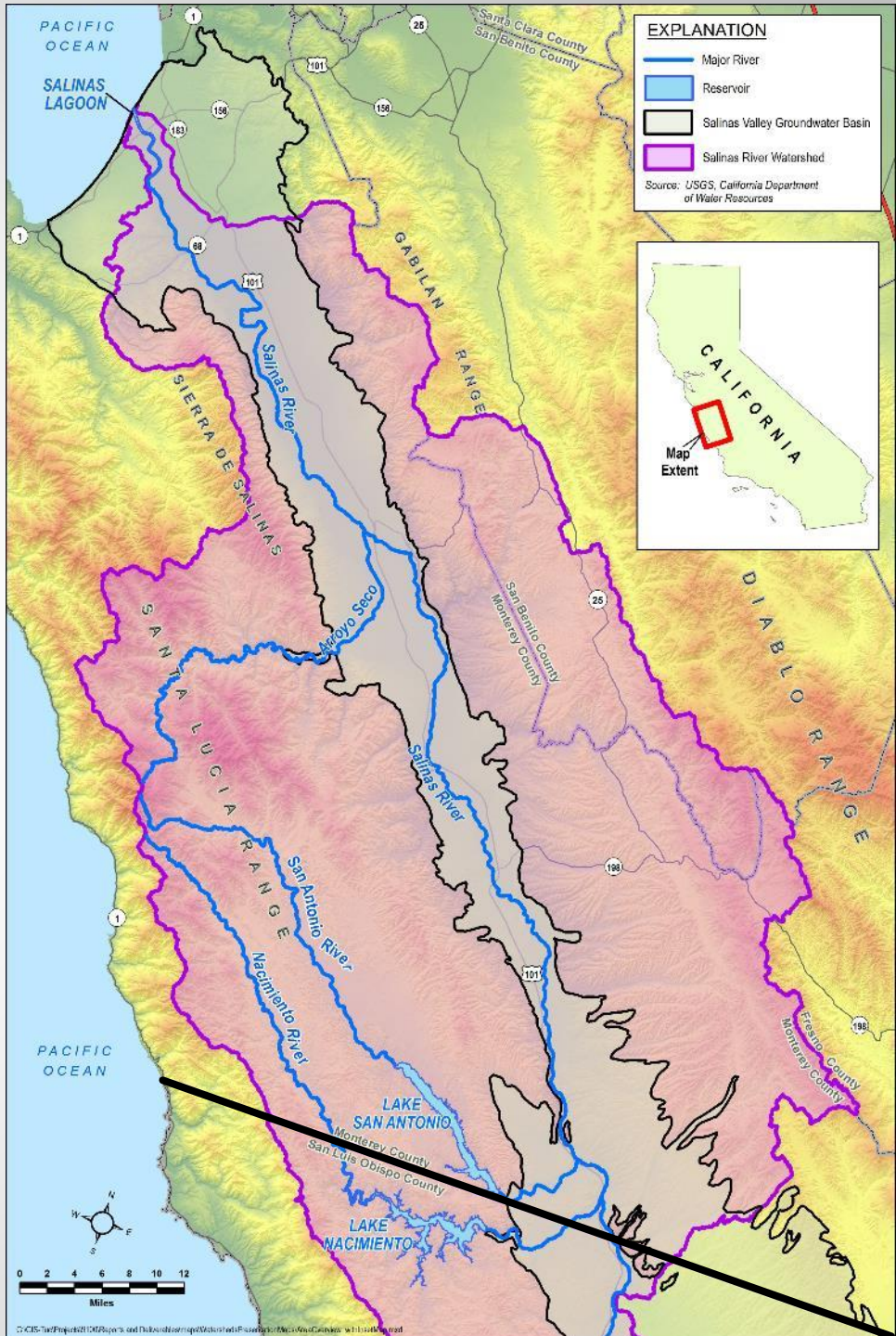


- Seven subbasins in Monterey County; one is adjudicated (Seaside Basin)
- Water budgets are developed for each subbasin's GSP by grouping model results by zones



