Kern River Groundwater Sustainability Agency (KRGSA)

Water Budget Workshop No. 1
Data and Approach for the KRGSA

June 7, 2018

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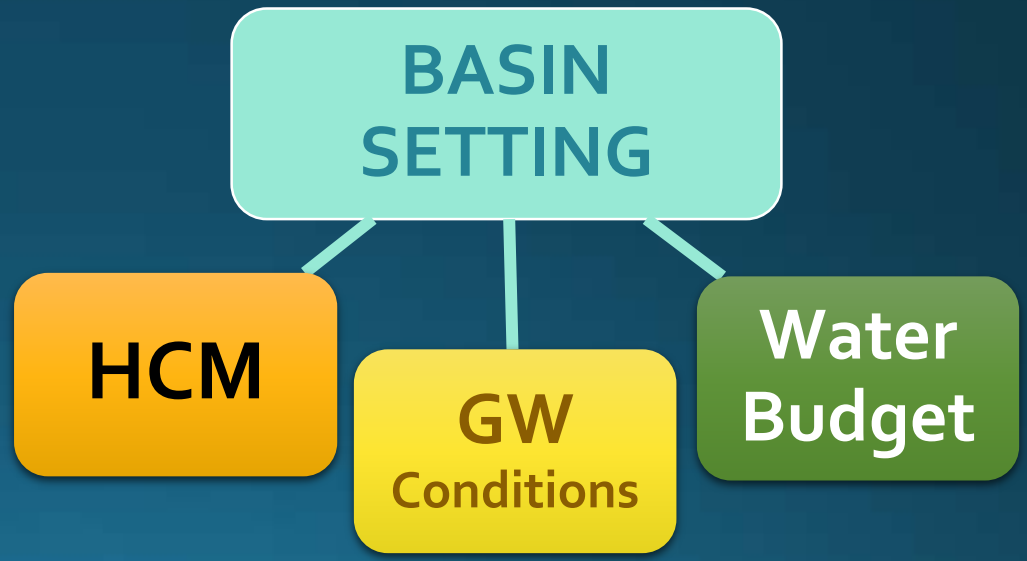
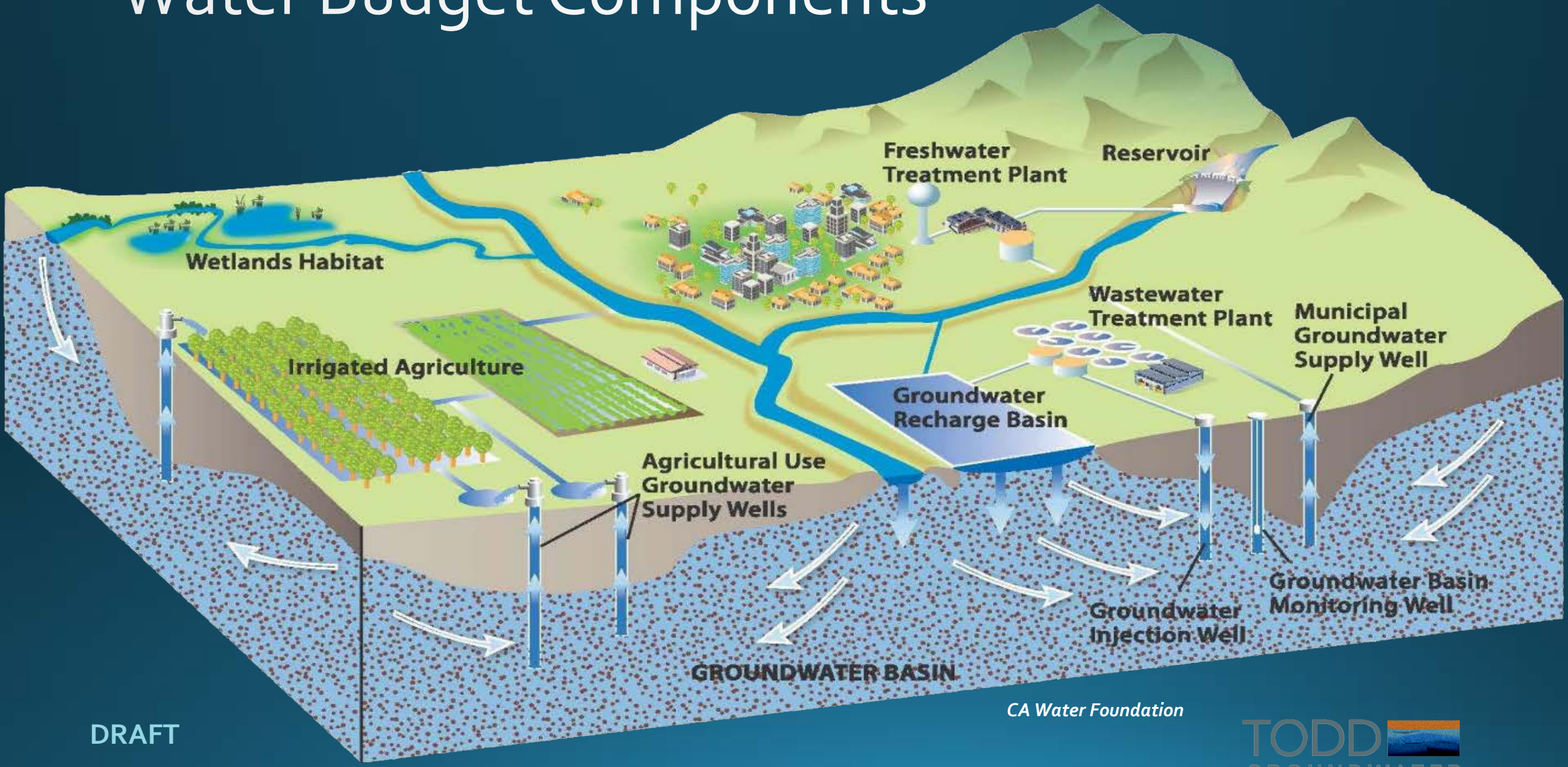
GSP Requirements for Basin Setting

- Hydrogeologic Conceptual Model (HCM) and Groundwater (GW) Conditions discussed at April Board meeting
- Today - Water Budget workshop on data and approach
- Ongoing work with agencies to reconcile data sources and avoid "double counting"



