C2VSimFG

Baseline Development

Presented By:
Liz DaBramo (Woodard & Curran)
Guobiao Huang (DWR)

CALIFORNIA DEPARTMENT OF WATER RESOURCES
SUSTAINABLE GROUNDWATER MANAGEMENT PROGRAM

Woodard & Curran

Presentation Outline

- Baseline Development
  - Hydrology
  - Land Use
  - Stream Inflows
  - Surface water delivery
  - Initial Groundwater Conditions
- Baseline Results
- Applications and Next Steps

Baseline Version Assumptions and Purpose

Based on calibrated C2VSimFG historical model v1.01

Baseline condition for projected water budget

The C2VSimFG Baseline simulates Central Valley regional water budgets and groundwater levels under current conditions, providing a framework for local entities to adapt to their region and evaluate groundwater sustainability.

SGMA Regulation

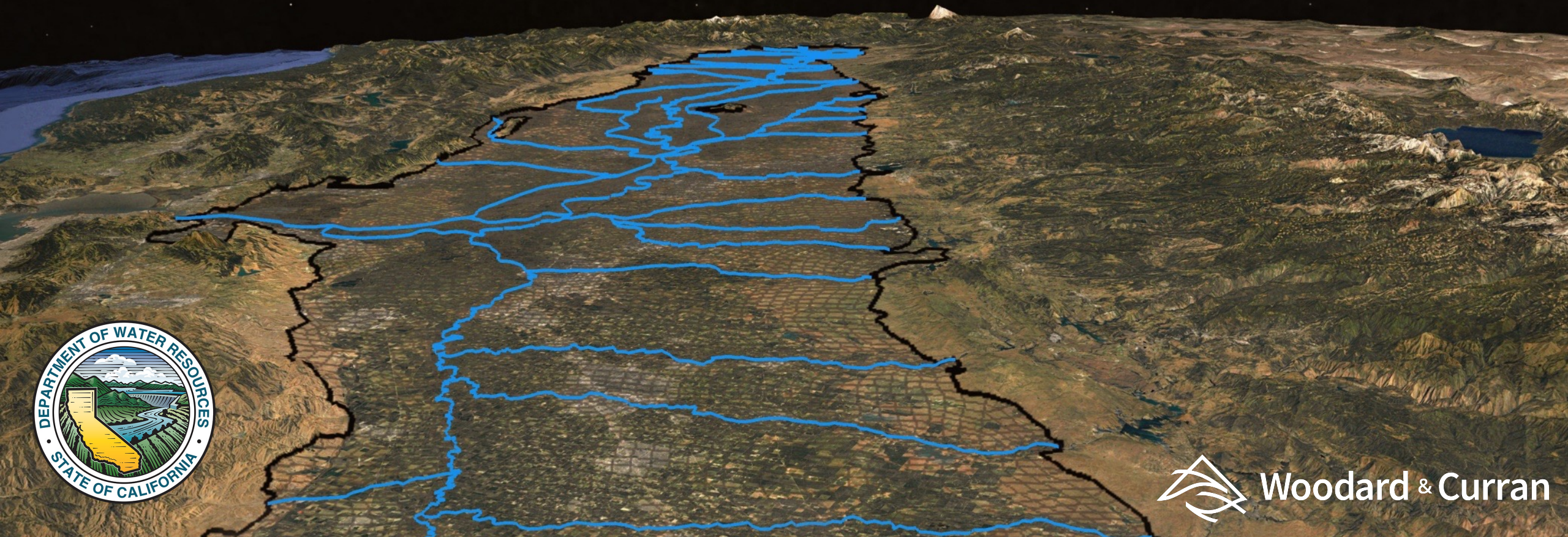
23 CCR § 354.18 Water Budget – Projected Budget Components

§ 354.18 (c) (3)

- Projected water budgets shall be used to estimate **future baseline conditions of supply, demand, and aquifer response to Plan implementation**
- (A) Projected hydrology shall utilize **50 years of historical precipitation, evapotranspiration, and streamflow information as the baseline condition for estimating future hydrology.** The projected hydrology information shall also be applied as the baseline condition used to evaluate future scenarios of hydrologic uncertainty associated with projections of climate change and sea level rise .
- (B) Projected water demand shall **utilize the most recent land use, evapotranspiration, and crop coefficient information as the baseline condition for estimating future water demand**. The projected water demand information shall also be applied as the baseline condition used to evaluate future scenarios of water demand uncertainty associated with projected changes in local land use planning, population growth, and climate.
- (C) Projected surface water supply shall utilize the most recent water supply information as the baseline condition for estimating future surface water supply. **The projected surface water supply shall also be applied as the baseline condition used to evaluate future scenarios of surface water supply availability and reliability as a function of the historical surface water supply identified in Section 354.18(c)(2)(A),** and the projected changes in local land use planning, population growth, and climate.

California Central Valley Groundwater-Surface Water Simulation Model – Fine Grid (C2VSimFG)

Baseline Inputs



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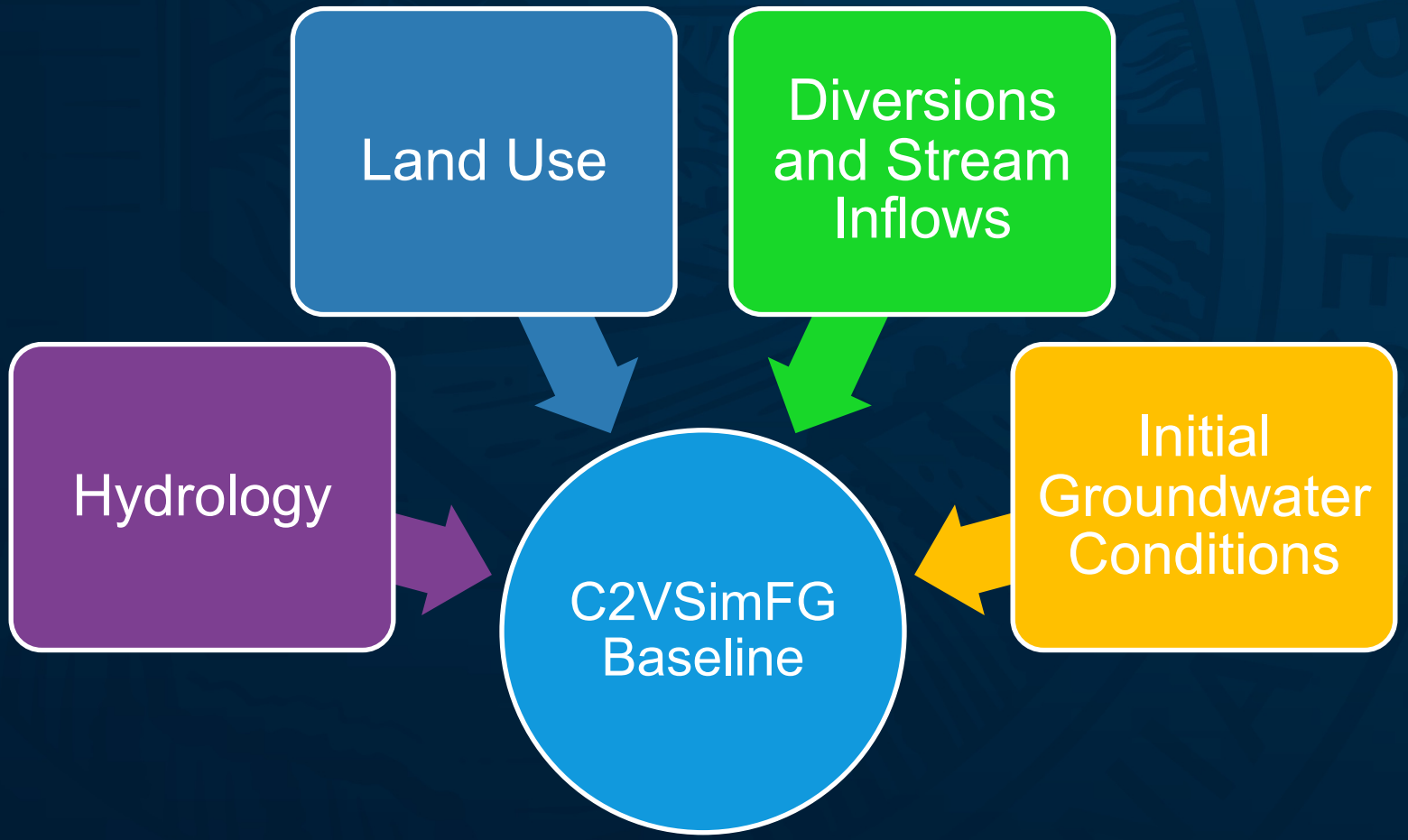
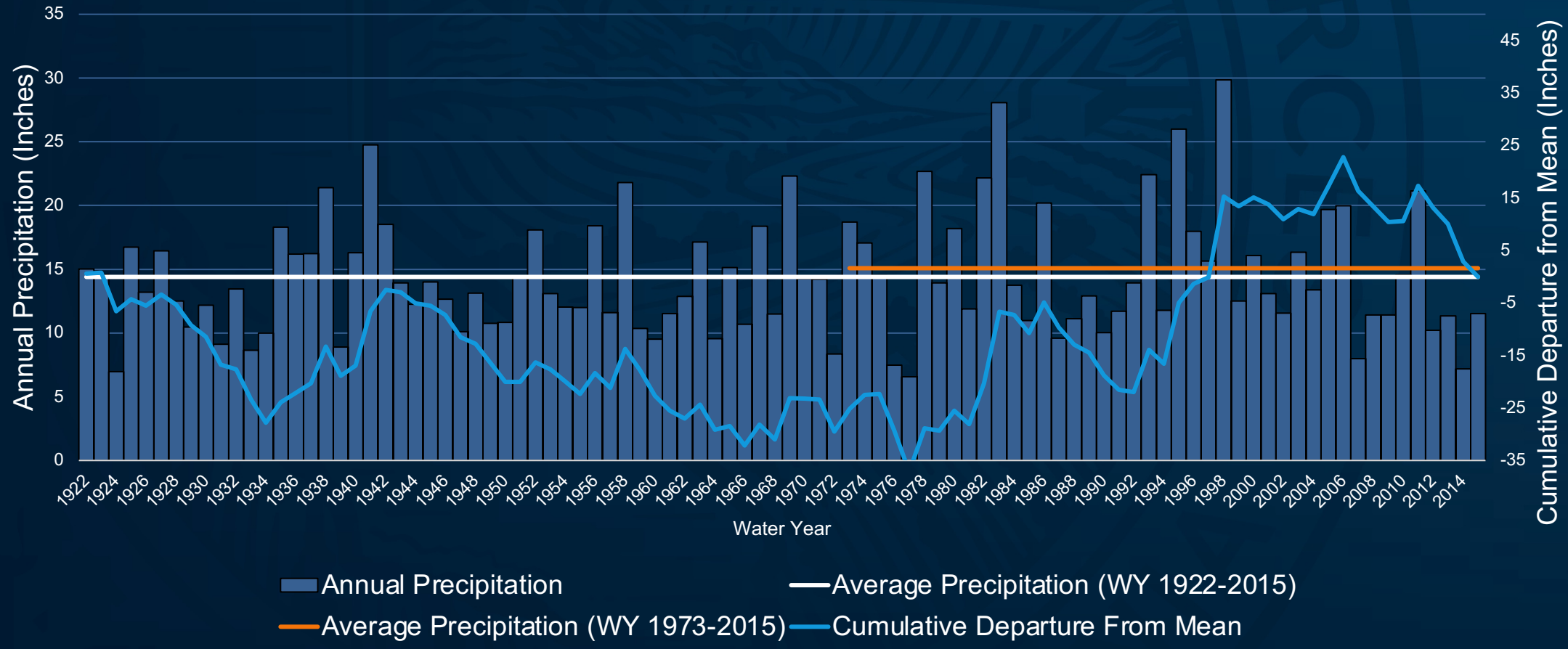
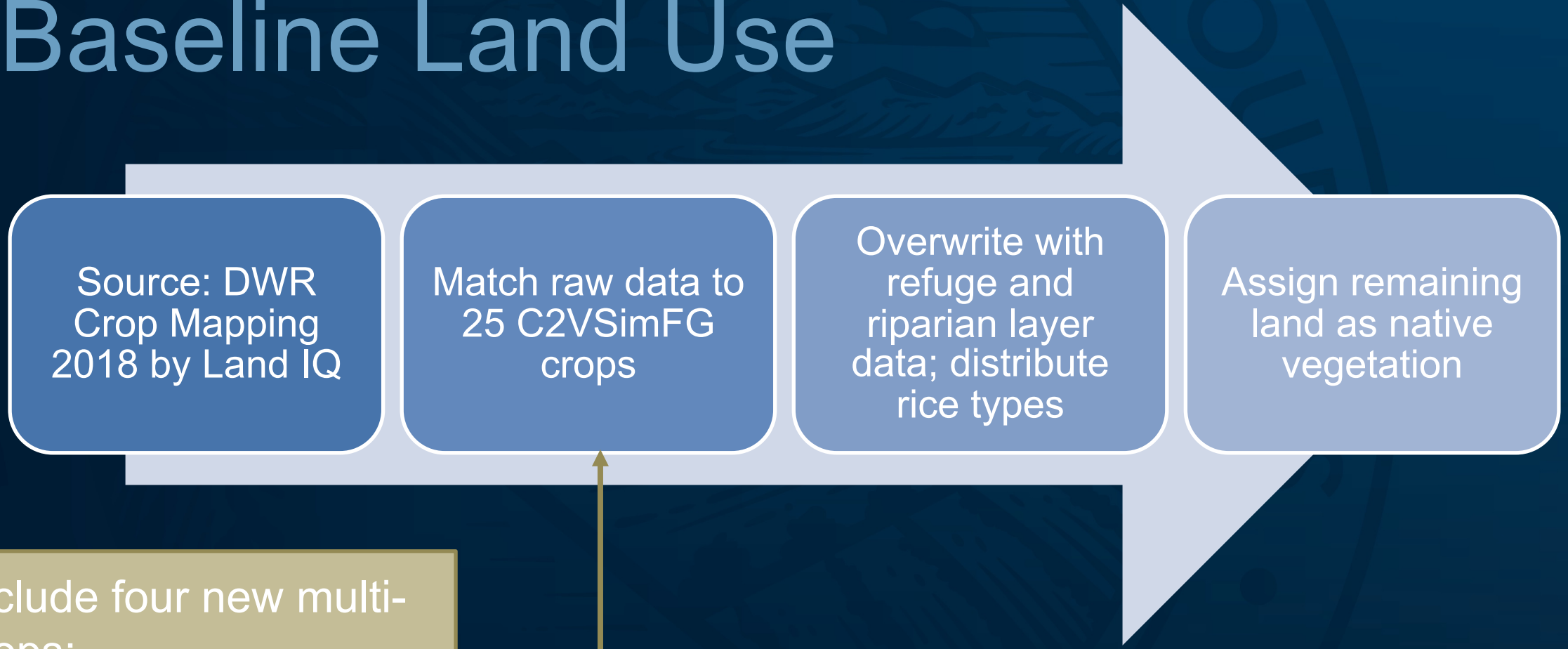
Baseline Development



