Kern River Groundwater Sustainability Agency (KRGSA)

Groundwater Sustainability Plan (GSP) Update
Water Budget Summary and Projected Water Supplies

May 2, 2019

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GSP Overview

Technical Components

- Data Compilation / Data Management System
- Institutional Setting – Water Supply / Plan Area
- Hydrogeologic Conceptual Model / Groundwater
- Water Budget (Current, Historical, Projected)

Today's Discussion

Policy Components

- Sustainability Goals and Criteria

Management / Plan Components

- Management Scenarios Projected Water Budget
- Monitoring Networks Plan Development

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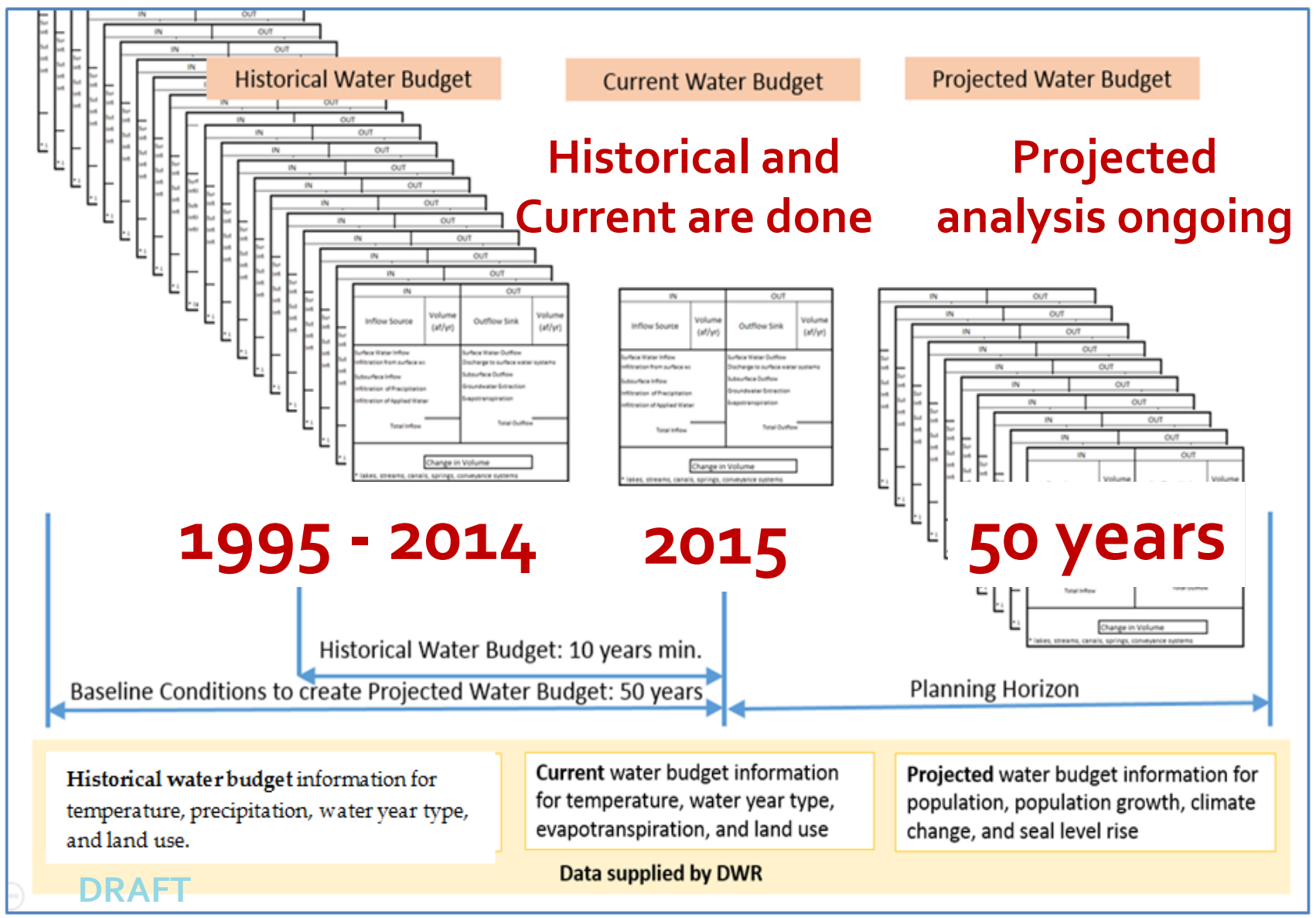
GSP-Required Water Budgets



Future Projected Water Budgets Modeling

3 Model Baselines:

1. Current Land Use and Projected Supplies
2. 2030 Climate Change Factors
3. 2070 Climate Change Factors

KGA selected 2030 for modeling/planning

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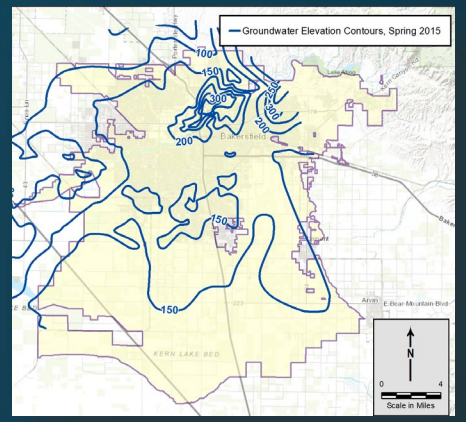
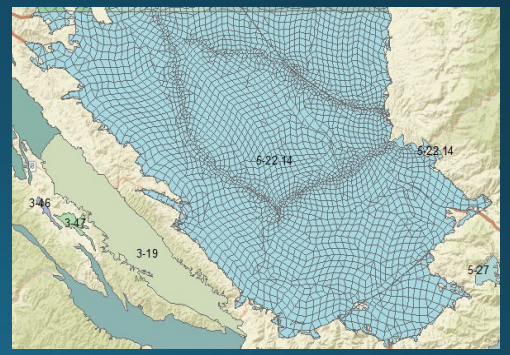
Historical Groundwater Budget Analysis

3 Independent Methods:

1. Annual Water Level Contour Maps
2. Accounting of Monthly Inflows and Outflows (Checkbook Method)
3. Model Simulation with C2VSimFG-Kern model