Water Budget Components



CA Water Foundation

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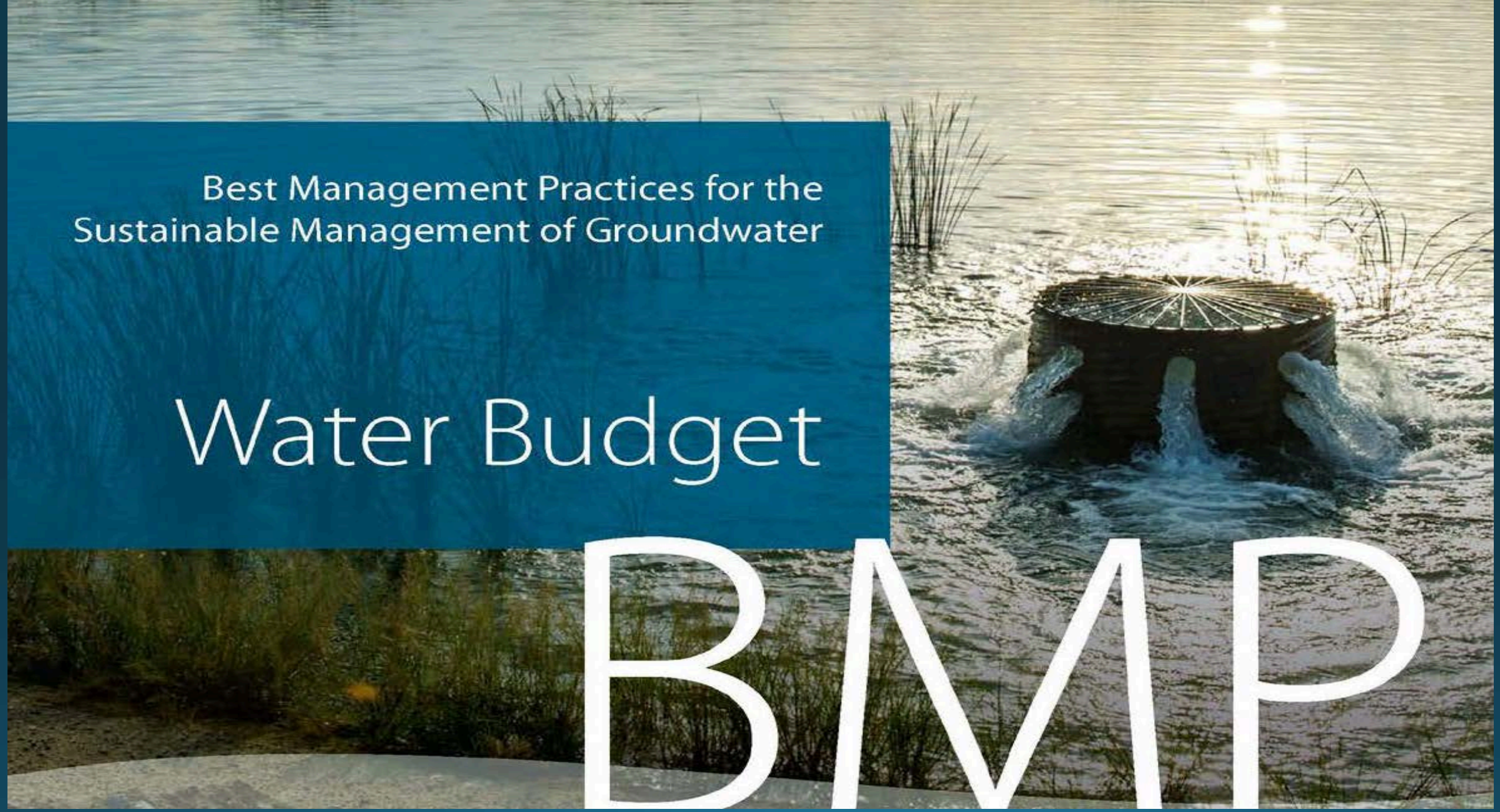

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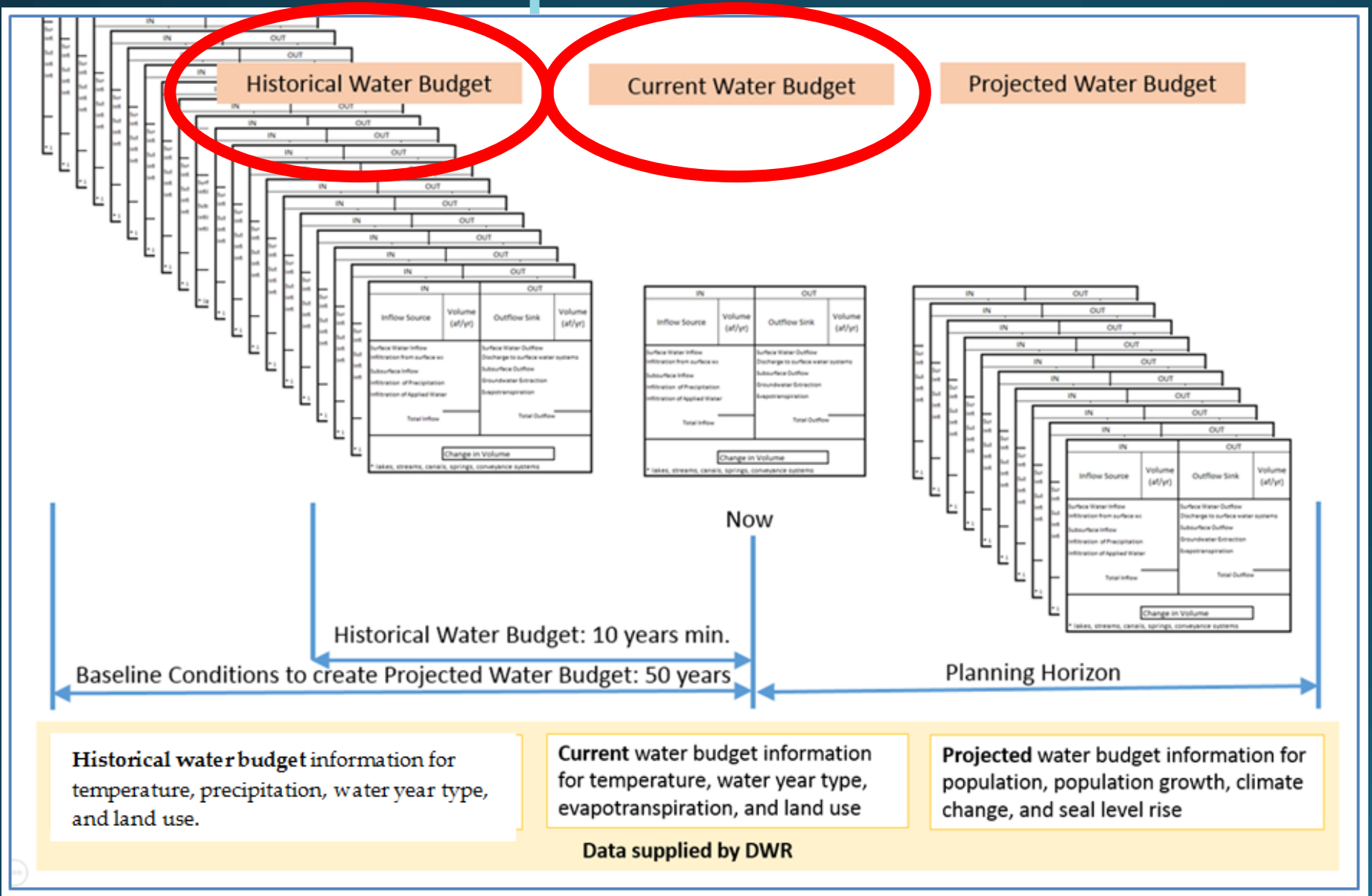
GSP Requirements