Baseline Hydrology – Water Years 1922-2015



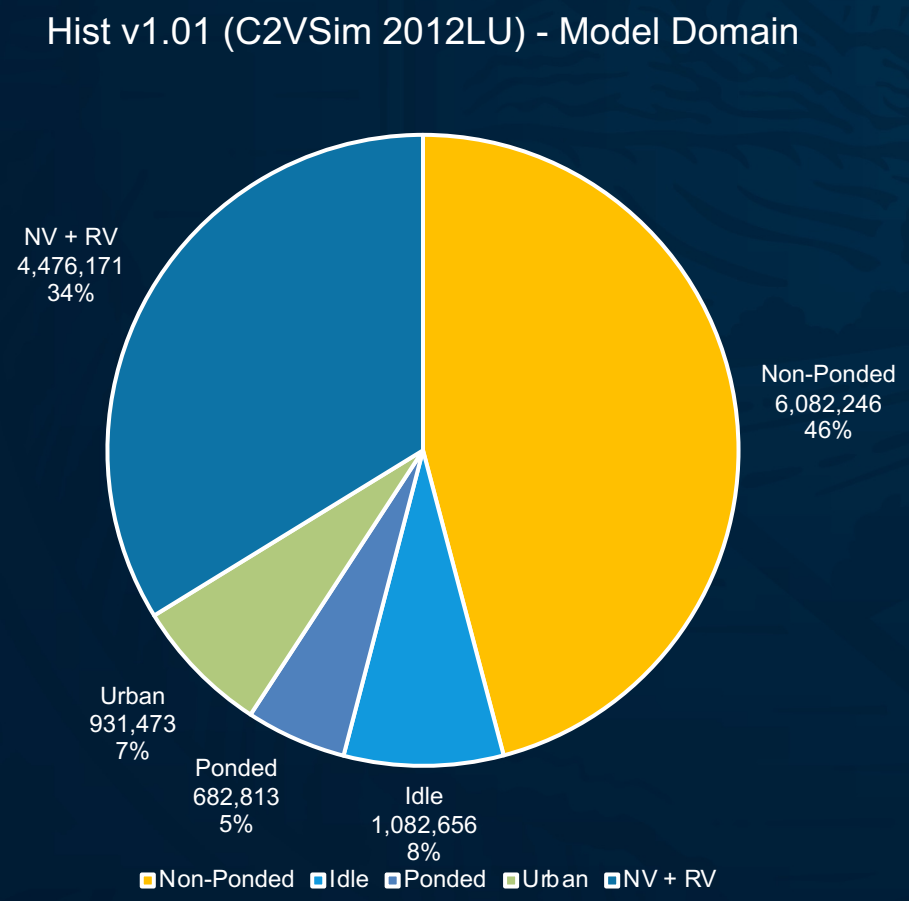
Baseline Land Use

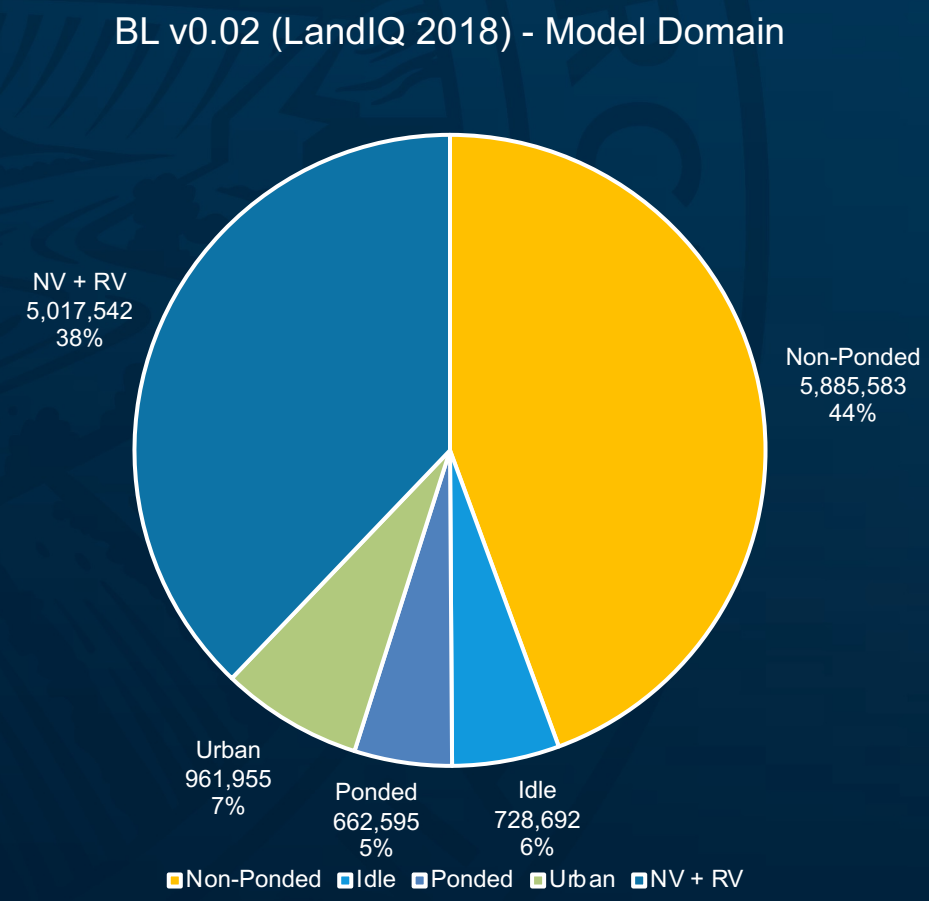


Include four new multi-crops:

- Grain and field
- Grain and truck
- Double truck (early season)
- Double truck (mid season)