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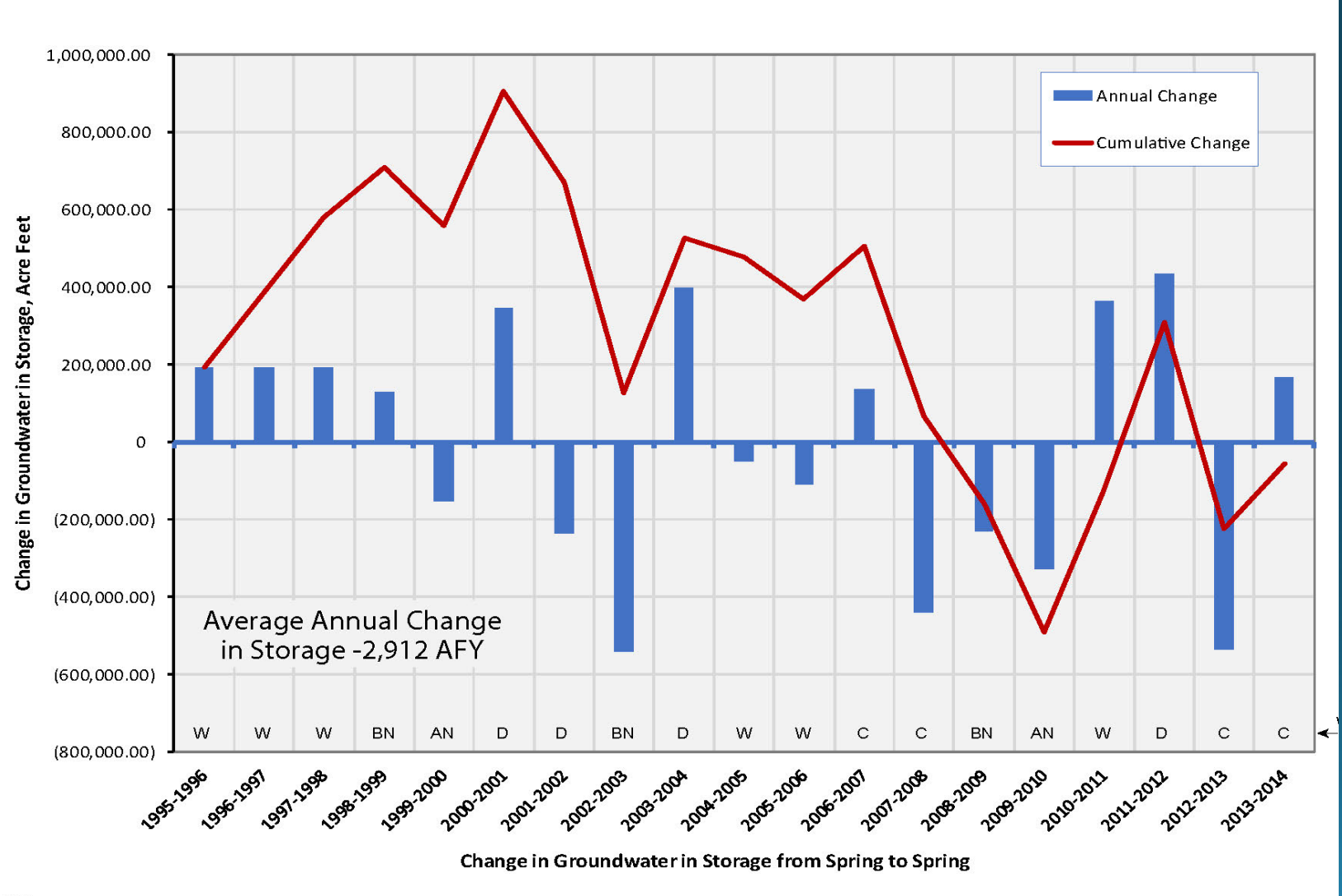
Method 1: Change in Groundwater in Storage from Annual Spring Water Level Contour Maps



- 20-year average hydrologic conditions
- Maps available for 18 years of the 20-year period
- 10% average aquifer storage parameter (Sy)
- Average Annual Change in Storage -2,912 AFY

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Groundwater Inflow Component	Ave. Annual Historical Inflow (WY 1995 – 2014), AFY	Current Annual Inflow (WY 2015), AFY
Kern River Channel Recharge	69,779	8,447
Unlined Canal Recharge	77,820	60,145
Municipal Return Flows	9,949	8,773
Applied Irrigation Infiltration	33,133	31,151
Agricultural Return Flows	34,162	26,207
Deep Percolation of Precipitation	4,243	4,434
Stormwater Conservation	20,786	17,827
Wastewater Percolation	4,142	4,600
Groundwater Banking	65,879	1,520
TOTAL AVERAGE INFLOWS	319,893	163,104
Groundwater Outflow Component	**Ave. Annual Historical Outflow (WY 1995 – 2014), AFY**	**Current Annual Outflow (WY 2015), AFY**
Agricultural Pumping	175,668	196,859
Municipal Pumping	109,966	96,390
Small Water Systems/Private Pumping	9,038	7,201
Banking Recovery Pumping	27,199	100,727
TOTAL AVERAGE OUTFLOWS	321,871	401,177

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Method 2: Groundwater Budget Checkbook