Focus on current and historical budgets first

Must cover entire subbasin

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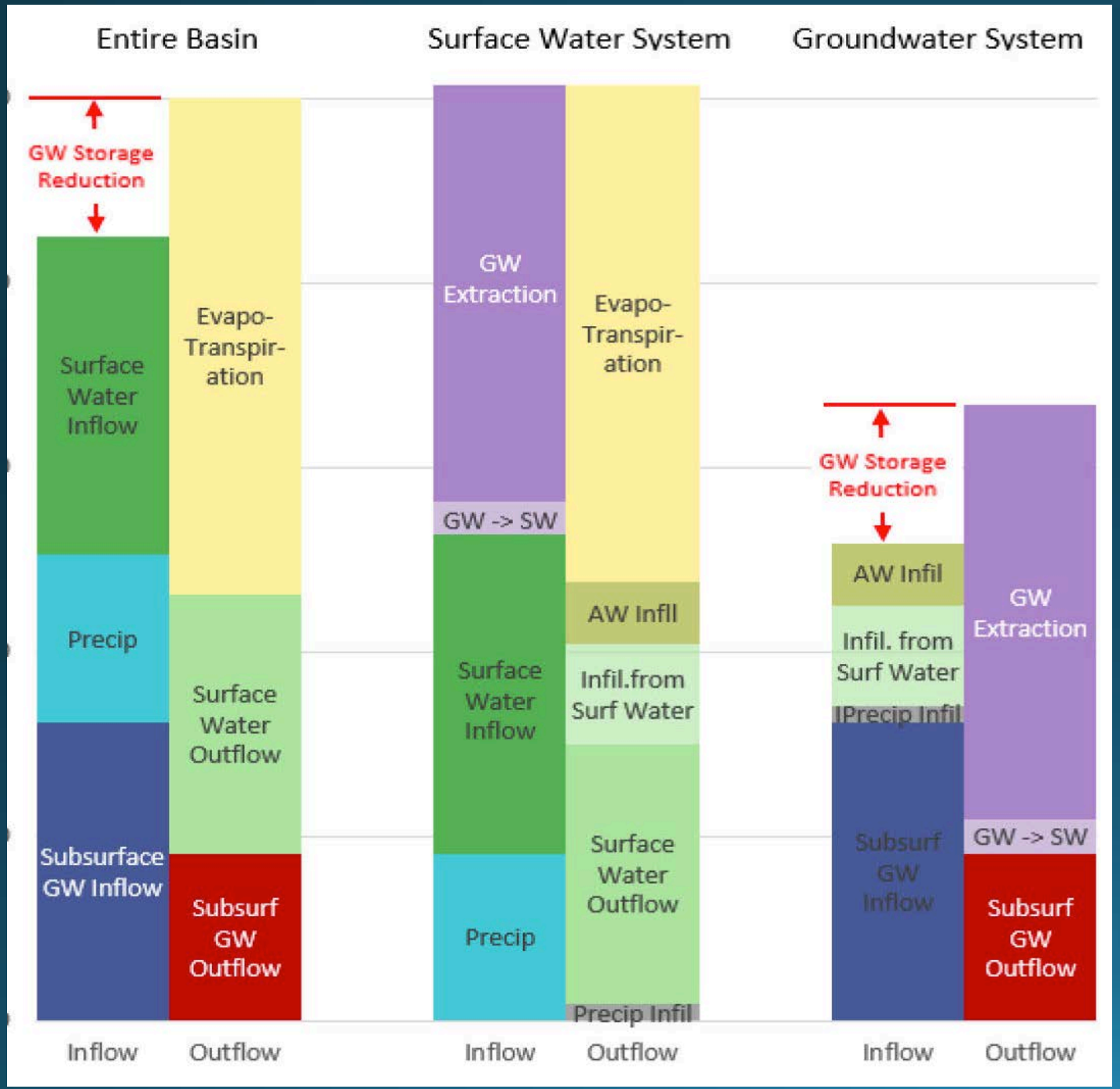

Water Budgets BMP Example

- Separate water budgets for groundwater and surface water
- Combine for GSA and Subbasin budgets
- Graphical representation required by regulations

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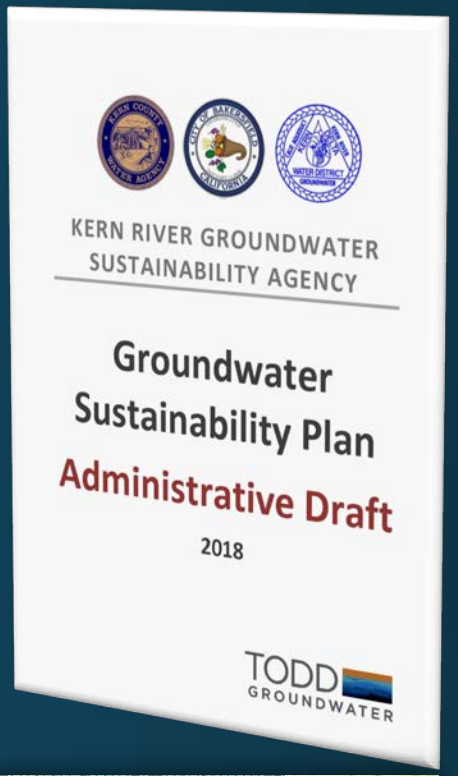
KRGSA Water Budgets - Purpose

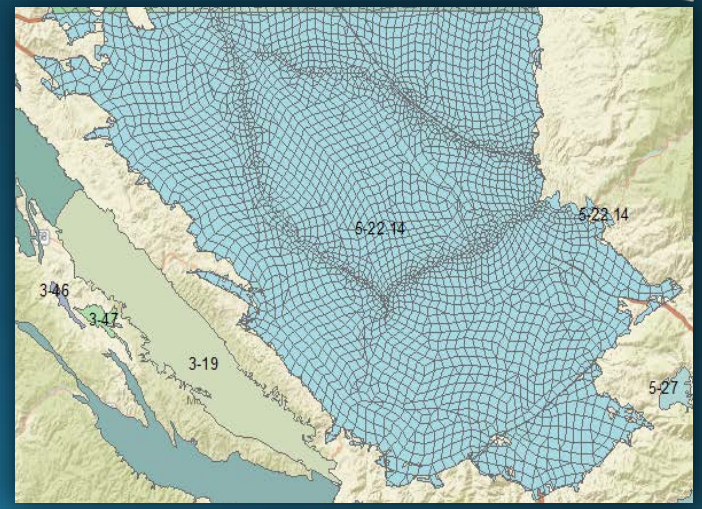
KRGSA Water Budgets – KRGSA GSP

- Develop Water Budgets for KRGSA agencies (without subsurface inflows and outflows)
- Scale up to a KRGSA Water Budget for the GSP

Subbasin Water Budgets – Groundwater Model

- Incorporate water budgets into the Subbasin groundwater model
- Combine with other subbasin water budget data
- Use model for Subbasin Water Budget and subsurface inflows and outflows





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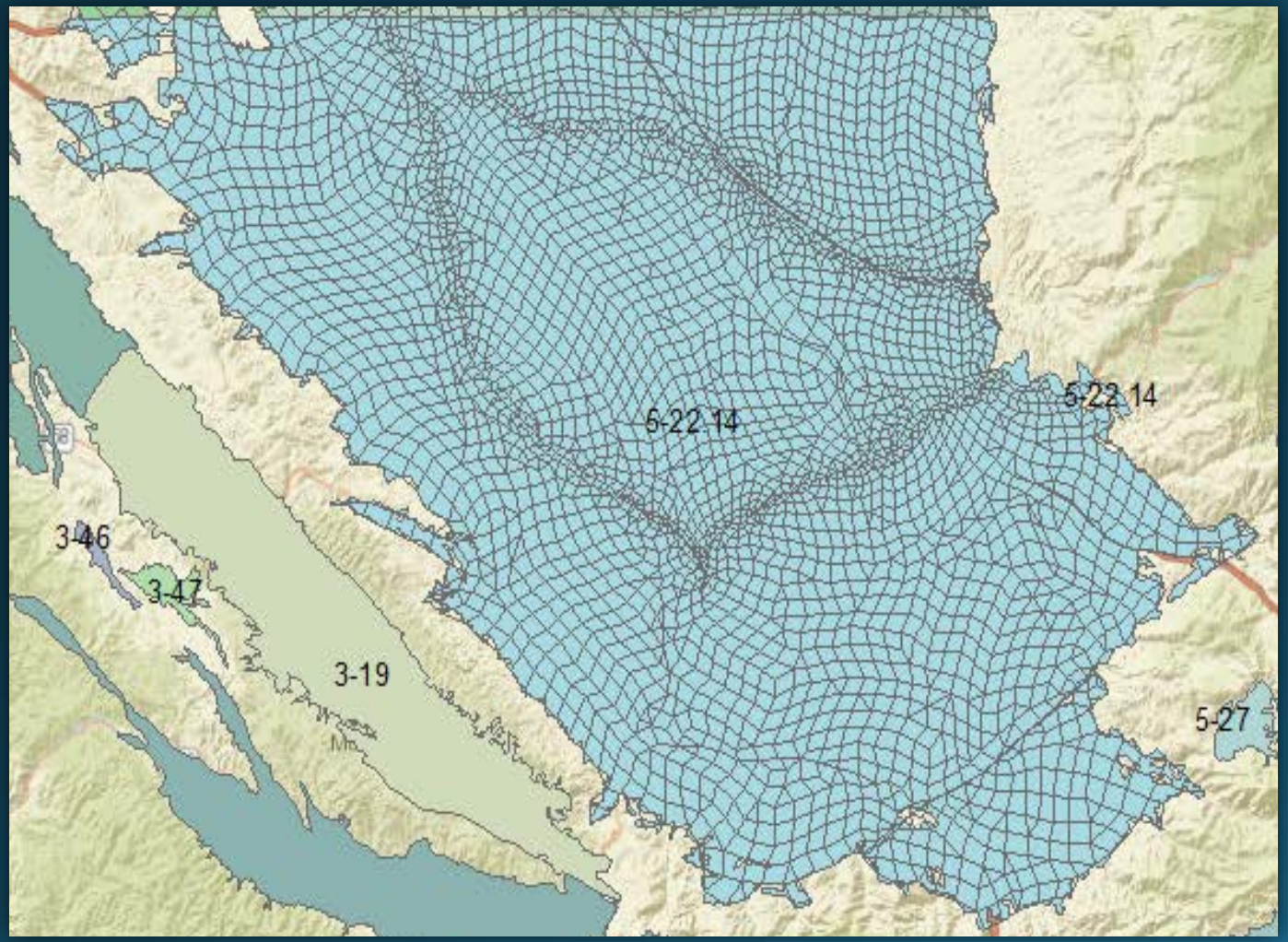
Water Budget Study Periods