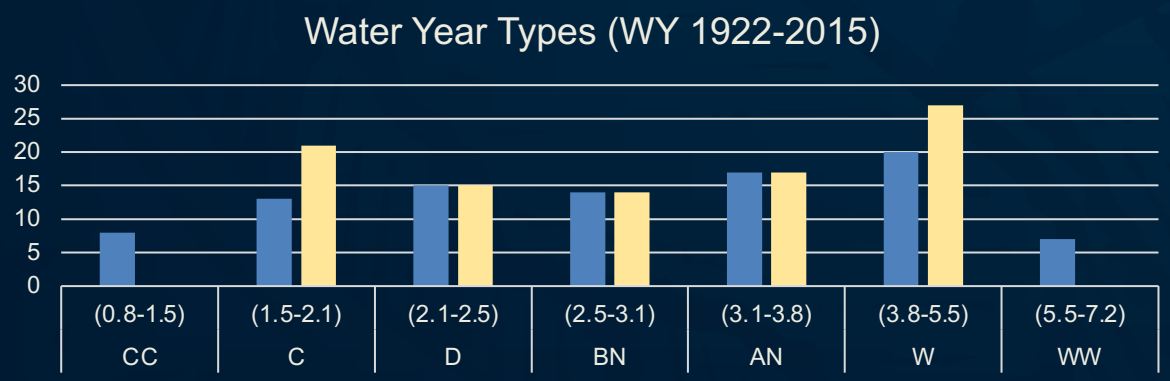
Baseline Land Use

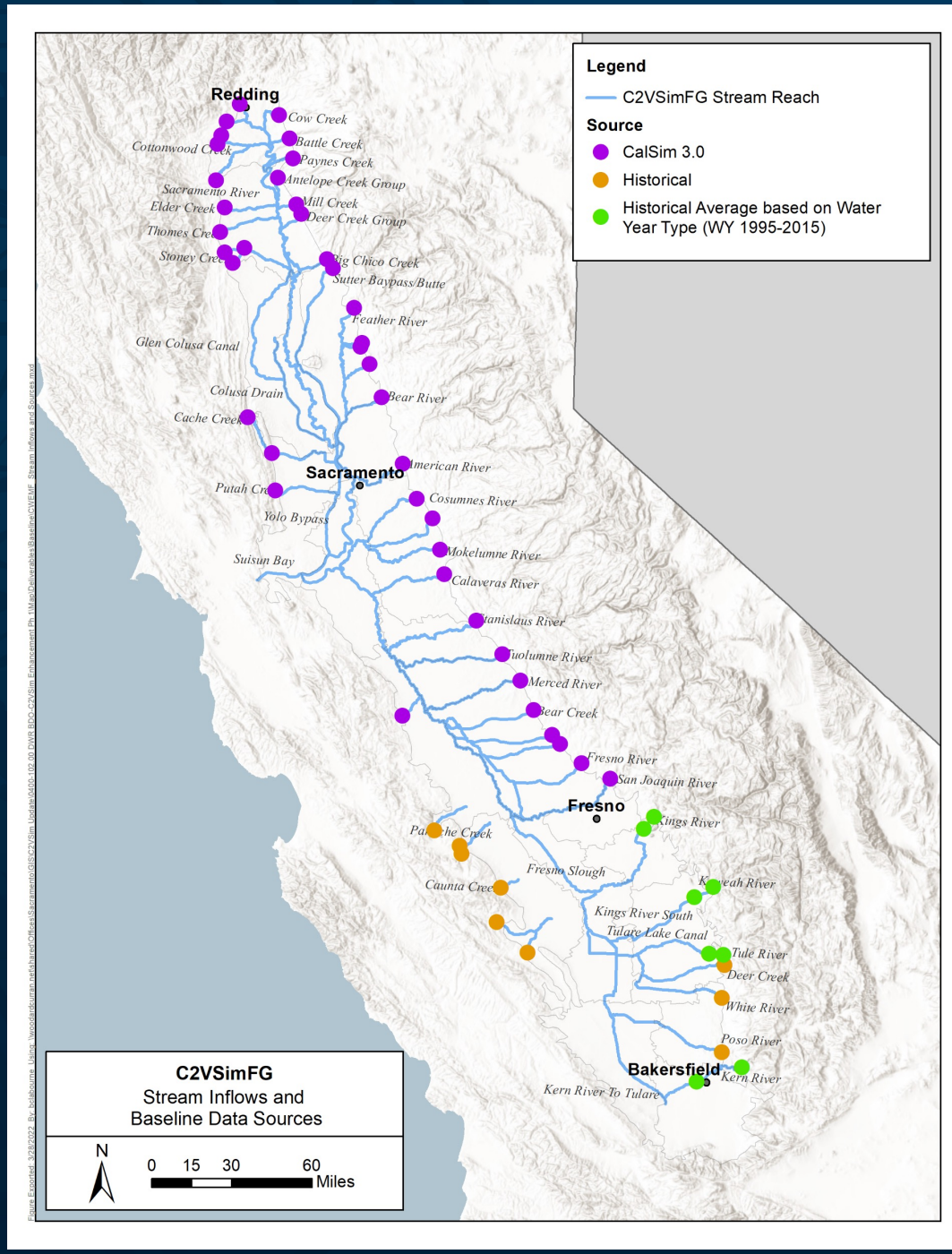




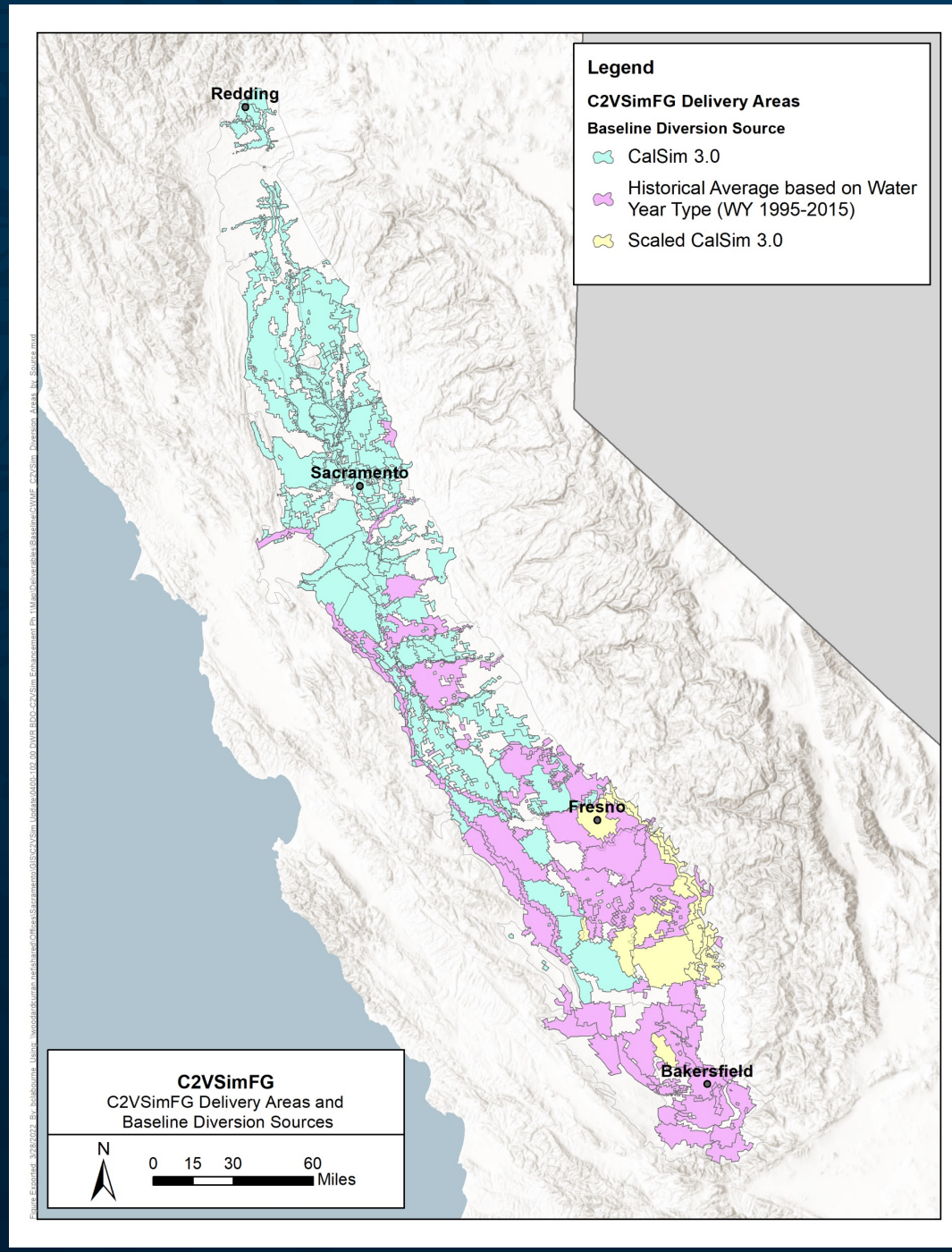
Diversions and Stream Inflows

- Linked Sacramento and San Joaquin Valley with CalSim 3.0 projections
- In regions outside of CalSim 3.0 extent, historical averaged based on water year types – with special distinction for very wet and very dry years