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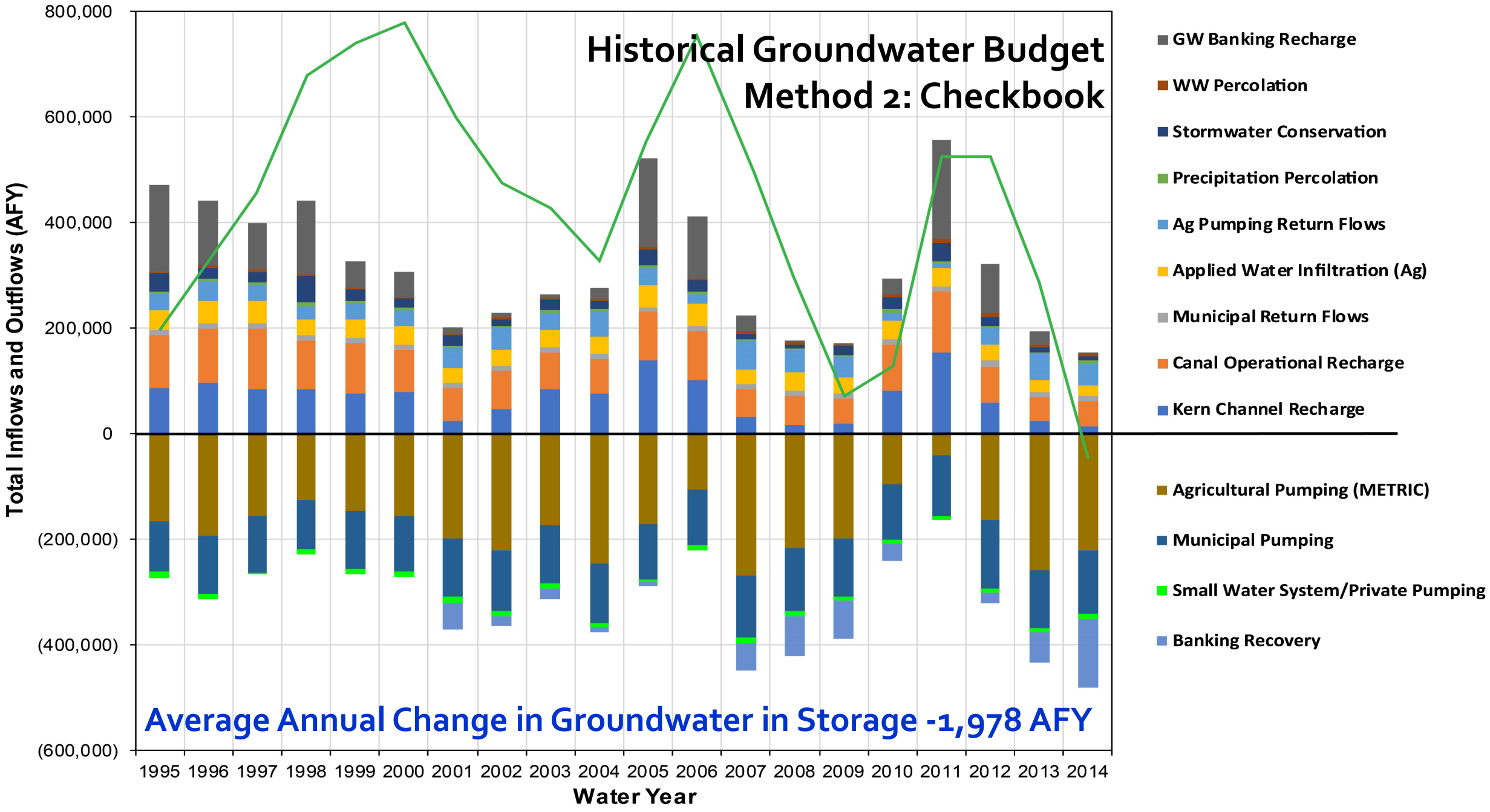
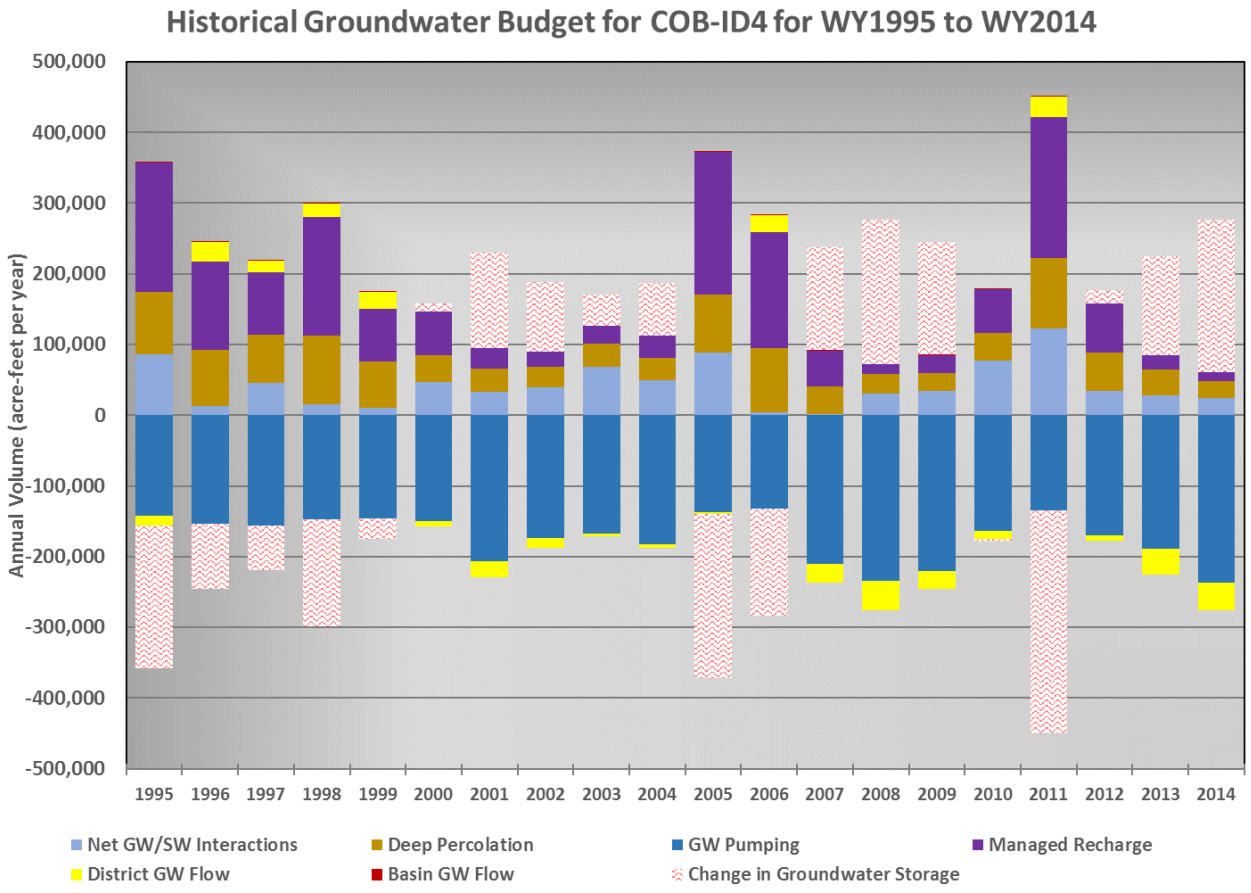
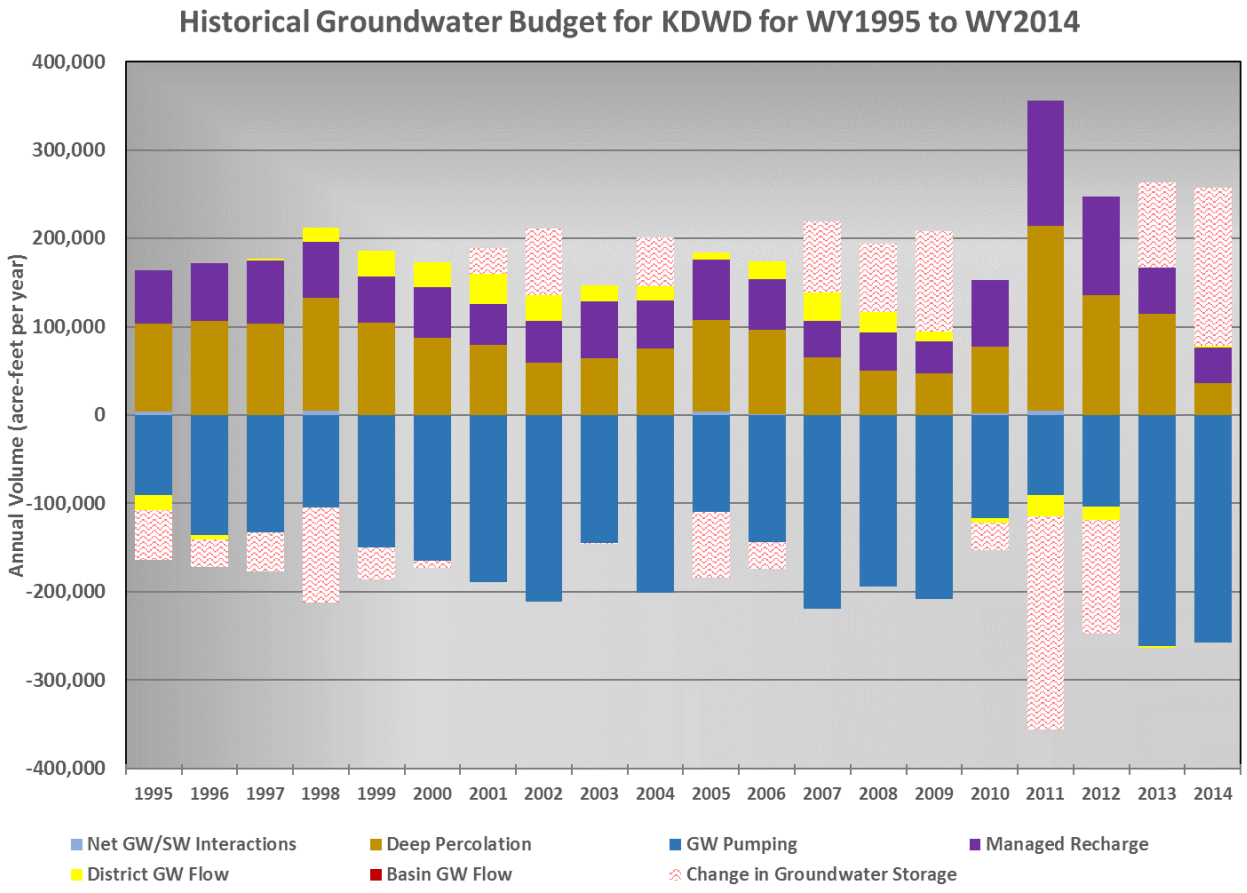