- 21-year Study Period for Model
  - 1995 – 2015 (Water Years)
  - Average hydrologic period
  - Banking input from 1978 to account for banked water in storage
- 23-year data collection period for GSP
  - 1995 – 2017 (Water Years)
  - Incorporates more current information for GSP sustainability analysis

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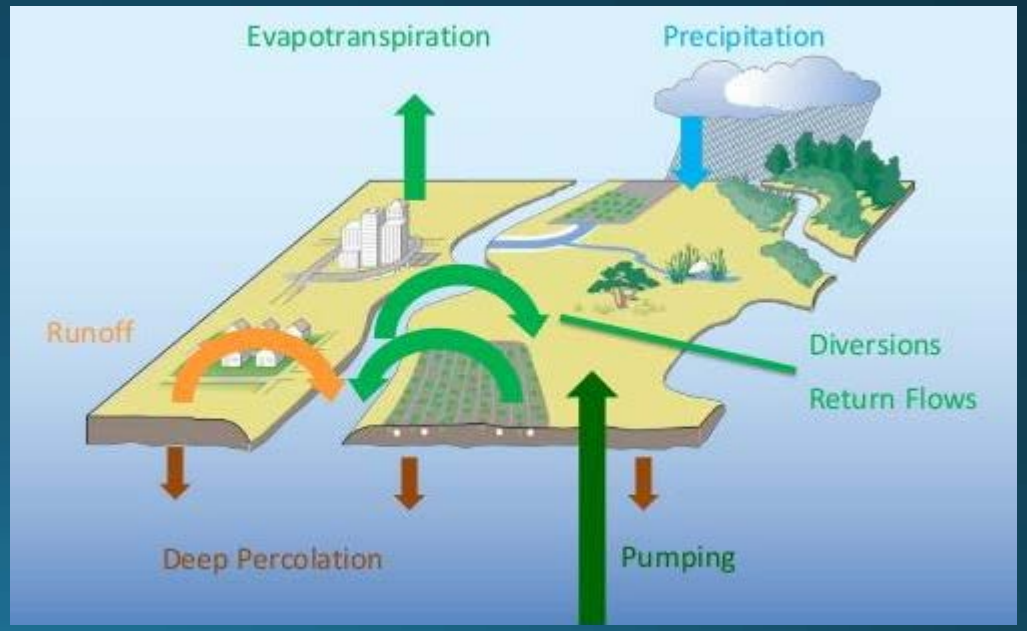
KRGSA Water Budgets - Approach

- Kern County water managed in real time for optimal use
- Provides flexibility and optimization of water but results in complex accounting of physical molecules

  - Focus on the physical system
    - Where does the "wet water" go? (not paper exchanges)
    - Water budget process follows the molecules – does not assign "ownership" of the water
    - Prevent "double-counting"



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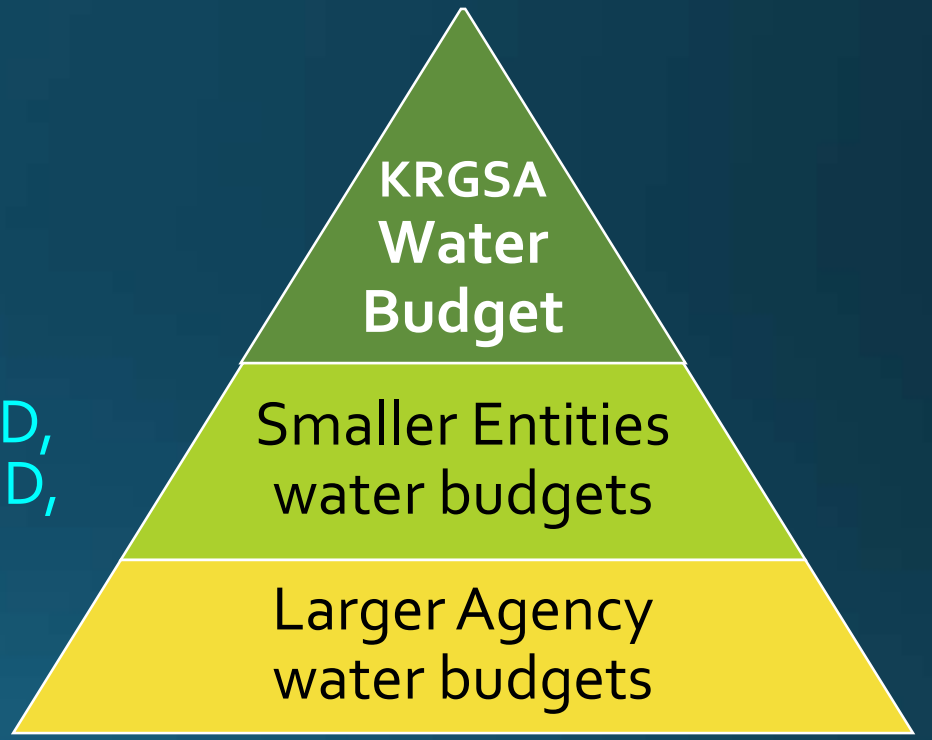
KRGSA Water Budgets - Approach

- Conduct analysis at the agency level
  - KCWA Improvement District No. 4 (ID4)
  - City of Bakersfield Water Resources
  - Kern Delta Water District
- Incorporate additional agencies/areas:
  - Cal Water, Greenfield County WD, East Niles CSD, NOR/OMWC, Berrenda Mesa, Rosedale Ranch ID, Vaughn MWC, Lamont CSD
- Combine for a KRGSA Water Budget
  - Groundwater and Surface Water
  - Document space and time
- How to handle "white areas" within KRGSA?