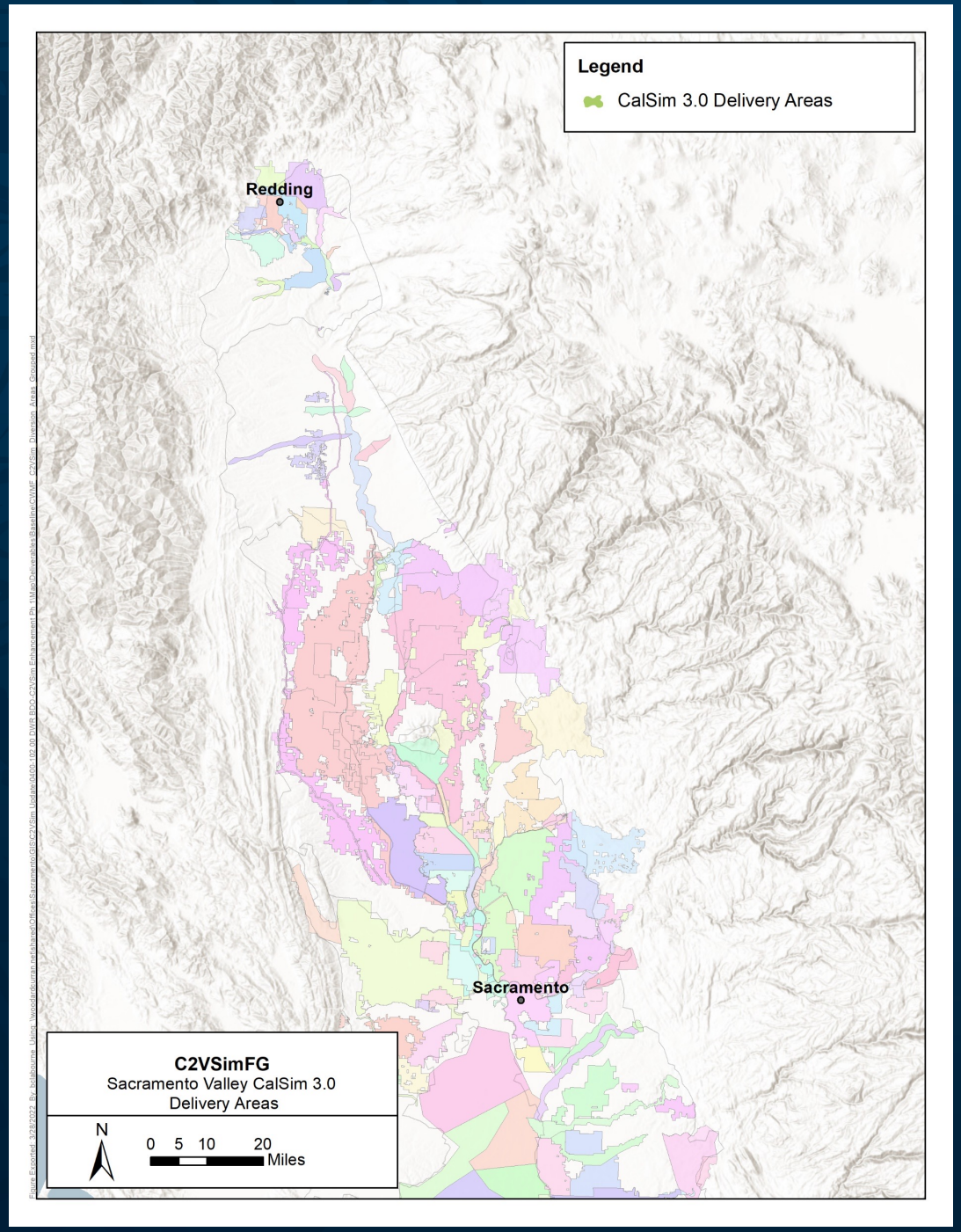


Diversions and Stream Inflows



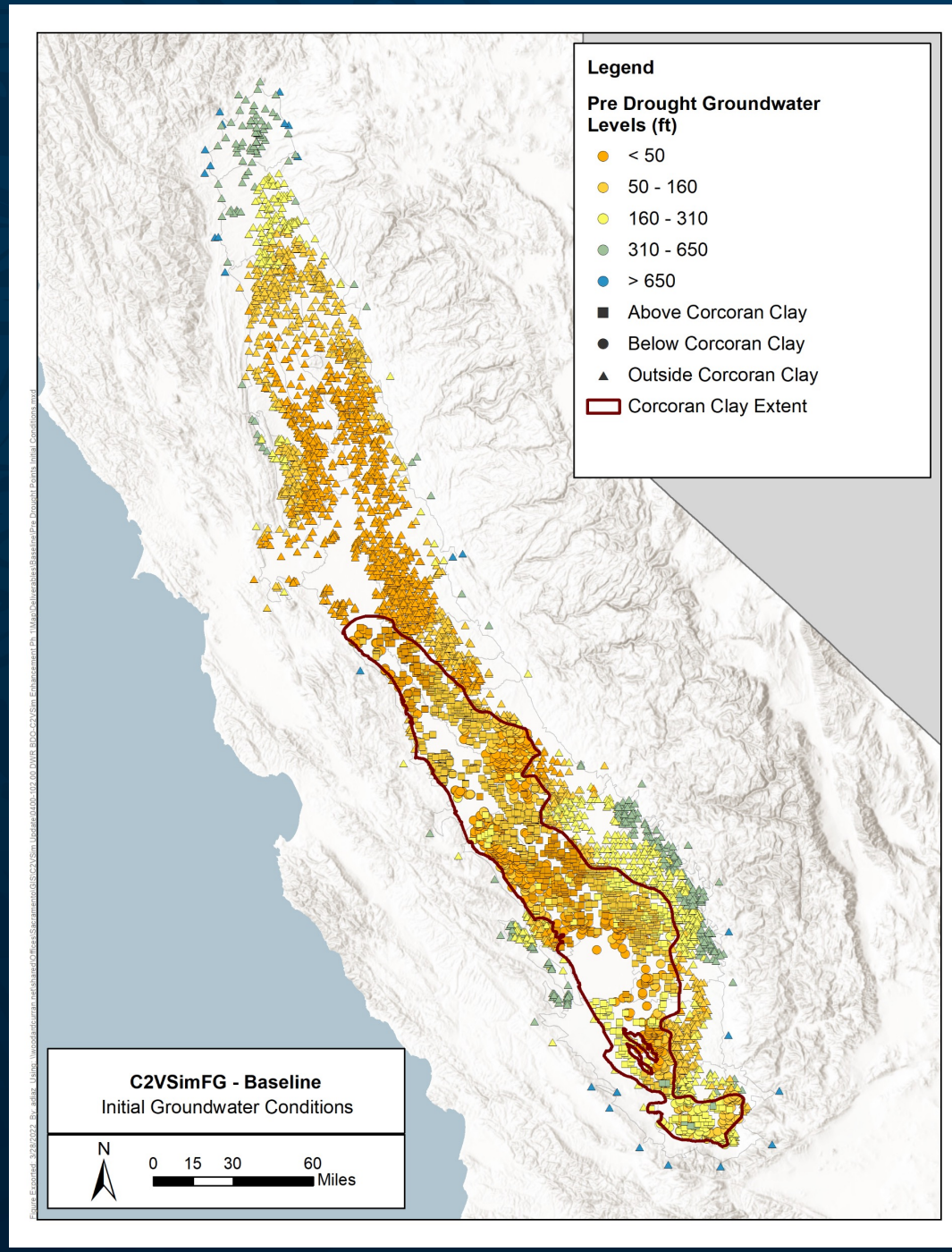
Diversions and Stream Inflows

- While individual diversion projections may vary from historical averages, combined delivery areas distributes surface water between rice areas

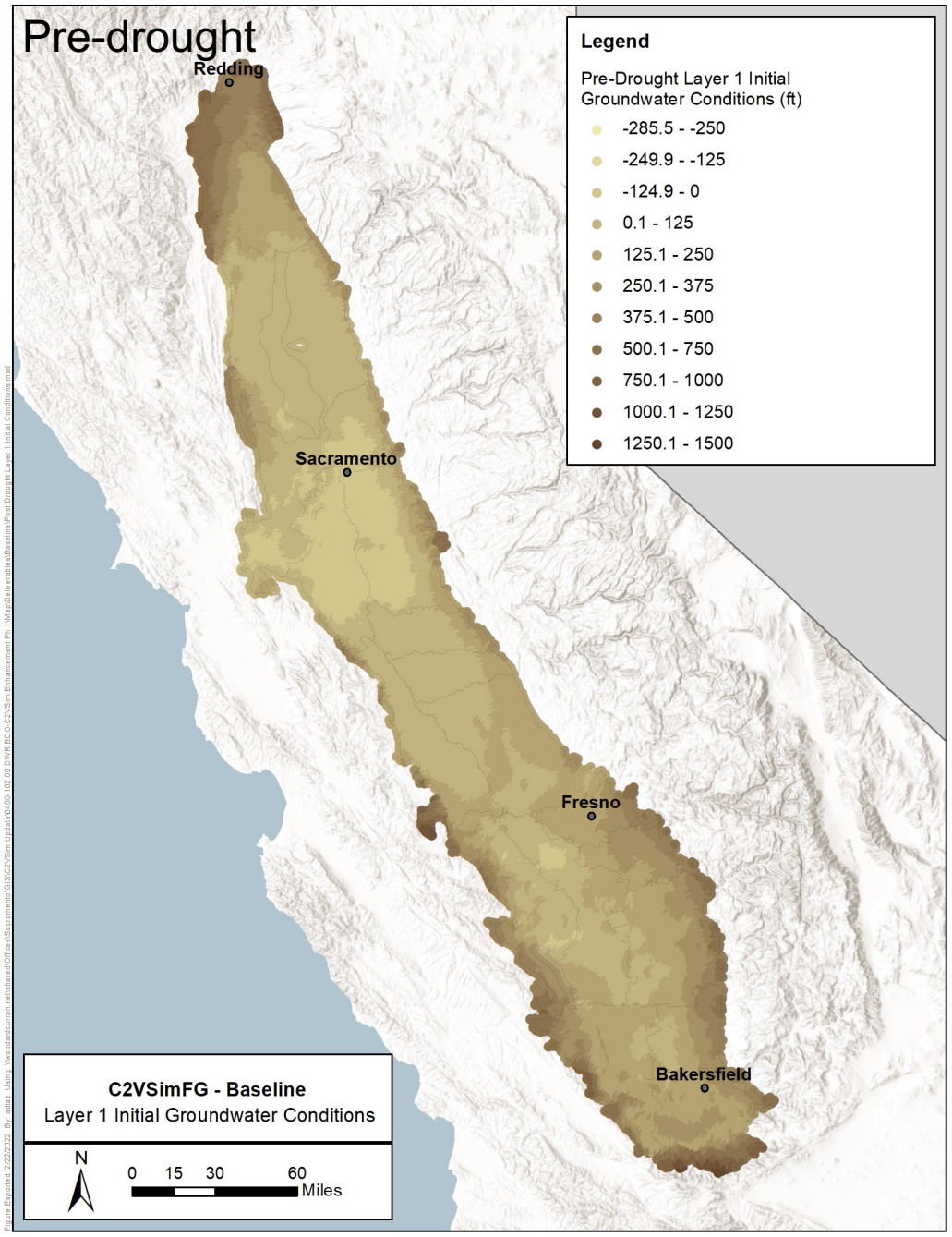


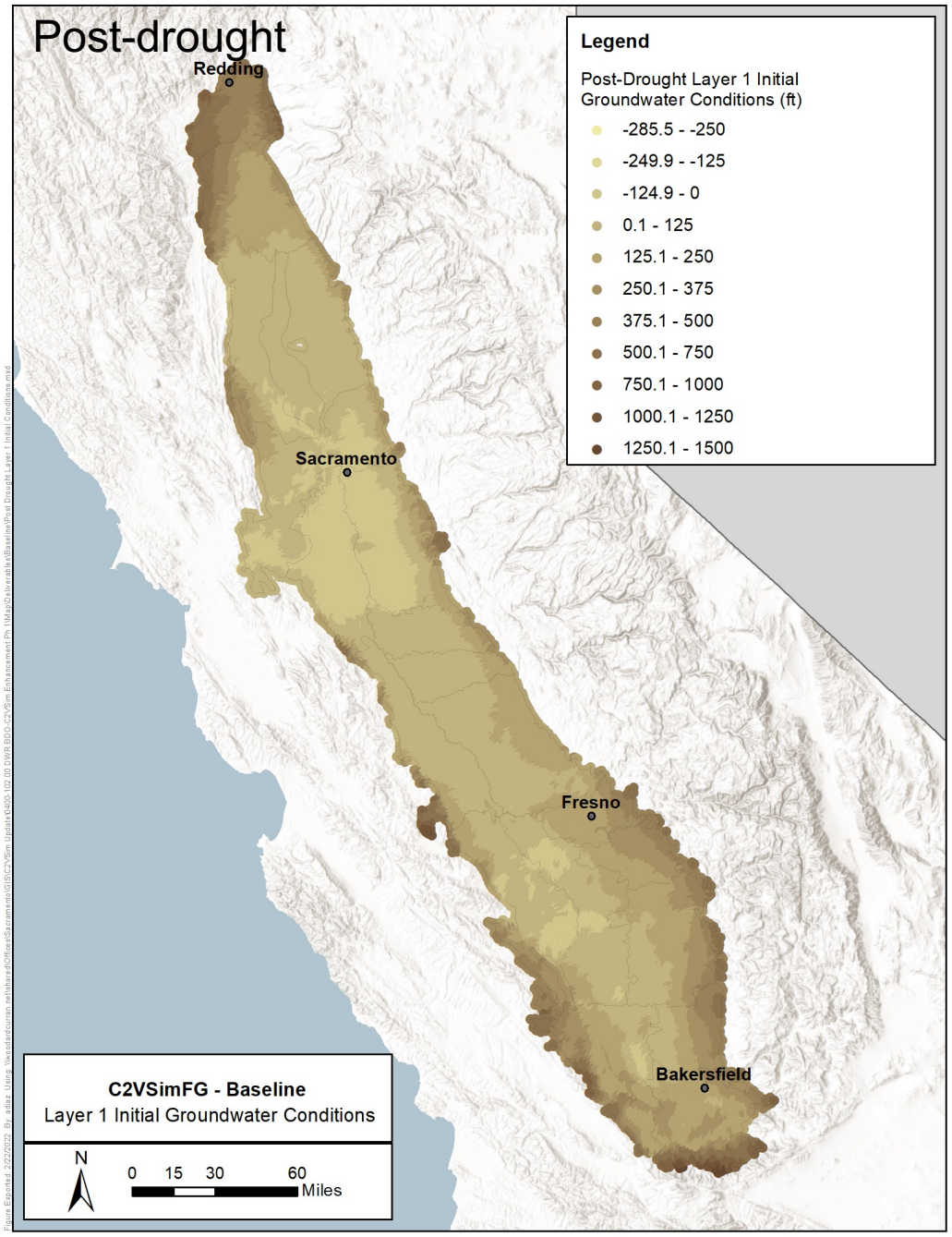
Initial Groundwater Conditions

- **TWO** sets of initial conditions for users to choose from:
  - **"Pre-drought"** – WY 2010-2012
  - **"Post-drought"** – WY 2018-2020 (recovery)
- Developed from observed groundwater levels