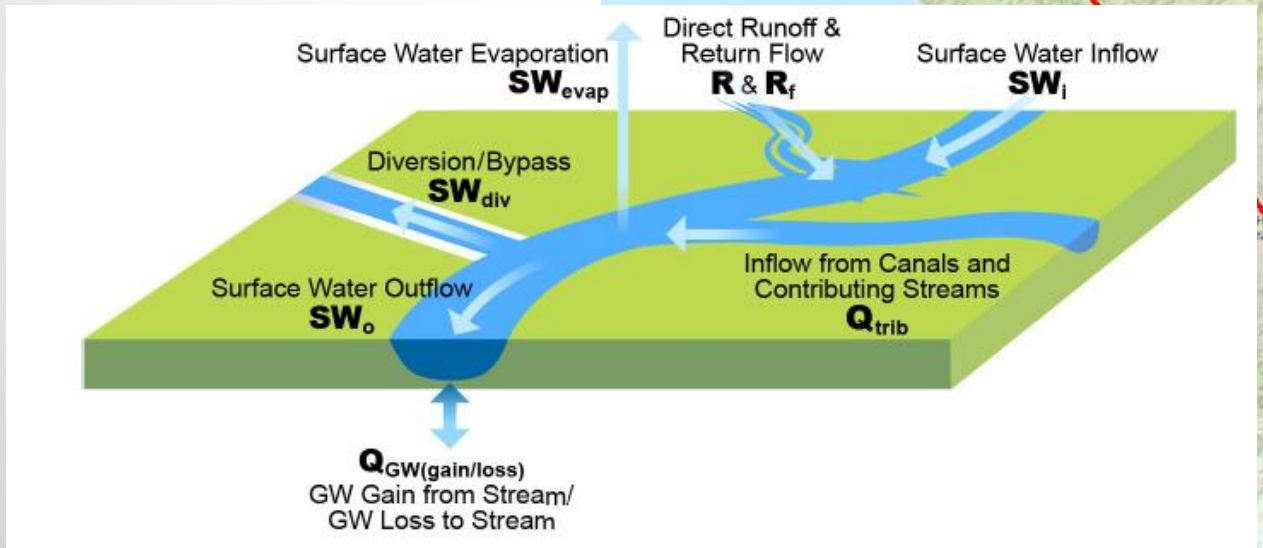
Surface Water Budget

- Inflows
  - Salinas River in
  - Reservoir releases
  - Arroyo Seco and other tributaries
  - Return flows
  - From groundwater
- Outflows
  - Salinas River out
  - Diversions
  - To groundwater



Model Surface Water Network

- Salina River, tributaries, and conveyance systems
- Water budgets accounting for inflows and outflows that cross boundary