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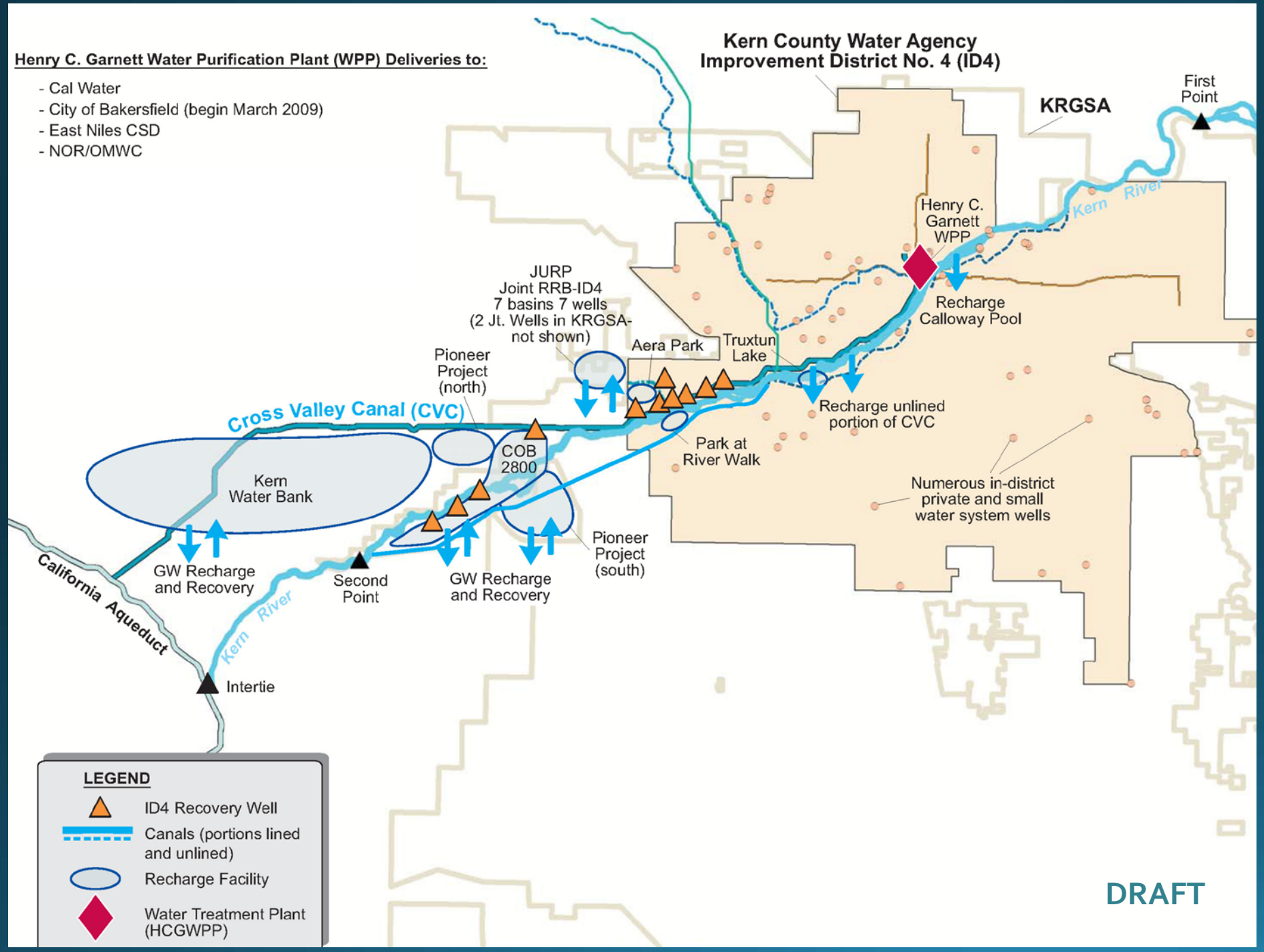
Schematic Diagram ID4



- Monthly inflows to the WPP including SWP, groundwater, and other water sources by exchange
- Recharge in Calloway pool, unlined CVC, and banking projects (supplemental data from KR Annual Reports)
- ID4 recovery pumping
- Private in-district pumping (except City, Cal Water, other agencies)
- Treated surface water deliveries other KRGSA agencies

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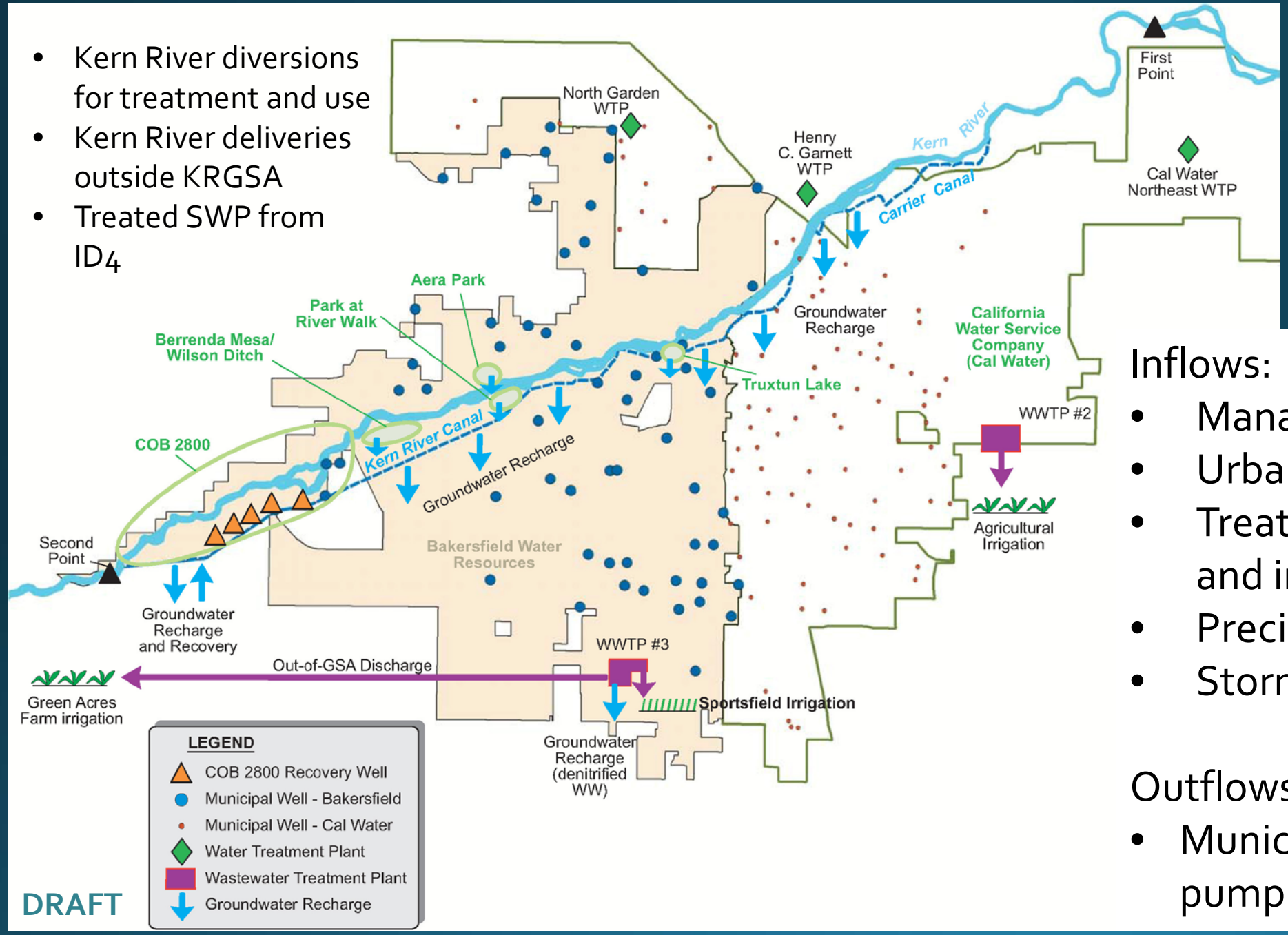
Schematic Diagram Bakersfield

Water Resources

- Kern River diversions for treatment and use
- Kern River deliveries outside KRGSA
- Treated SWP from ID4