LAYER 1


Pre-drought
Redding
Sacramento
Fresno
Bakersfield
Legend
Pre-Drought Layer 1 Initial Groundwater Conditions (ft)
-285.5 - -250
-249.9 - -125
-124.9 - 0
0.1 - 125
125.1 - 250
250.1 - 375
375.1 - 500
500.1 - 750
750.1 - 1000
1000.1 - 1250
1250.1 - 1500
C2VSimFG - Baseline
Layer 1 Initial Groundwater Conditions
N
0 15 30 60
Miles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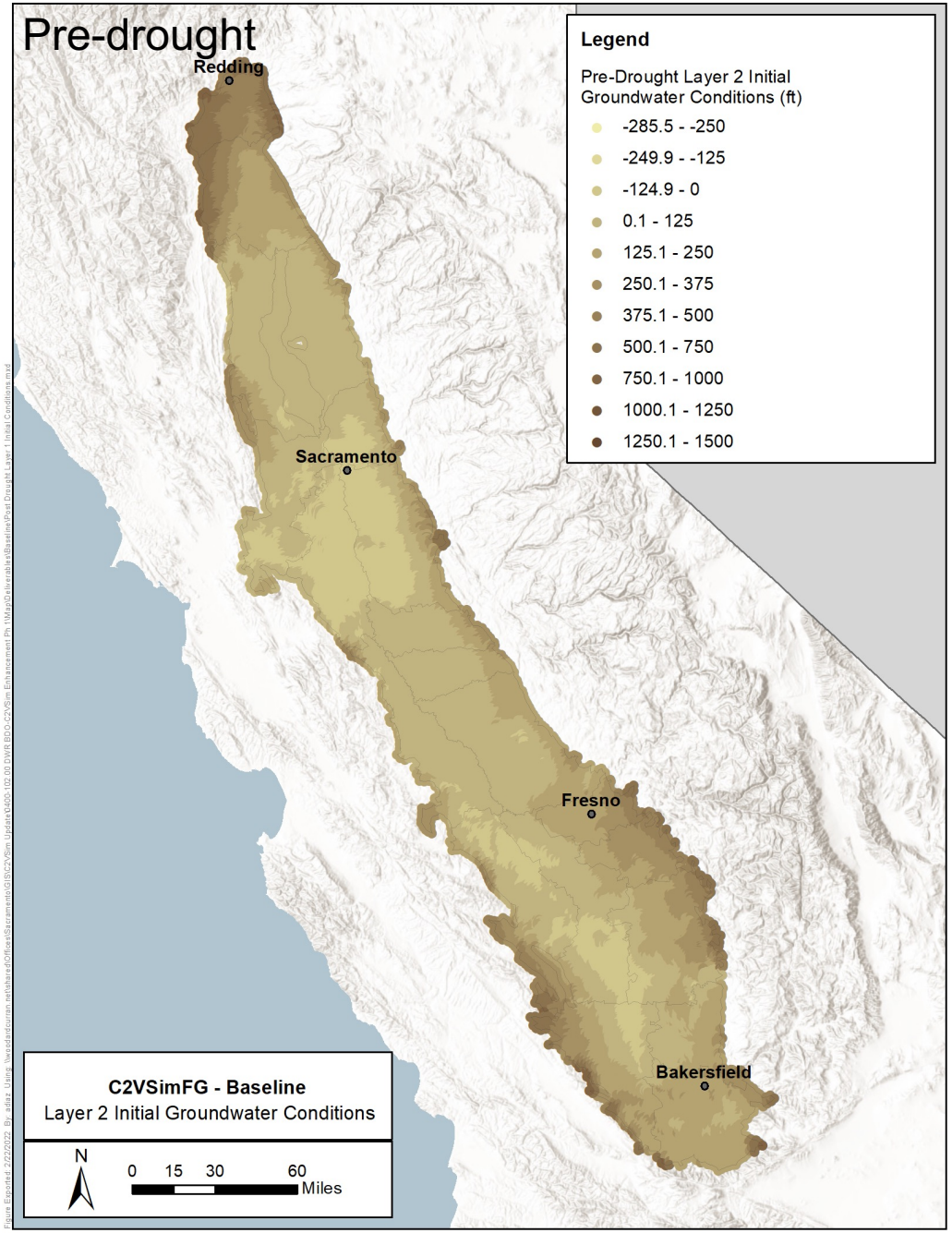
LAYER 2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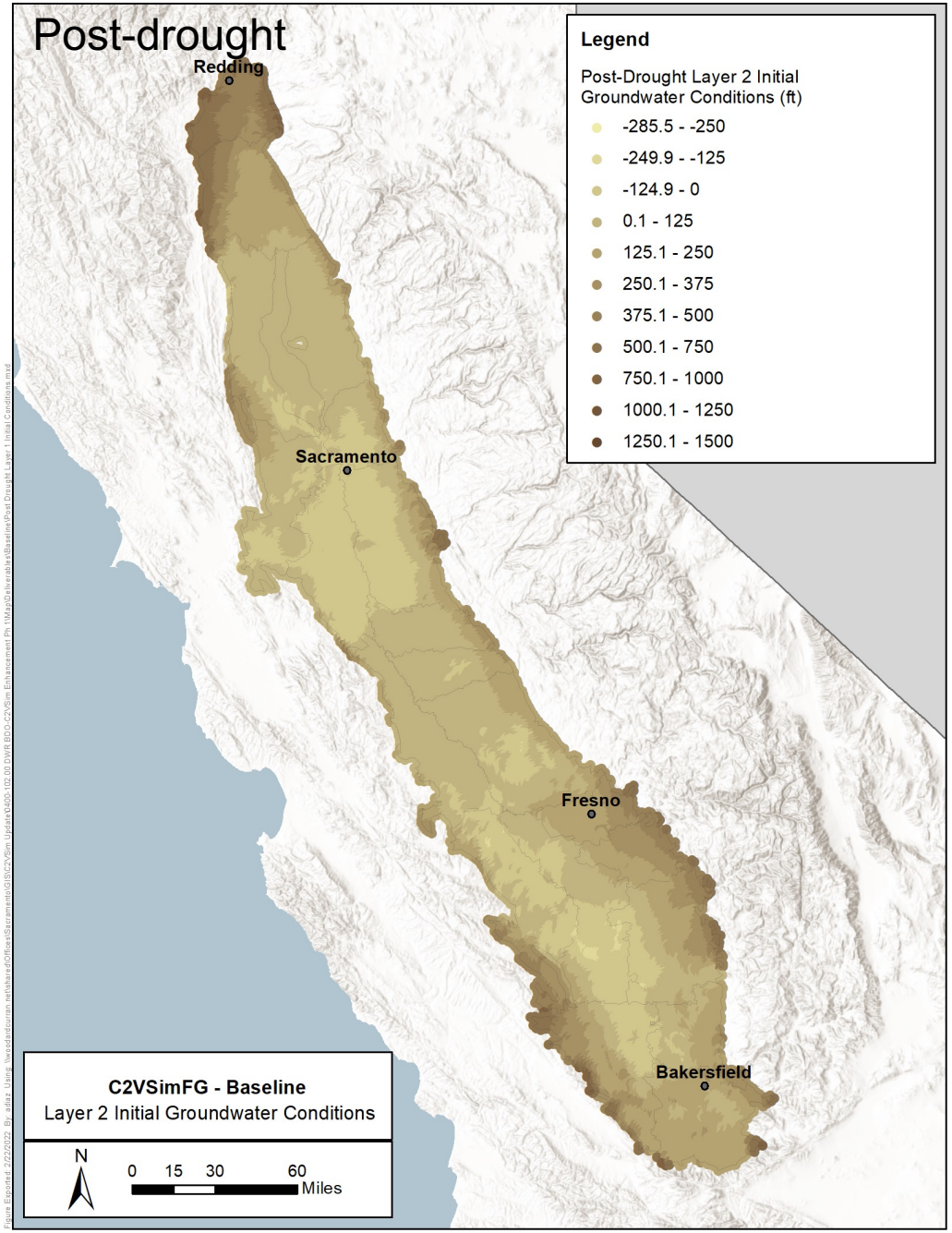
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C2VSimFG - Baseline
Layer 2 Initial Groundwater Conditions
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0 15 30 60
Miles

Other Baseline Data Inputs

C2VSimFG Baseline Input	Assumptions
Preprocessor	No changes from Historical
Simulation MAIN	Simulation period WY 1922-2015
Groundwater MAIN	Two sets of initial groundwater heads for users to choose from: pre- and post-drought based on observed GWLs
Boundary conditions	Reservoir stage from CalSim 3.0
Pumping	No Sacramento Valley transfer pumping District and export pumping rates based on historical average by water year type
Land use	Constant land use from 2018 Land IQ; 4 new multi-crops
Land use initial conditions	Fall 2011 conditions from historical model
Nonponded crop files	New columns for multi-crops
Ponded depth and operations	Historical average based on water year type (WY 2005-2015)
Urban	Constant 2015 population; 2011 per capita water use
Stream inflows and diversions	Using CalSim 3.0 baseline data where possible, historically averaged (with specific excepts) elsewhere
Diversion and bypass specifications	No changes from Historical
Evapotranspiration	Same as historical, with additional of multi-crops. Local data backfilled to be consistent before WY 1974.
Precipitation	No changes from Historical
Small watersheds	No changes from Historical (updated ET column mapping)
Unsaturated zone	No changes from Historical