Historical Groundwater Budget
Method 2: Checkbook
Average Annual Change in Groundwater in Storage -1,978 AFY
Total Inflows and Outflows (AFY)
800,000
600,000
400,000
200,000
0
(200,000)
(400,000)
(600,000)
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014
Water Year
GW Banking Recharge
WW Percolation
Stormwater Conservation
Precipitation Percolation
Ag Pumping Return Flows
Applied Water Infiltration (Ag)
Municipal Return Flows
Canal Operational Recharge
Kern Channel Recharge
Agricultural Pumping (METRIC)
Municipal Pumping
Small Water System/Private Pumping
Banking Recovery

Method 3: Groundwater Budgets from Model

Average Annual Change in Storage: +3,926 AFY





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Banking Adjustments – Checkbook

- Remove Recharge and Recovery in KRGSA conducted by others
  - Berrenda Mesa
  - River recharge for Pioneer or other KCWA operations (excluding ID4)
  - Canal losses/river recharge by others
  - KDWD Metropolitan Banking Project balances
- Add banking outside of the KRGSA for KRGSA agencies
  - ID4 banking balances in Pioneer Project or Kern Water Bank
  - KDWD banking balances in Pioneer Project
- Adjusted Annual Average Change in Groundwater in Storage:
  - Unmodified Checkbook: -1,978 AFY (previous slide)
  - **Adjusted Checkbook: -29,153 AFY**
  - Does not include Isabella Storage

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Surface Water Supplies Historical and Projected

- Important for KRGSA sustainability
  - Kern River diversions
  - SWP imported water
  - Isabella Storage
  - Additional sources when available
- Reductions in future surface water supplies per DWR availability guidance and climate change analysis requirements
- Projected supplies evaluated by Future Water Budget Modeling (ongoing)