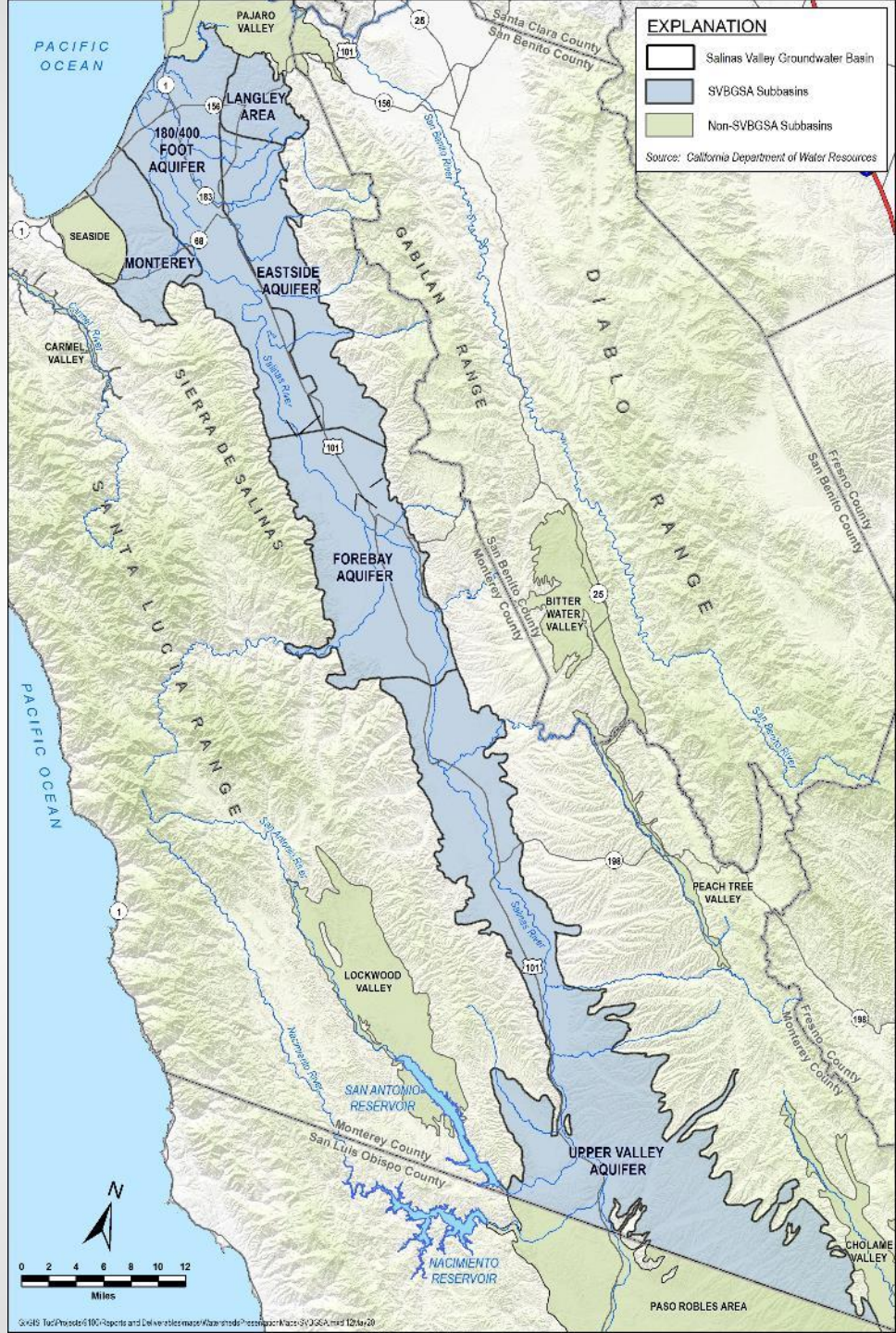


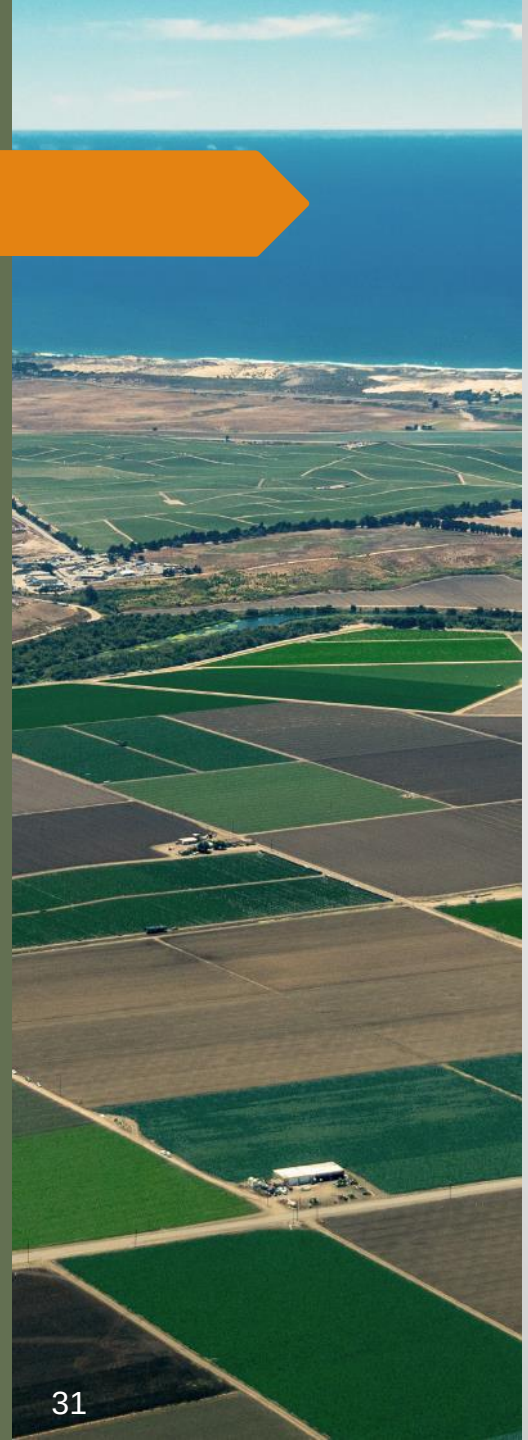
Model Domain

provisional data subject to revision

Groundwater Budget

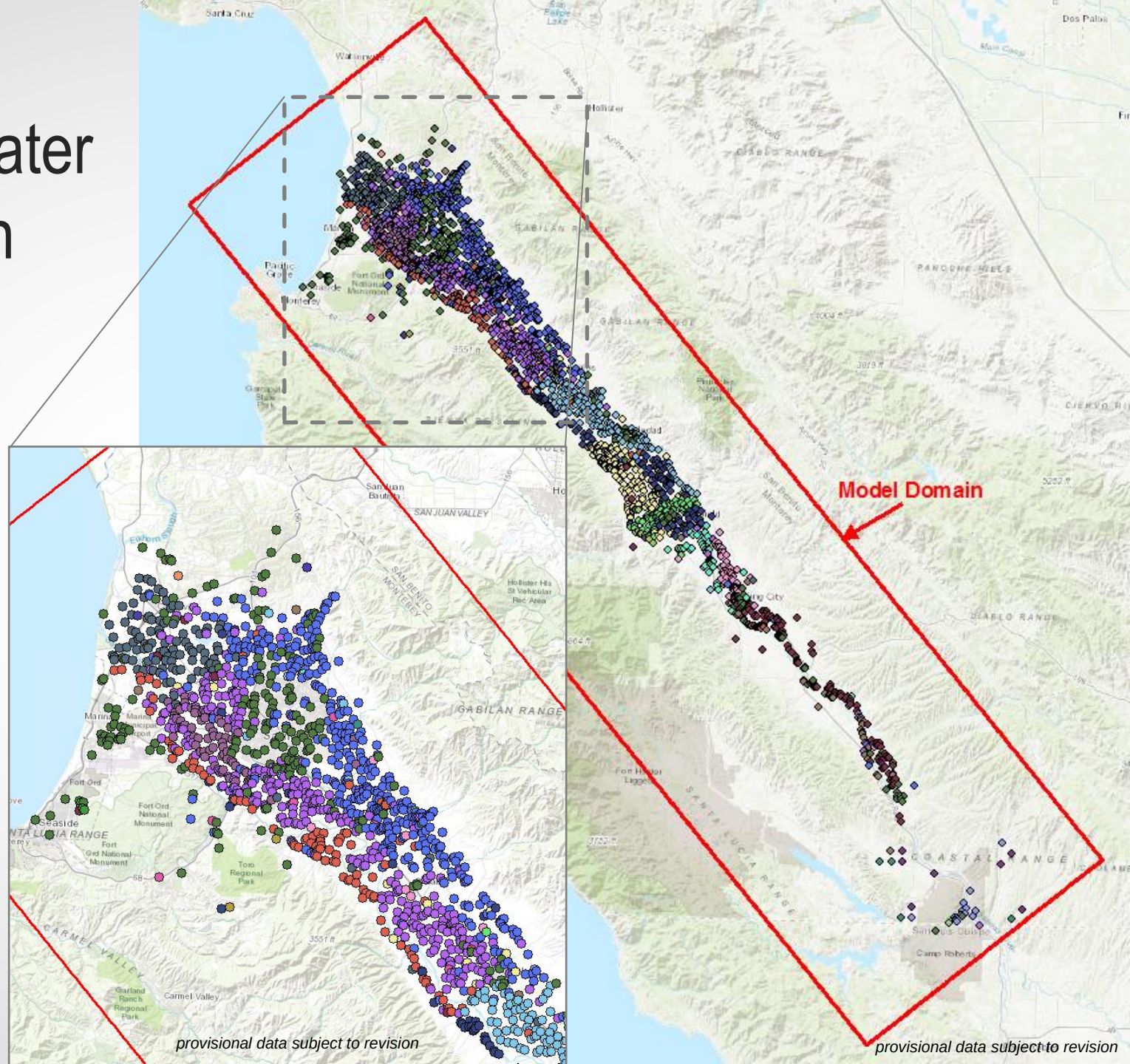
- Inflows
  - Groundwater flows from adjacent basins
  - Recharge
  - From surface water
- Outflows
  - Groundwater flows to adjacent basins
  - Groundwater extraction
  - Evapotranspiration
  - To surface water