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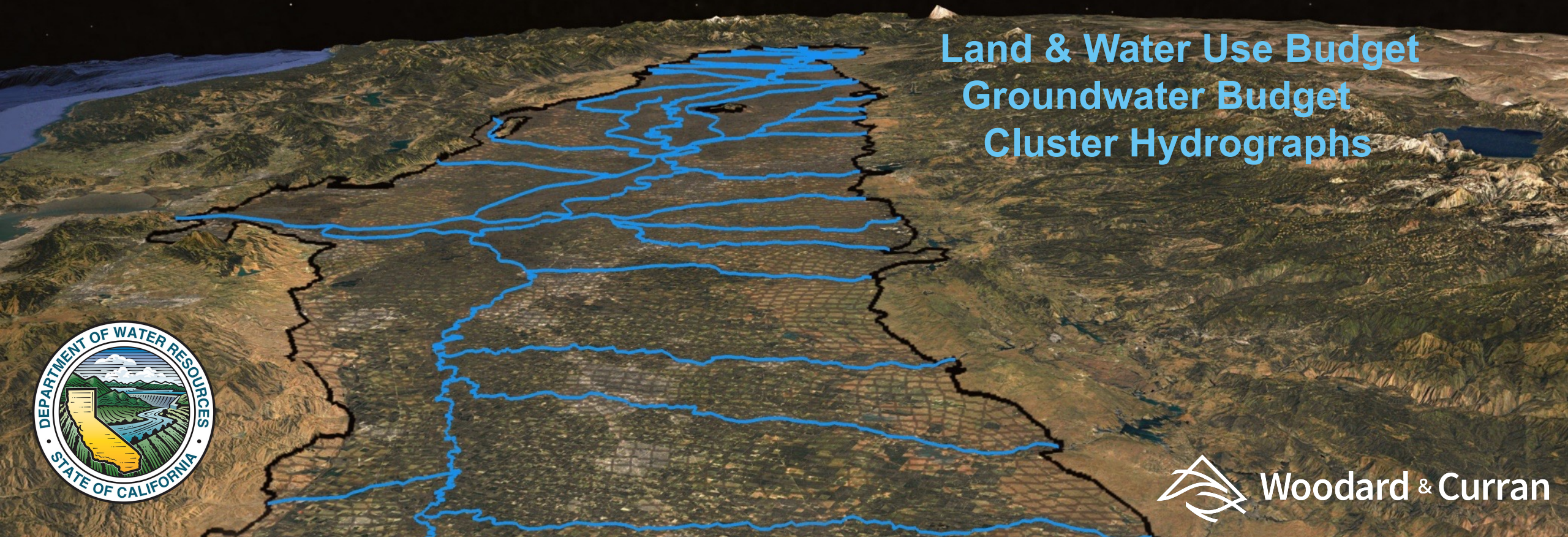
Baseline Results



Land & Water Use Budget
Groundwater Budget
Cluster Hydrographs

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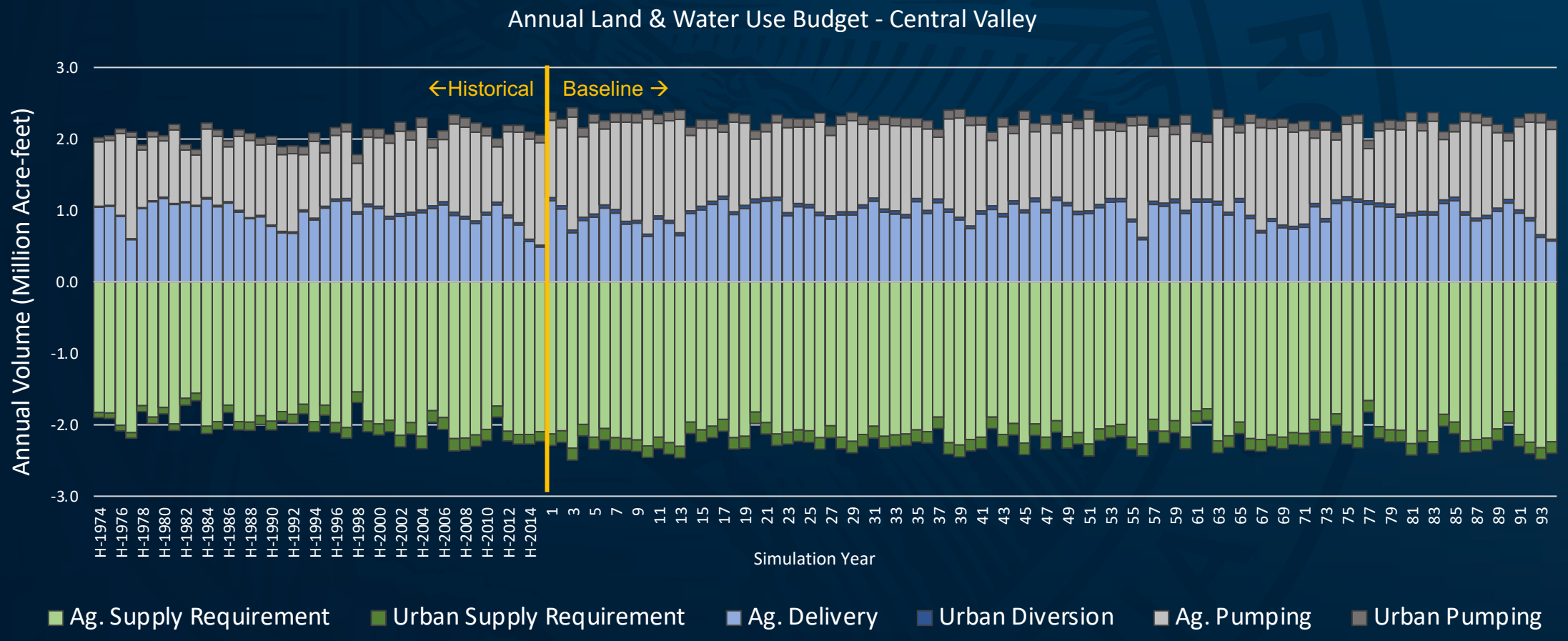
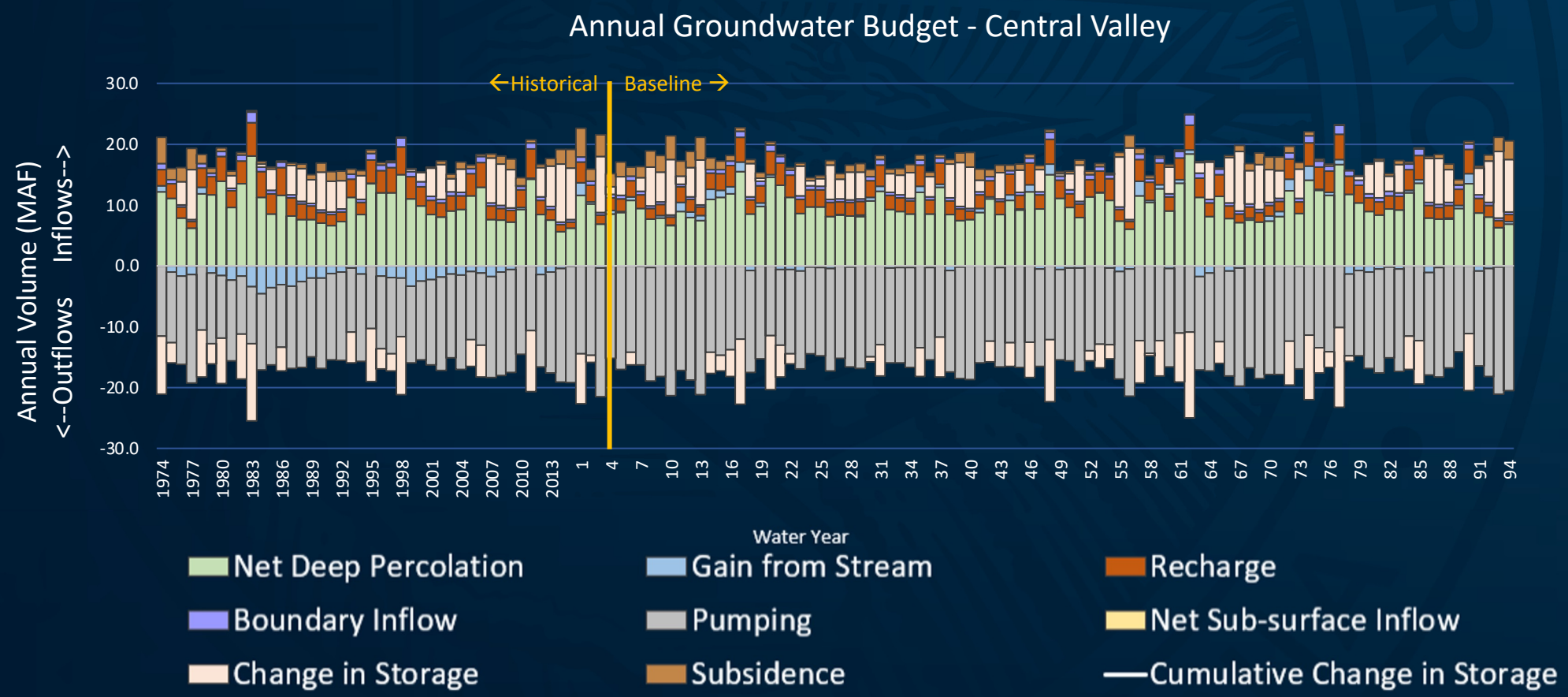
Baseline Land and Water Use Budget