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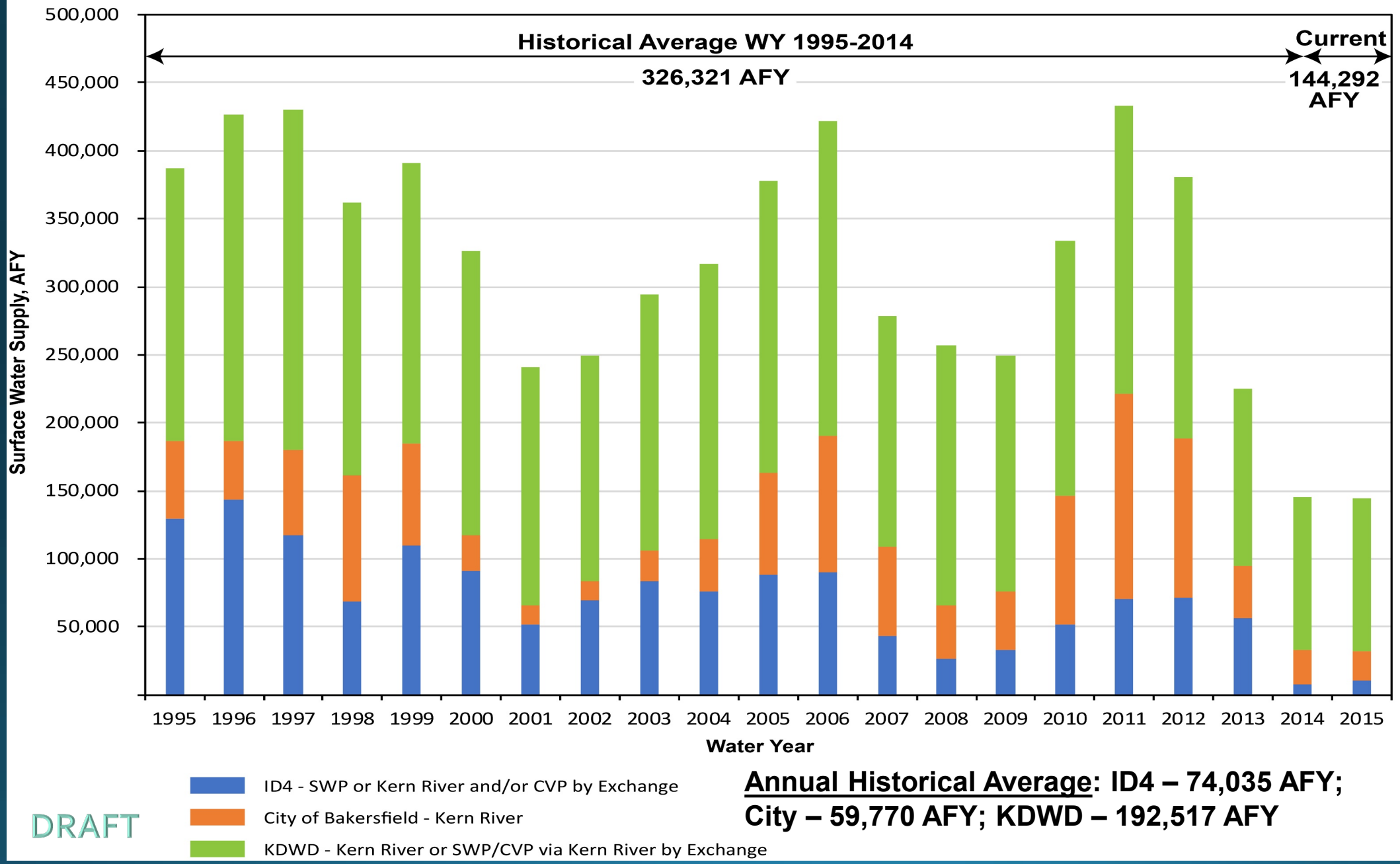
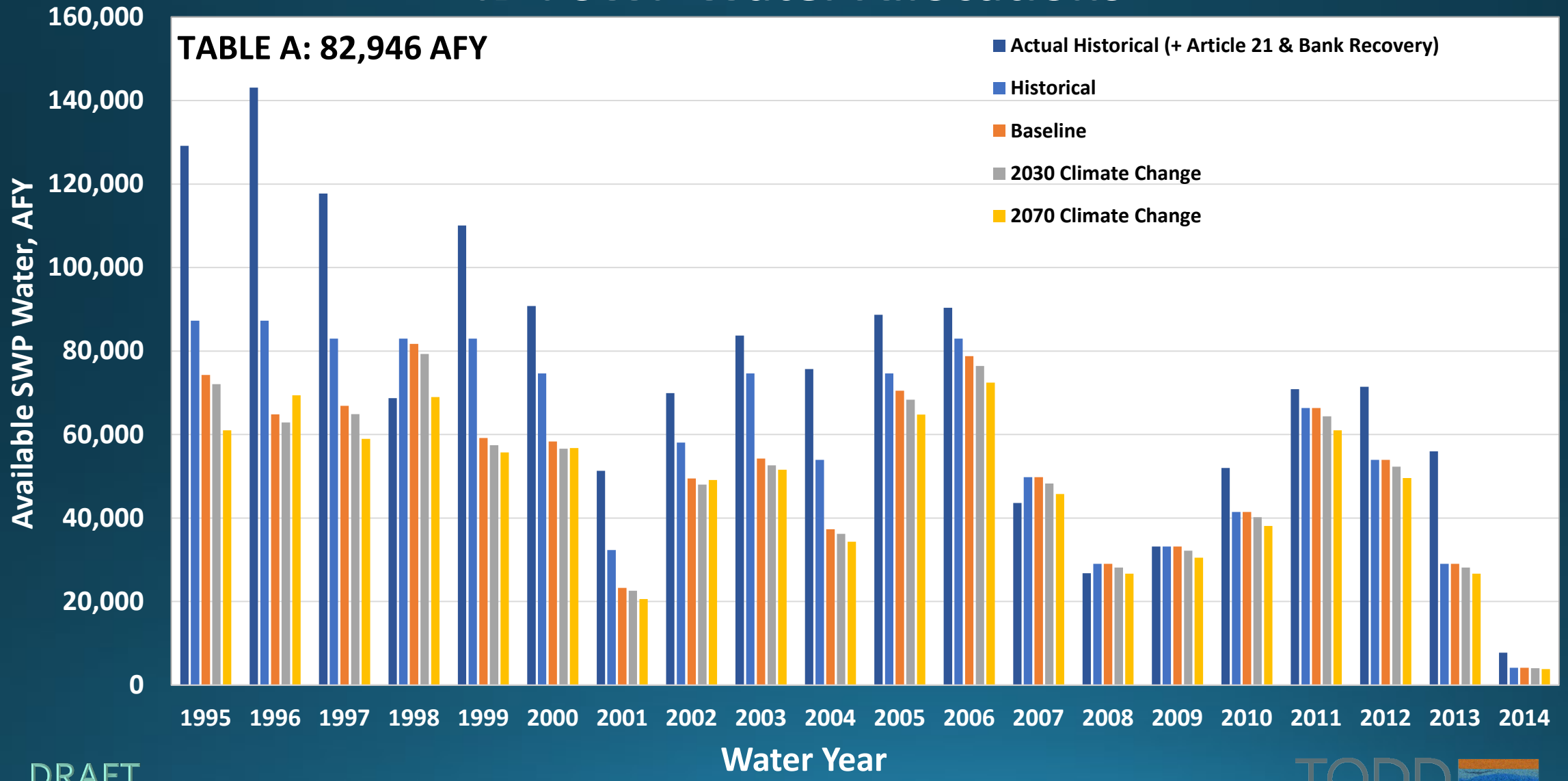


Annual Historical Average: ID4 – 74,035 AFY; City – 59,770 AFY; KDWD – 192,517 AFY