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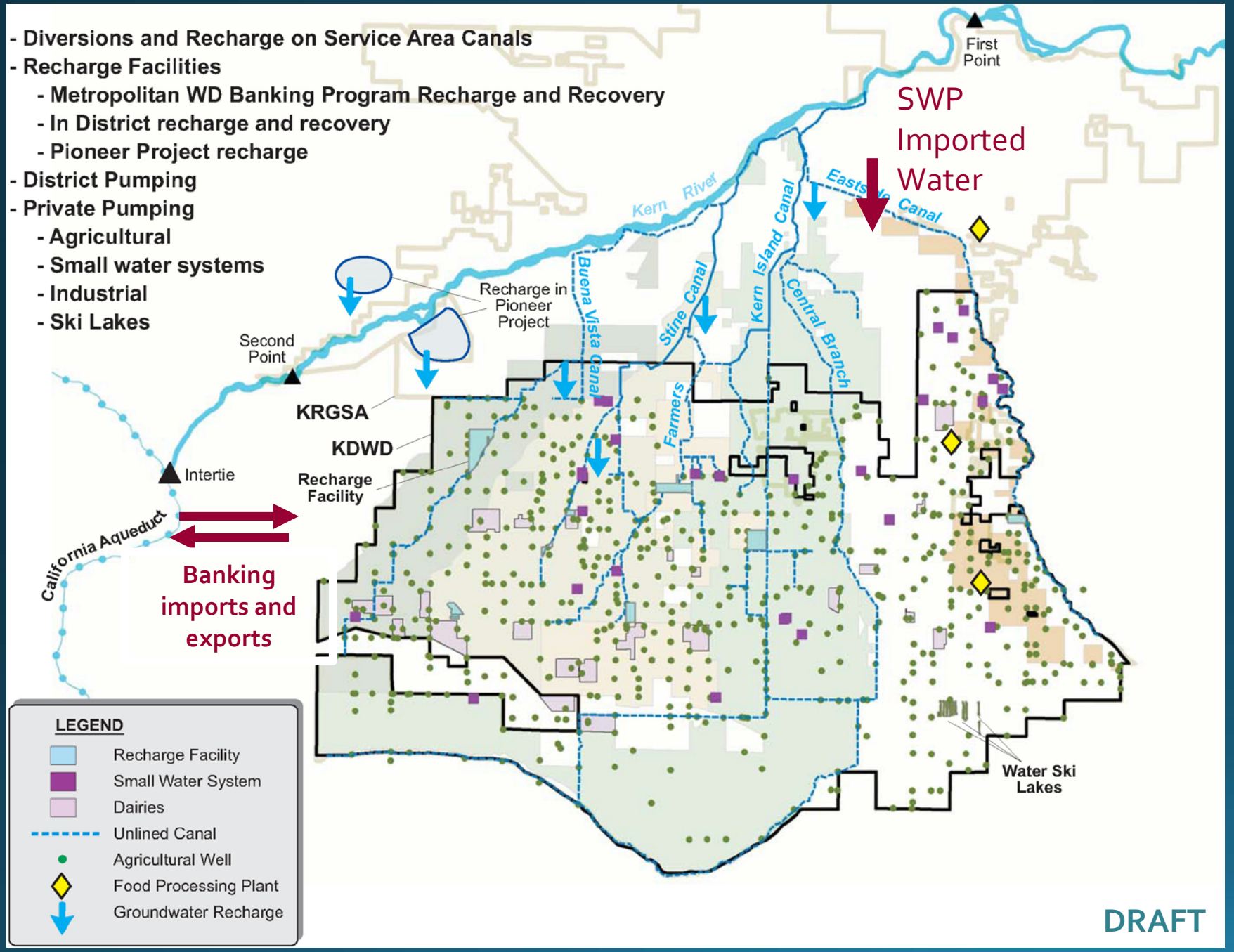
Inflows:

- Managed Recharge
- Urban Return Flows
- Treated wastewater recharge and irrigation return flows
- Precipitation infiltration
- Stormwater conservation

Outflows

- Municipal and Recovery pumping

Schematic Diagram KDWD



- Agricultural ET demand from METRIC ET data
- Diversions and managed recharge from District and KR Annual Reports
- ET demand not met by surface water assumed pumped from groundwater
- Dairies and food processing pump groundwater, consume small amounts, then recirculate for irrigation and recharge

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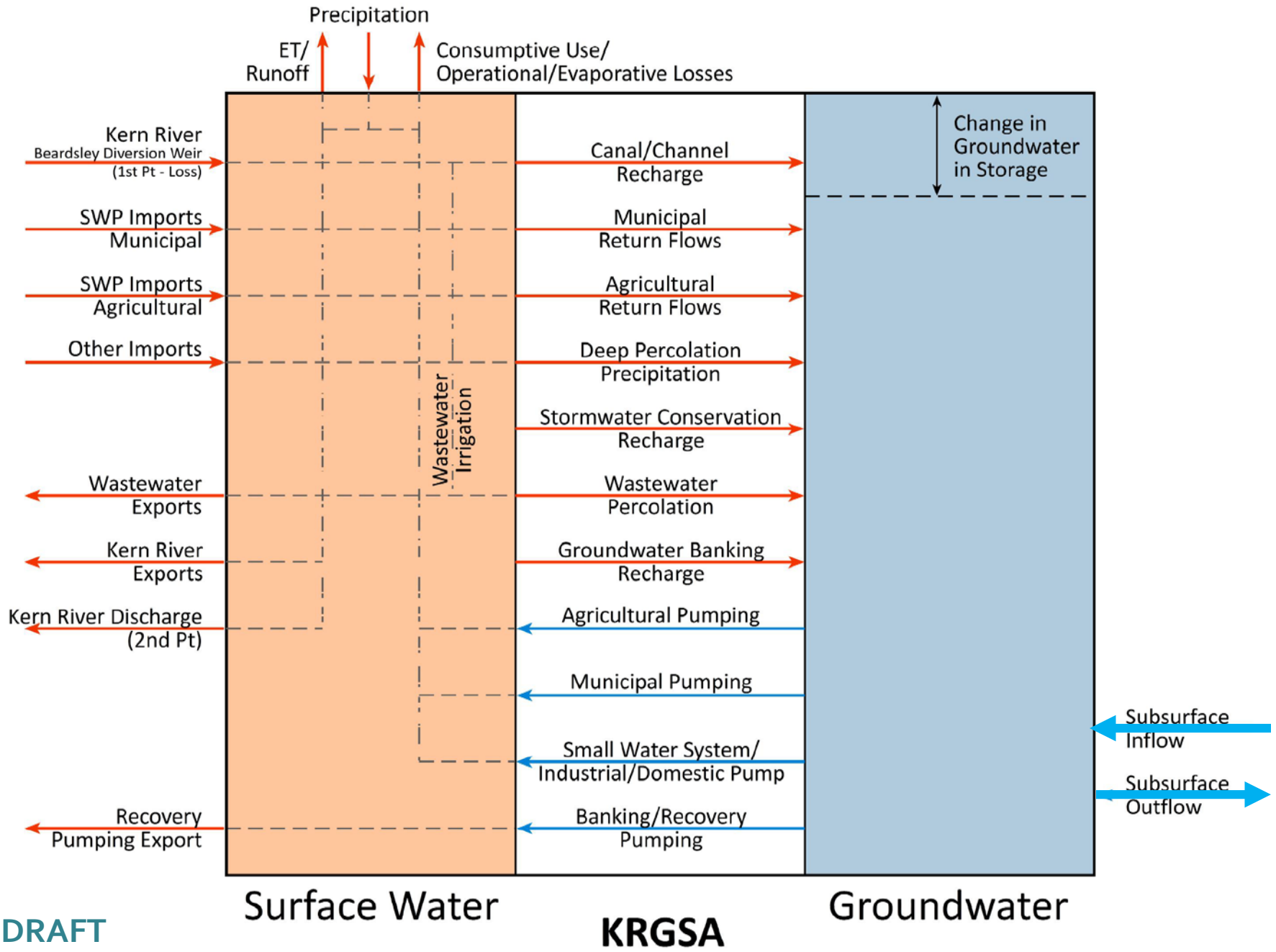
KRGSA Combined Water Budget Components