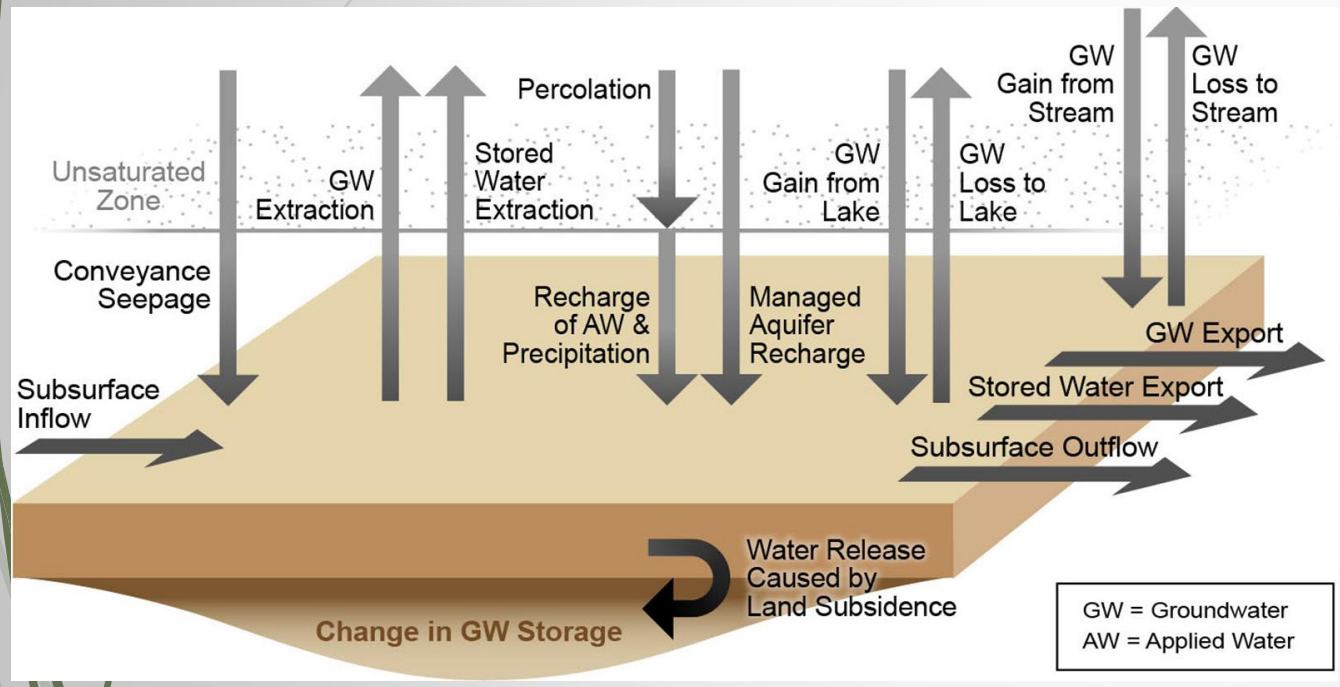


Groundwater Extraction

- Urban
- Agricultural
- Dots represent well grid cells simulated in model



Groundwater Budget



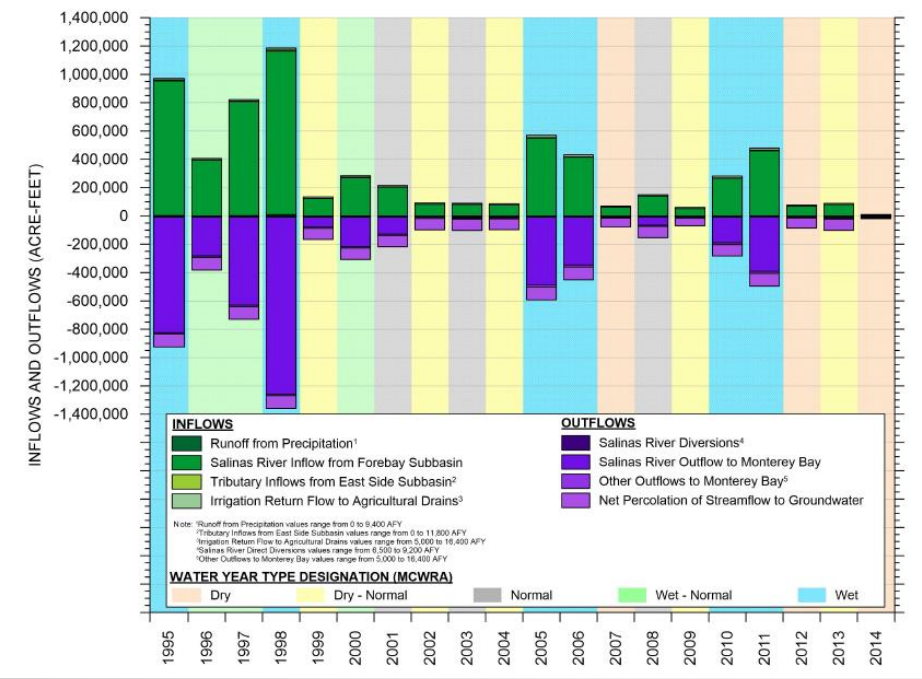
- Model estimates:
  - GW-SW exchange
  - Conveyance seepage
  - Subsurface In/Outflows
  - Recharge
  - Storage change

Water Budget Results

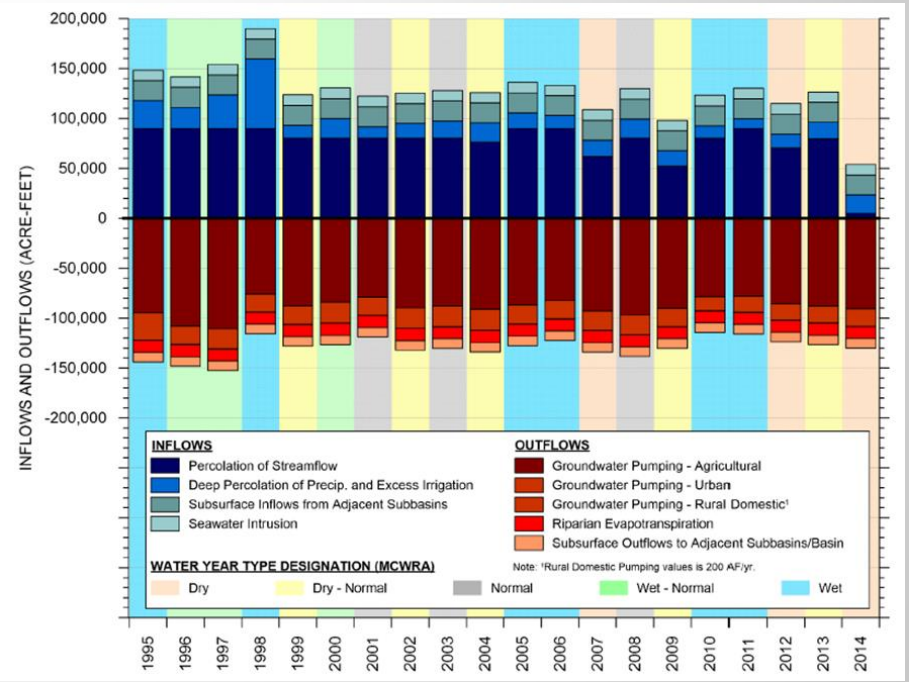
- For water budget development:
  - Historical conditions: WY 1968 through 2017
  - Current conditions: WY 2017
- Currently processing results

Historical Water Budgets:
180/400-Aquifer Subbasin GSP

Surface Water Budget



Groundwater Budget



Future Projections Water Budgets

- Incorporates estimated climate change conditions for 2030 and 2070 in accordance with guidance by DWR
- Currently processing results

Sustainable Yield

Sustainable Yield

- An estimate of the quantity of groundwater that can be pumped on a long-term average annual basis without causing undesirable results

Questions?

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