ID4 SWP Water Allocations



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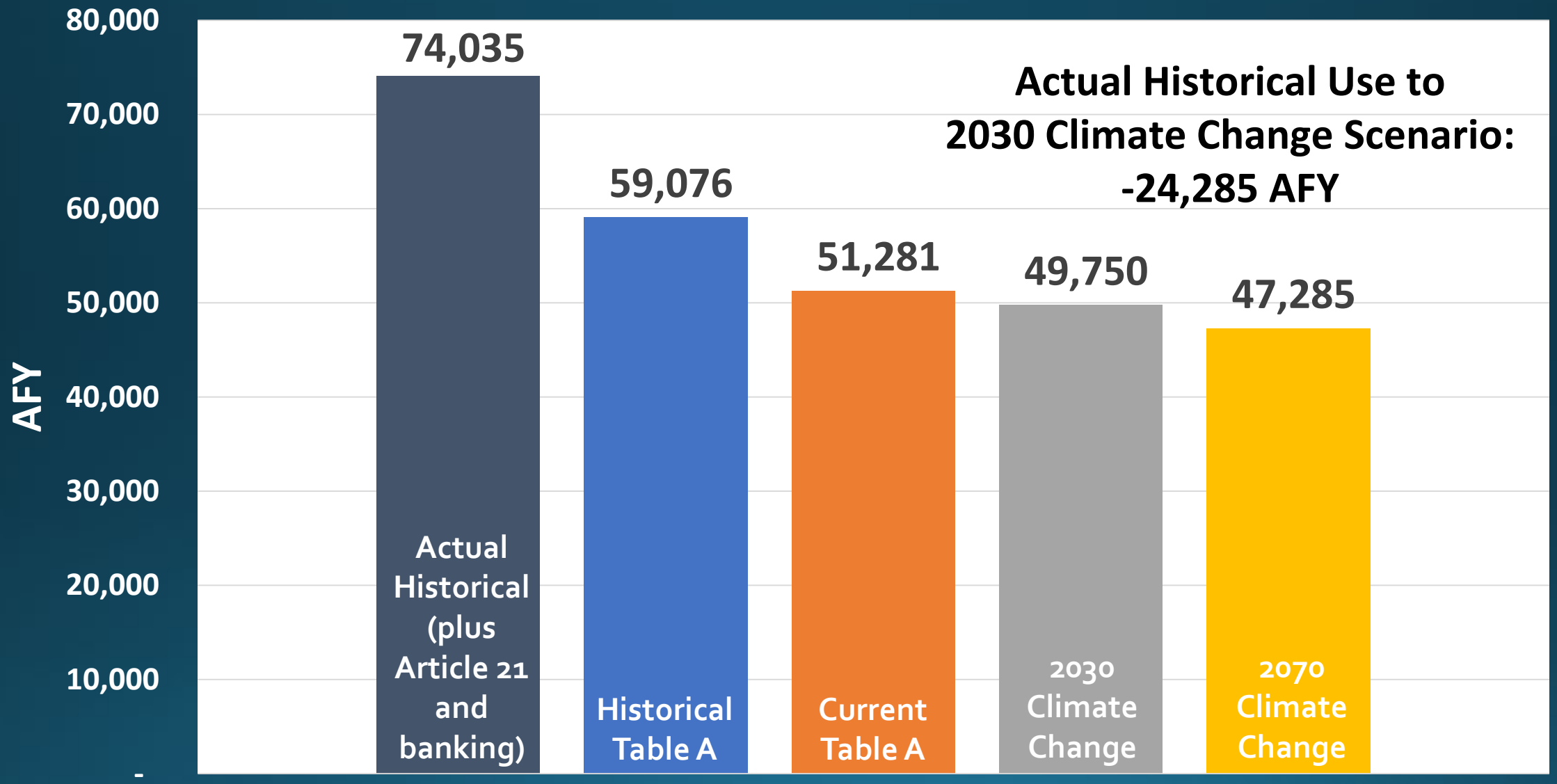
Historical and Projected ID4 SWP Supplies



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Average Annual SWP Water Availability

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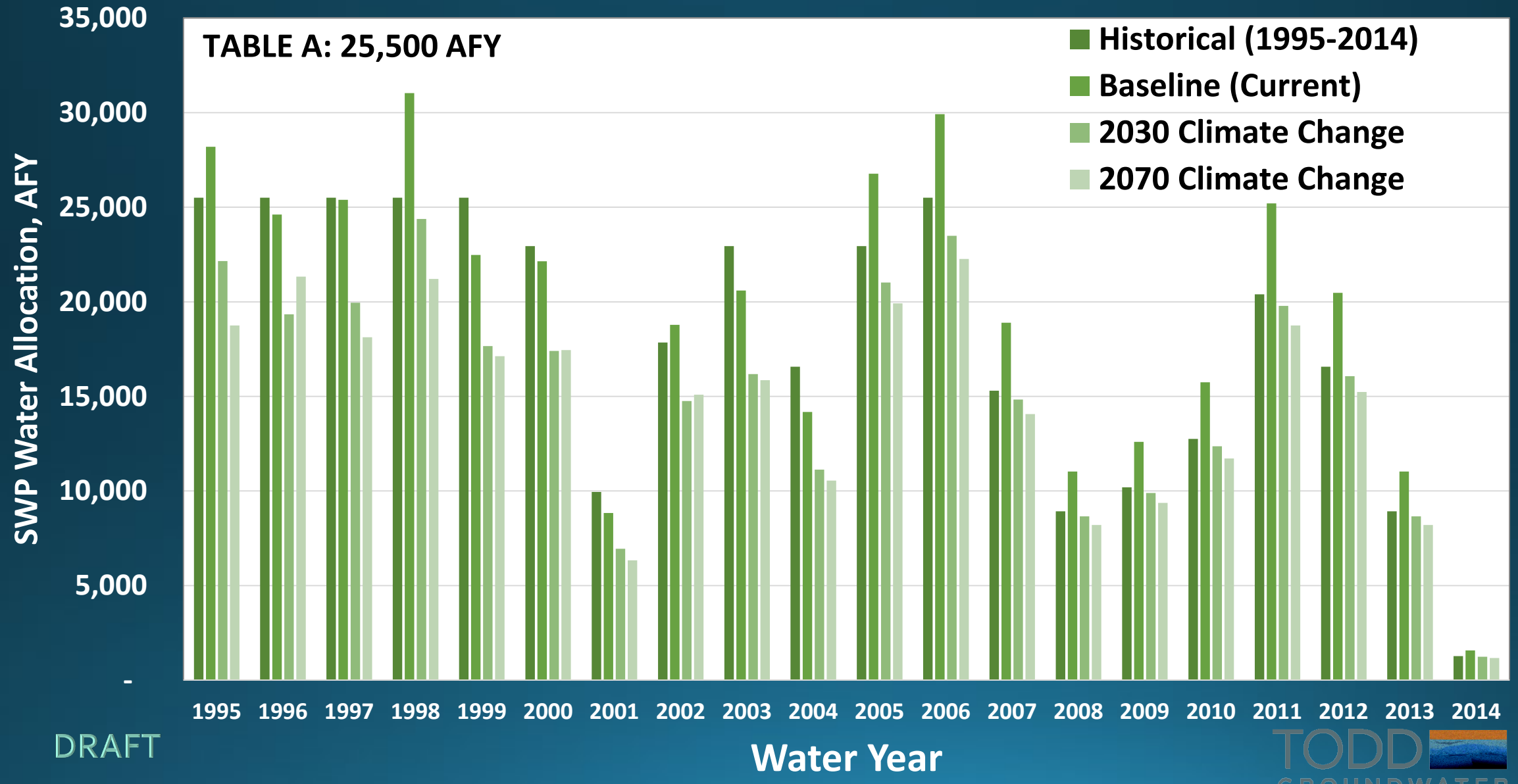
KDWD SWP Water Allocations