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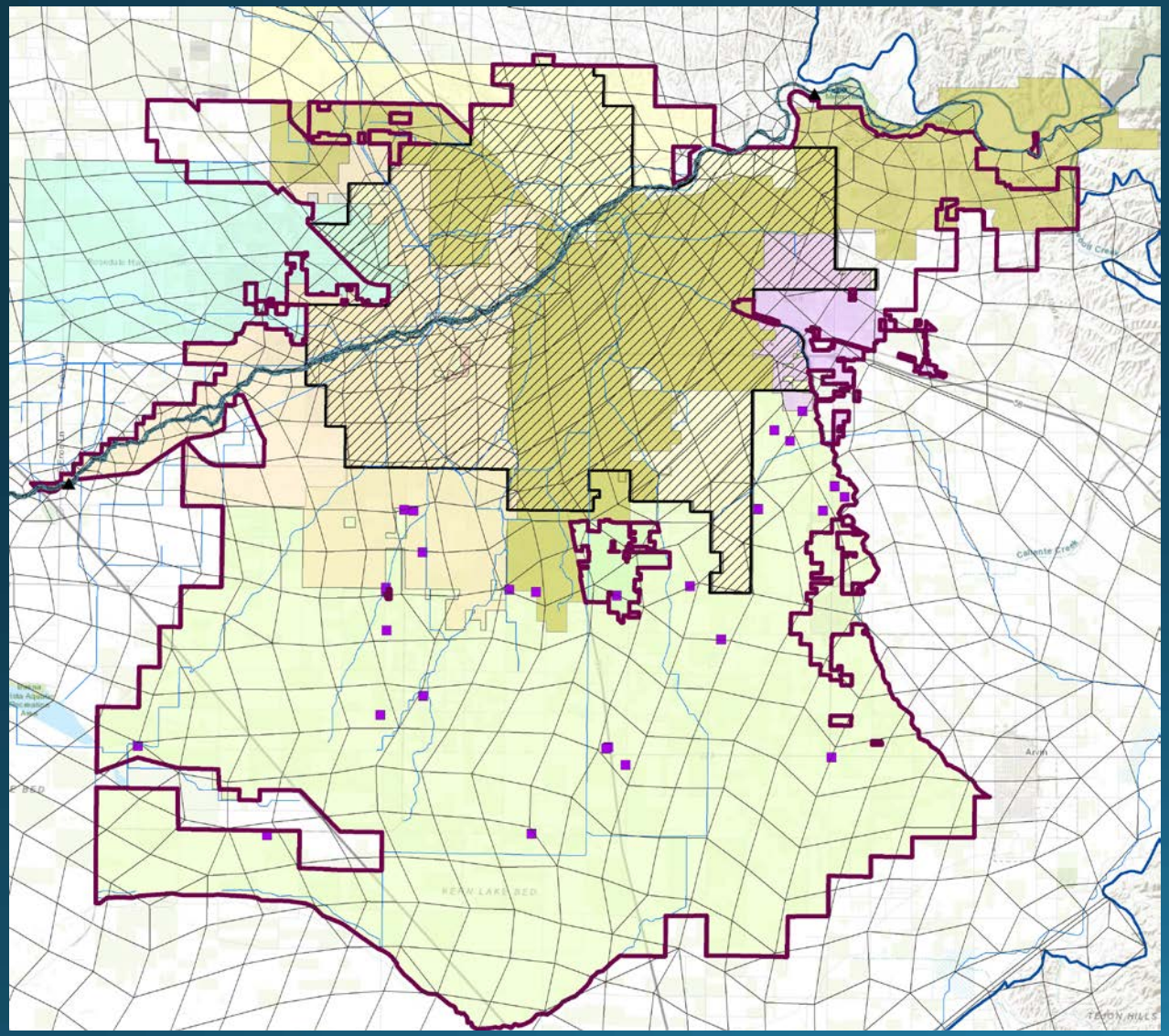
KRGSA Data for Subbasin Modeling



- Data combined by element
- To the extent feasible, honor monthly data by location
- Recharge and recovery pumping input directly
- Municipal pumping input directly by well
- Surface water for irrigation applied directly by area
- Model meets un-met agriculture demand (METRIC ET) with groundwater

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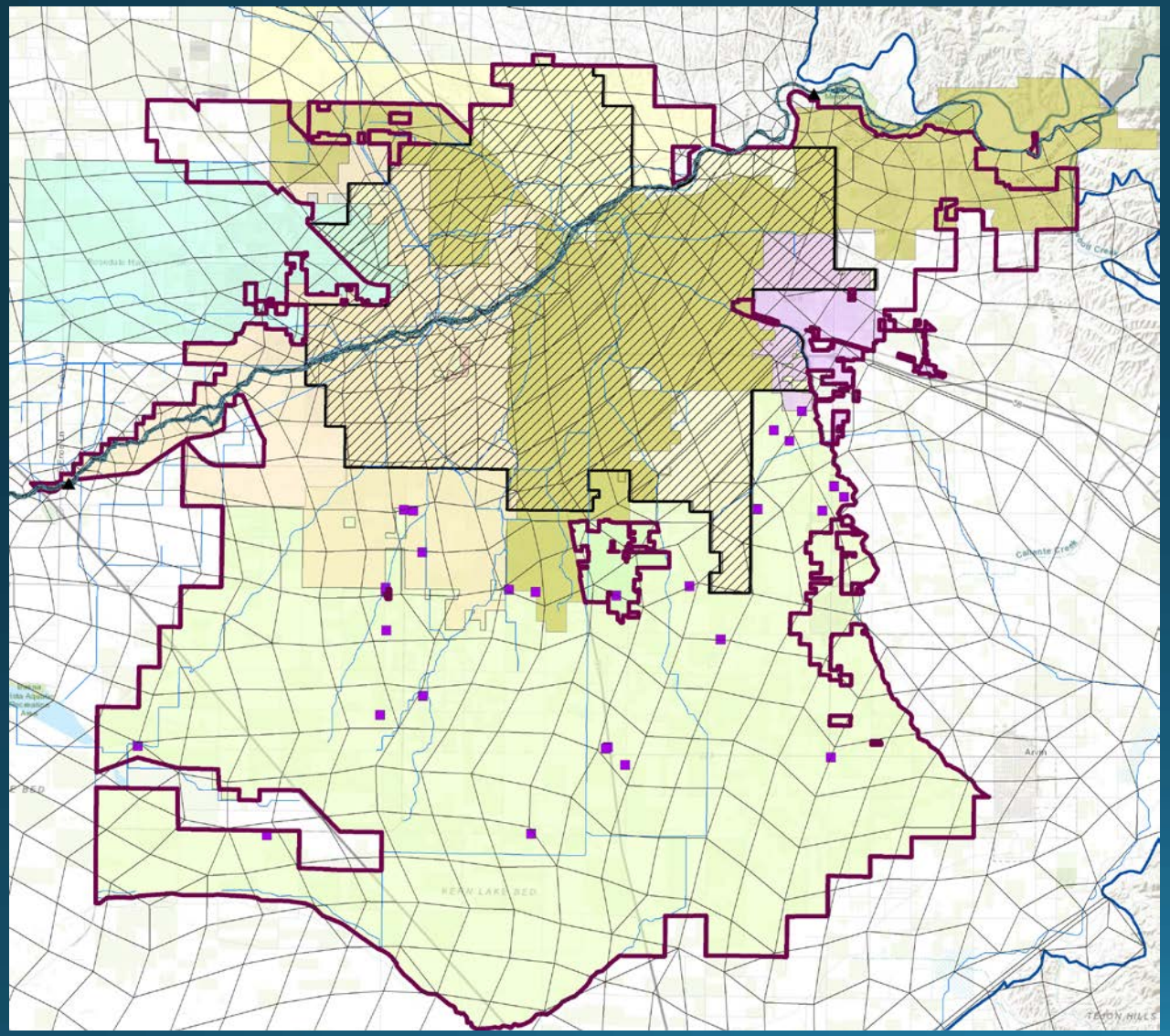
Use Model for Subsurface Flow



- Dynamic conditions around GSA boundaries in subbasin
- Model is the best tool for quantifying subsurface flows
- Water budgets will be completed as Hydrologic Inventories until model results are available
- Subsurface flows may not be needed for sustainability criteria