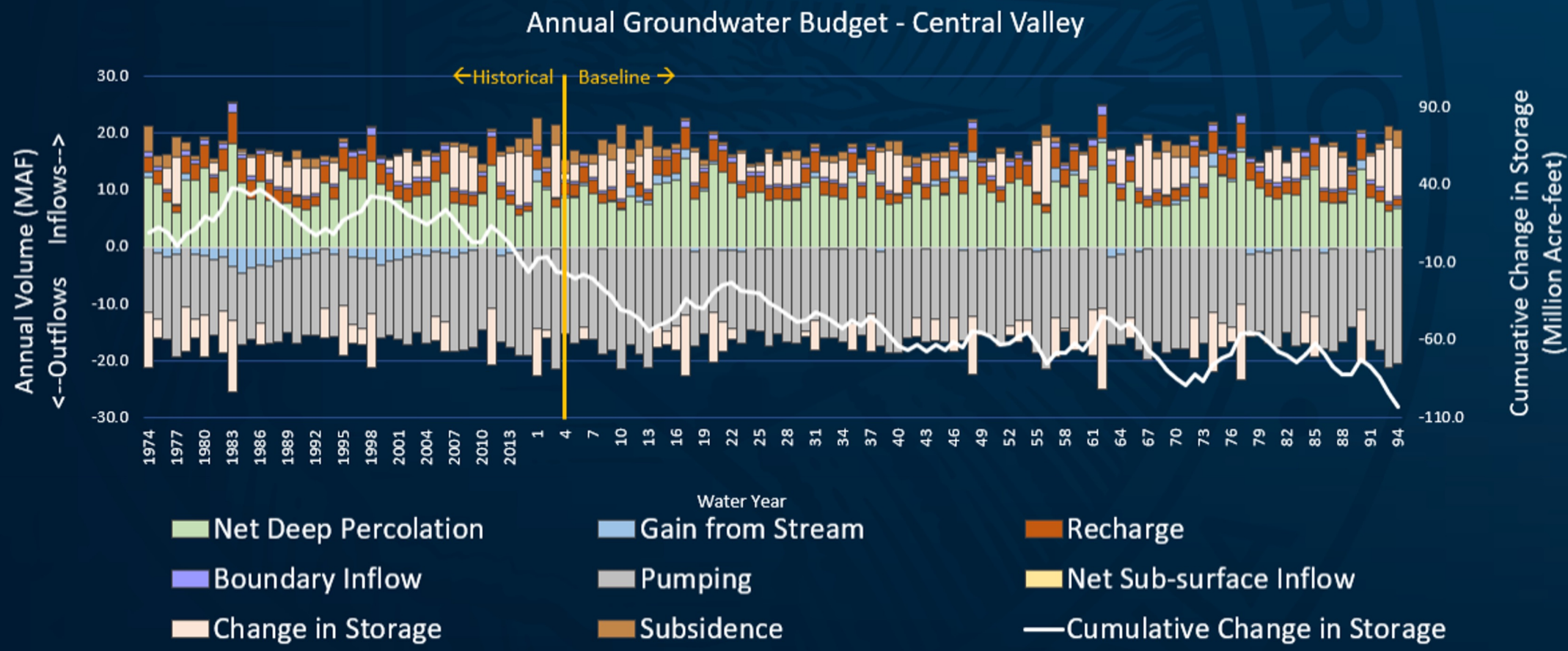


Baseline Groundwater Budget



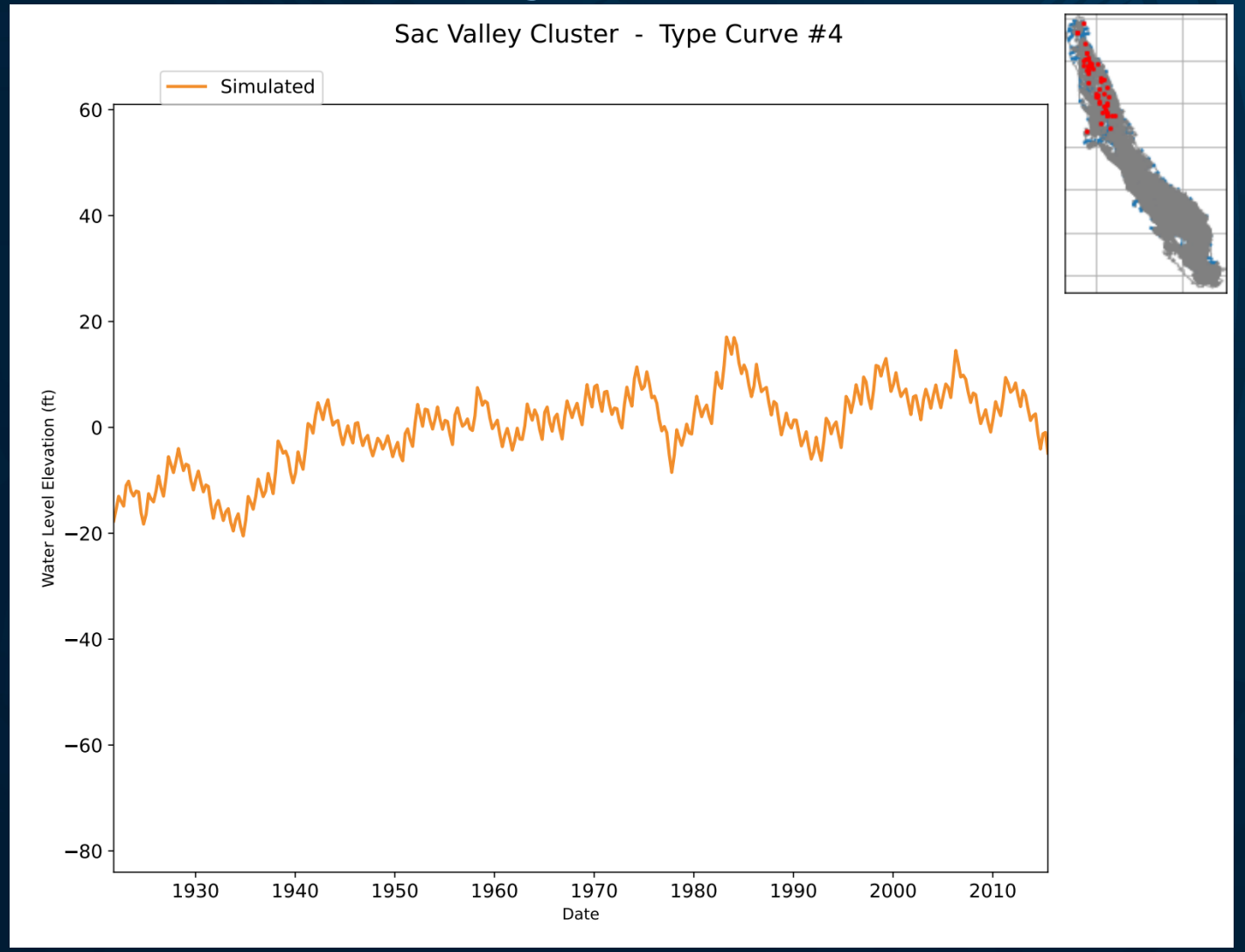
Preliminary Results – Subject to Change

Baseline Groundwater Budget



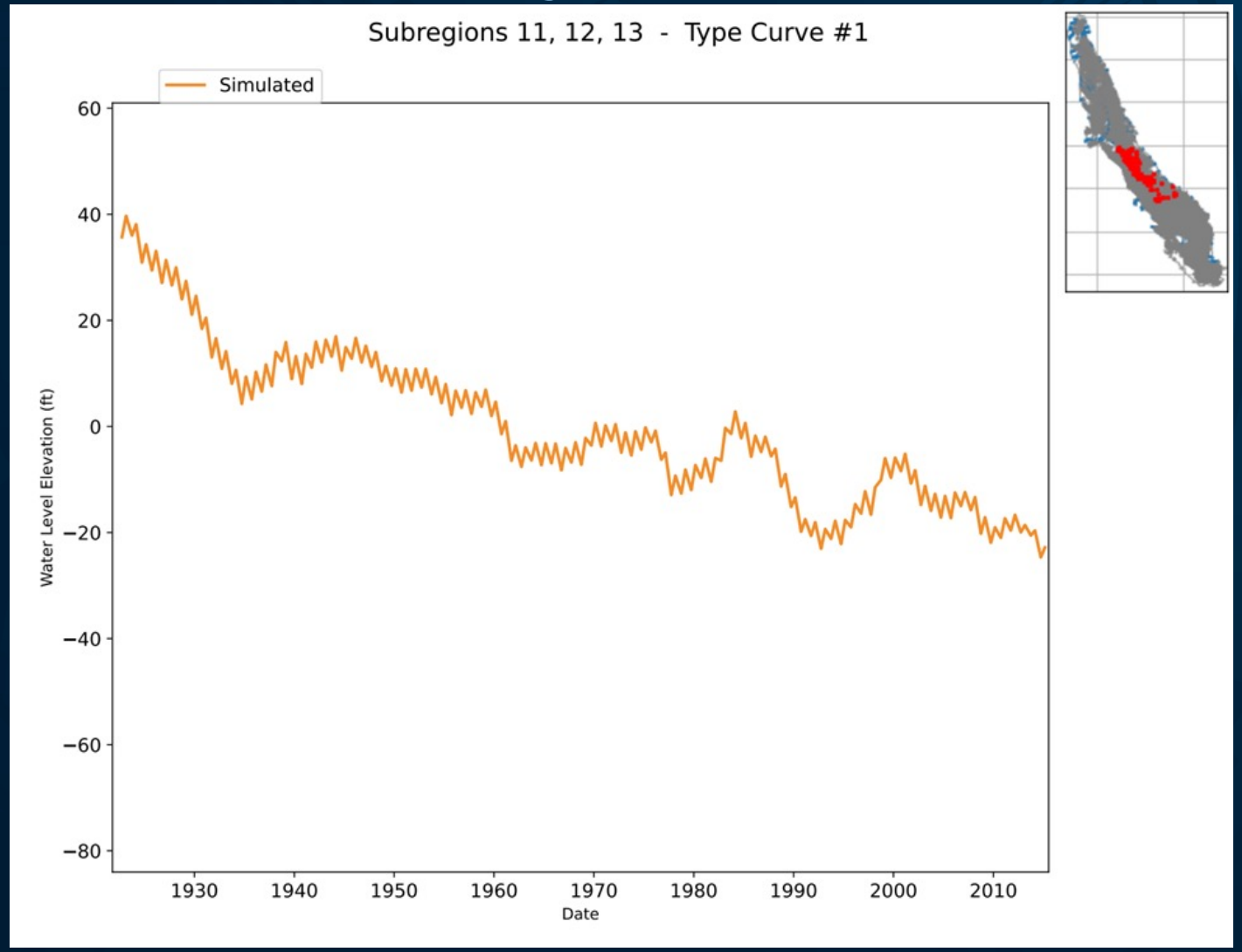
Preliminary Results – Subject to Change

Cluster Hydrographs
Sacramento Valley



Preliminary Results – Subject to Change

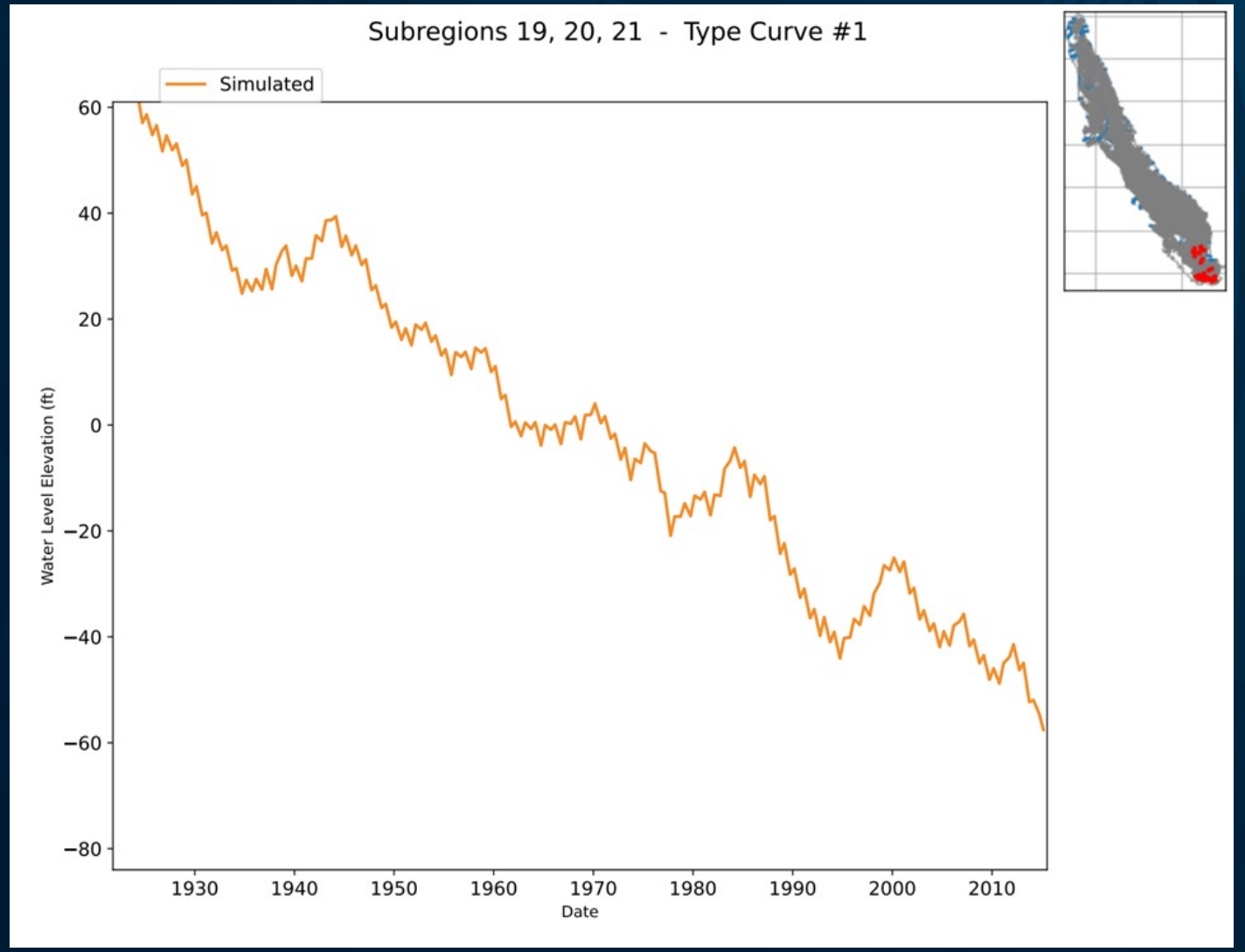
Cluster Hydrographs
San Joaquin Valley



Preliminary Results – Subject to Change

Cluster Hydrographs

Tulare Basin



Preliminary Results – Subject to Change

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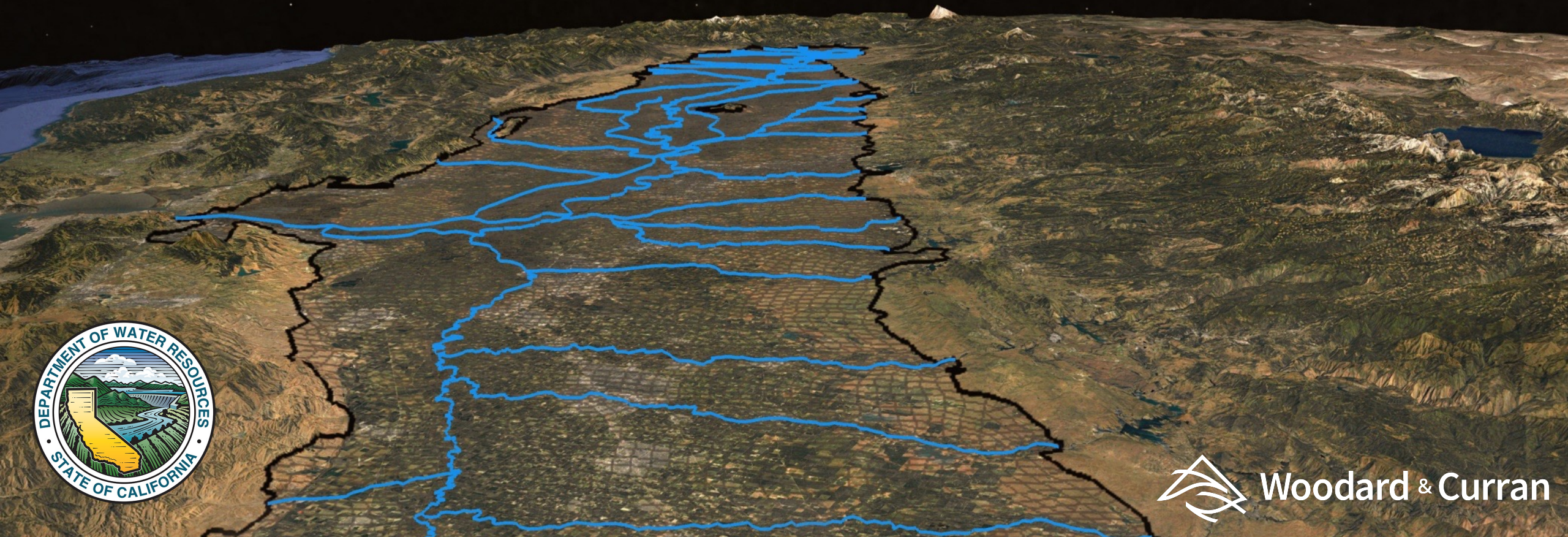
Applications and Next Steps



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Applications and Next Steps

How locals can utilize C2VSimFG Baseline

- Groundwater Sustainable Plan (GSP) implementation

Limitations of the Baseline

- Pending bug fixes in v1.01 are not incorporated (to preserve calibrated historical water budget)