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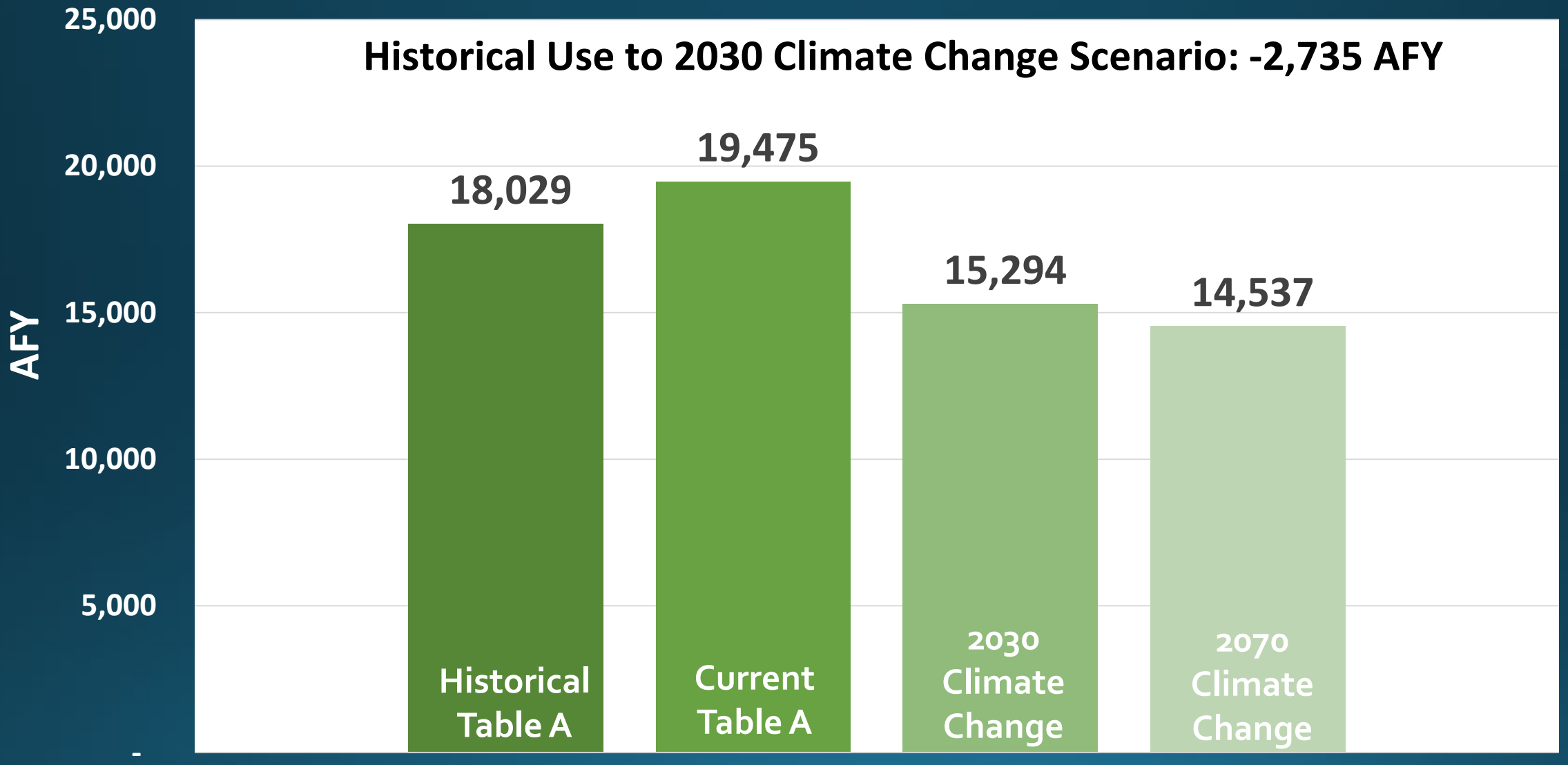
Historical and Projected KDWD SWP Supplies



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Average Annual SWP Water Availability