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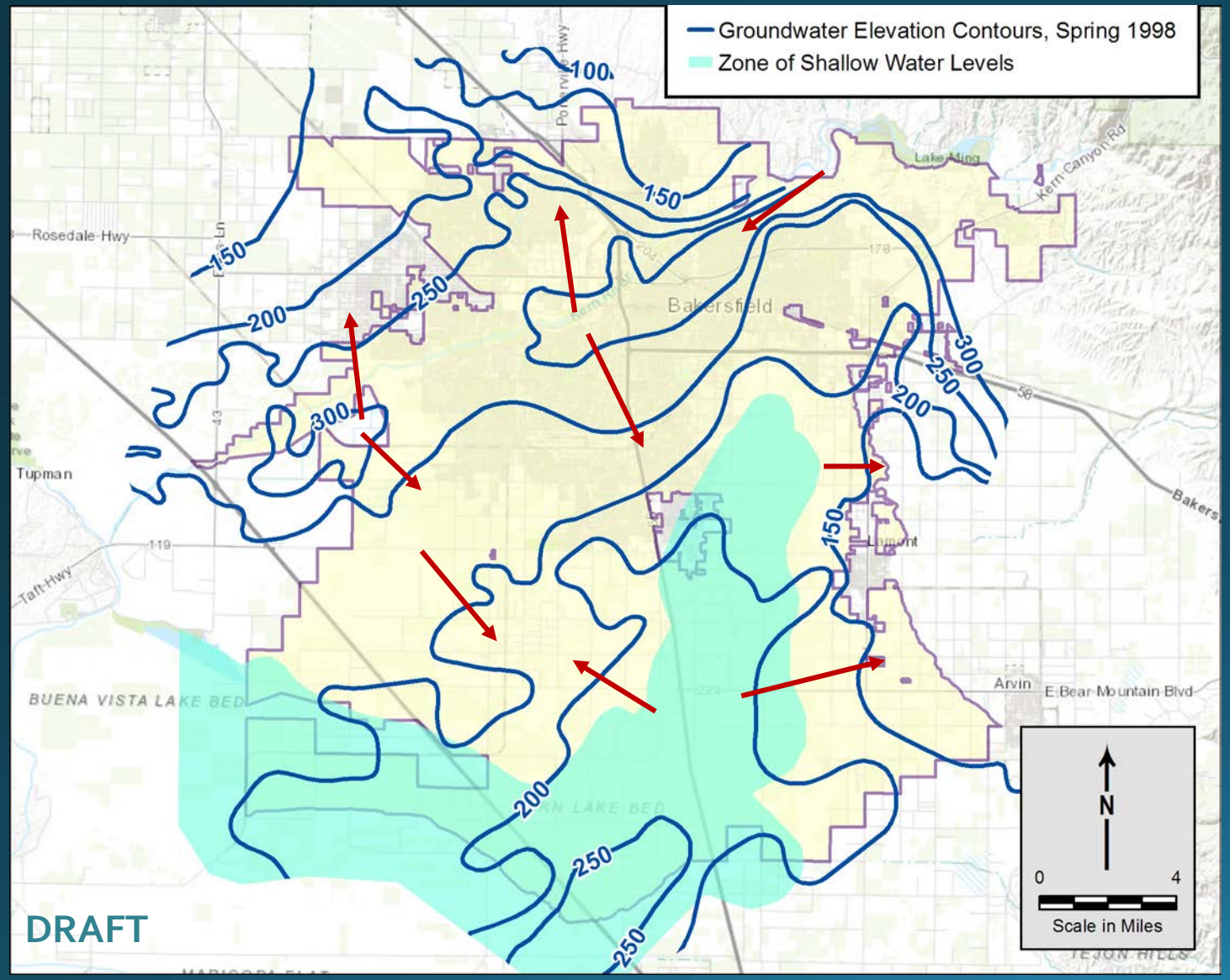
Groundwater Elevation Contours 1998



- Subsurface flows around KRGSA during wet periods are characterized by:
  - Inflows from the northeast (Kern River)
  - Outflows to the east and north
  - Inflows from the west
  - Some mounding along southern boundary

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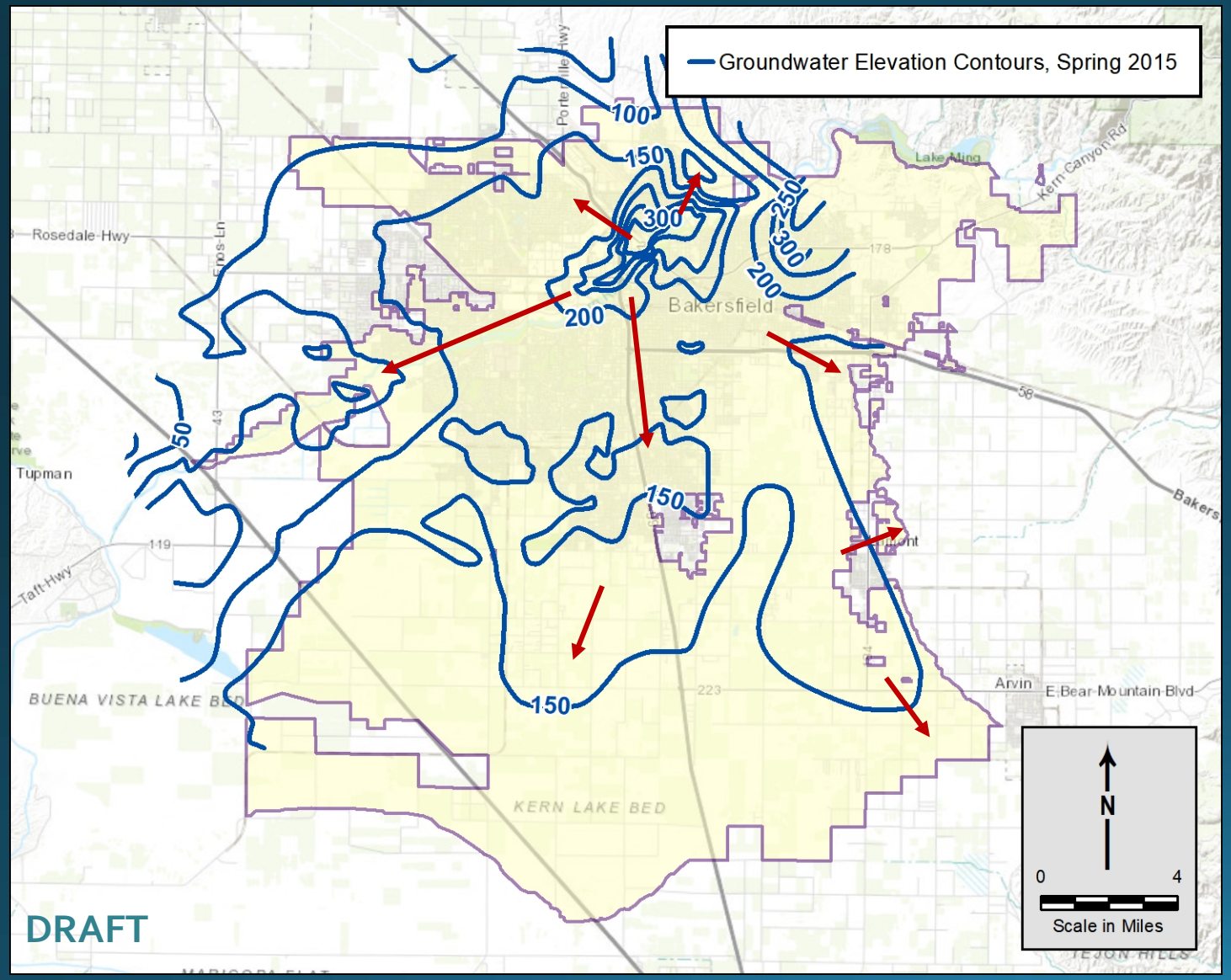
Groundwater Elevation Contours 2015



- Subsurface flows around KRGSA during dry periods:
  - inflows from the northeast
  - outflows elsewhere
- Model will be needed to quantify dynamic flows monthly and over time

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Kern River Surface Water Balance

- KRGSA boundaries contain Kern River between Beardsley Diversion Weir and Second Point
- Use/recharge in KRGSA
- Diversions out of the KRGSA (North Kern WSD, Cawelo WD, others)
- Measurement at Second Point
- Currently working to parce water budget at KRGSA boundaries
- Check with model data provided by GEI

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Next Steps

- Work with agencies to reconcile data and local water budgets
- Compile for KRGSA
- Format data sets for model

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