- Uncertainty in certain water source types (e.g., projected water transfer, water banking and treated water from oil fields), especially in Tulare Basin.

Upcoming further Baseline development

- Documentation and public release of the first version in 2022
- Future update based on new C2VSimFG historical version and new data, such as SWP delivery report 2021 CalSim 3 study;
- Projected climate change scenarios for 2030 and 2070.

California Central Valley Groundwater-Surface Water Simulation Model – Fine Grid (C2VSimFG)

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- William Sicke
- Ric McCallan

Davids Engineering
- Byron Clark

Presenting

Liz DaBramo
ldabramo@woodardcurran.com

Guobiao Huang Huang,
Guobiao.Huang@water.ca.gov

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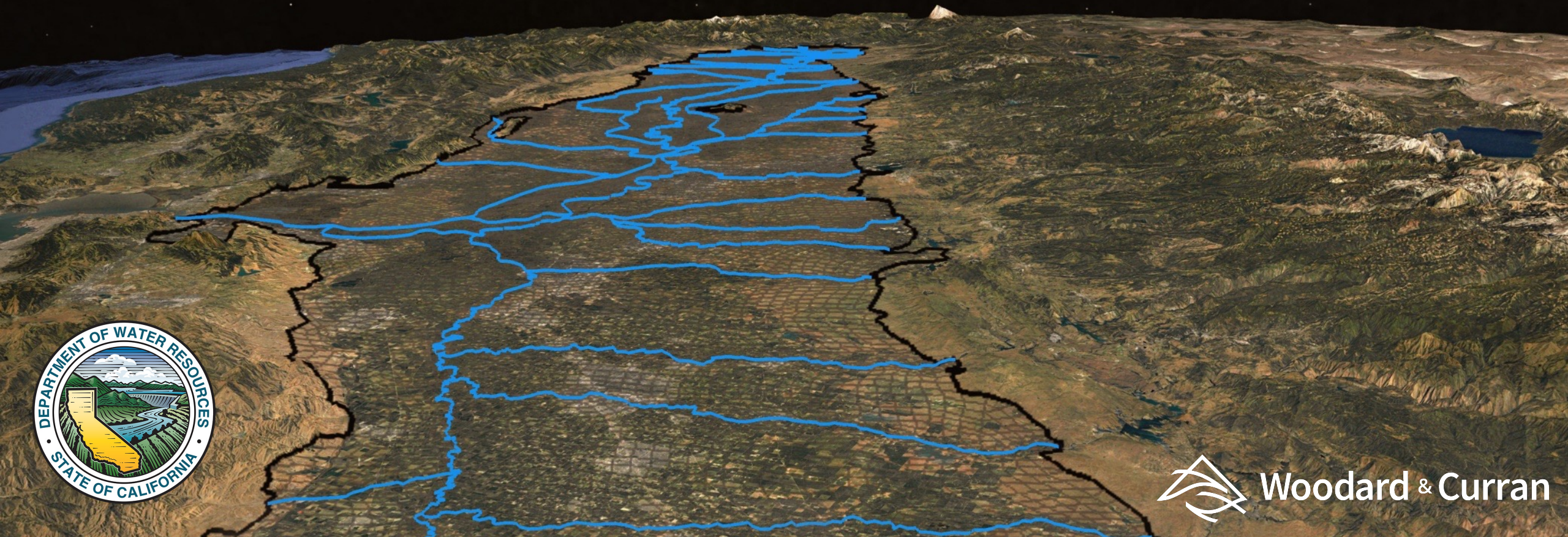
Backup Slides



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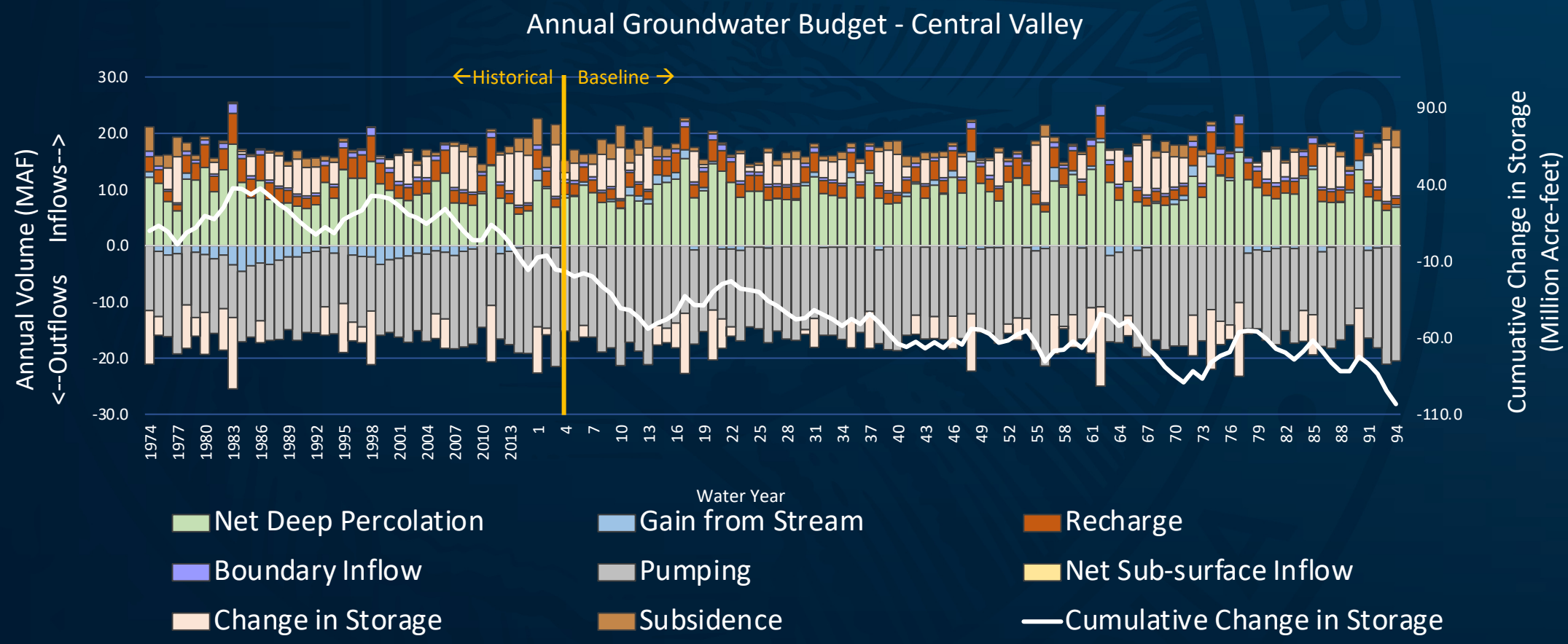
Baseline Groundwater Budget



Water Year Types

	Sac	SJ
	3.1	0.8
CC	4.2	1.5
C	5.3	2.1
D	6.5	2.5
BN	7.8	3.1
AN	9.3	3.8
W	13	5.5
WW	15.3	7.22