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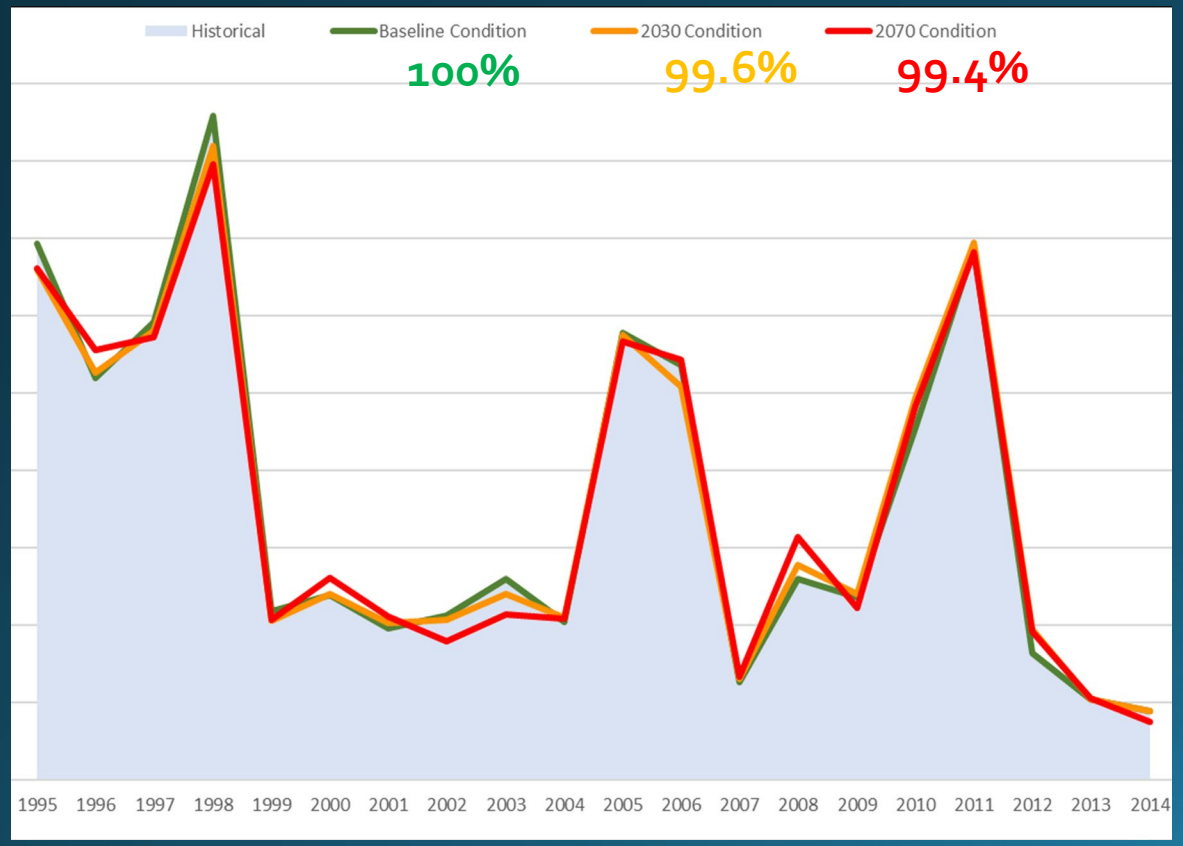
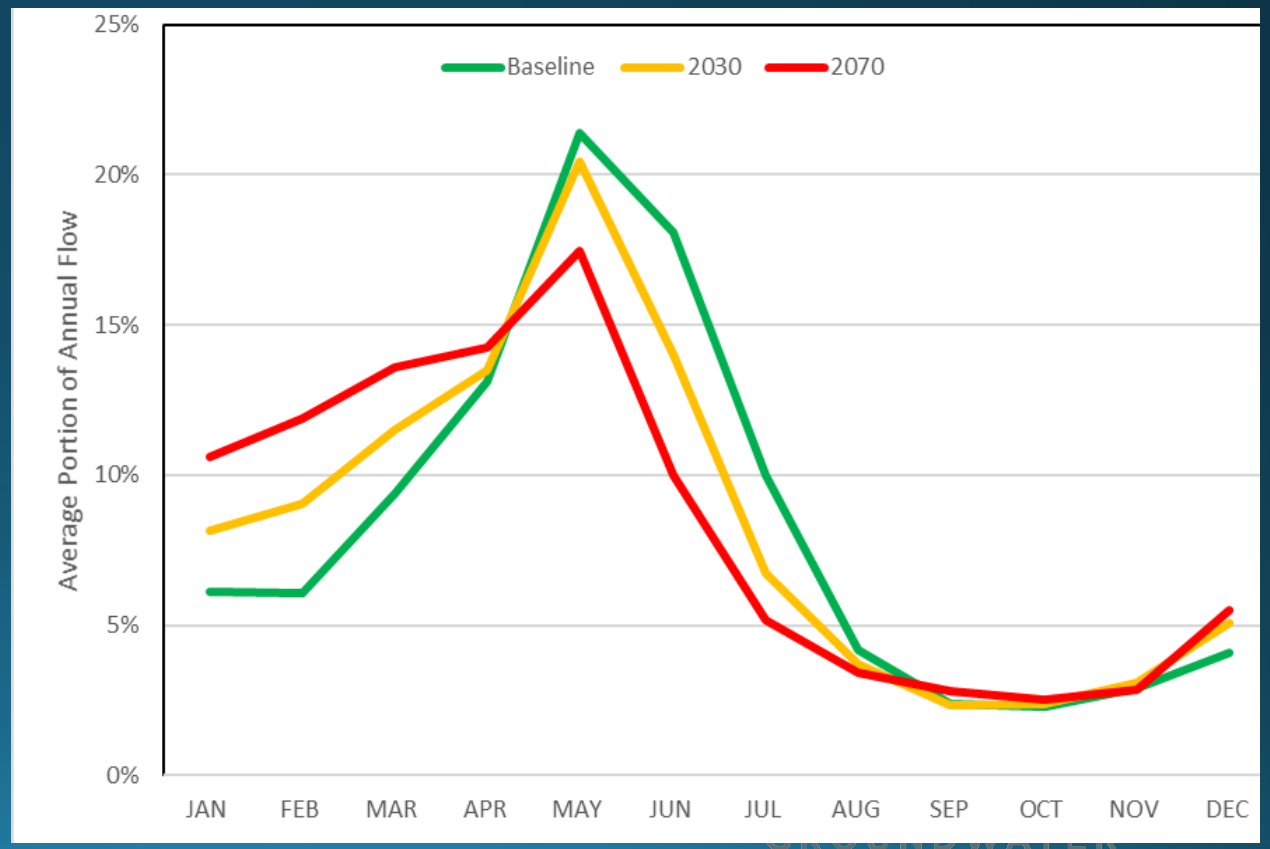
Future Kern River Flows

Total flow at First Point not projected to change significantly, but the timing shifts



Monthly portion of annual flows shifts from May – July to Dec – Mar



DWR Precipitation and ET Change Factors for 2030 and 2070 Climate Change Analysis

Precipitation

	Historical	Baseline	2030	2070
Annual (inches)	7.1	7.1	6.4	6.1
vs Historical		100%	90%	86%

Potential Evapotranspiration

	Historical	Baseline	2030	2070
Annual (inches)	33	33	34	35
vs Historical		101%	103%	107%

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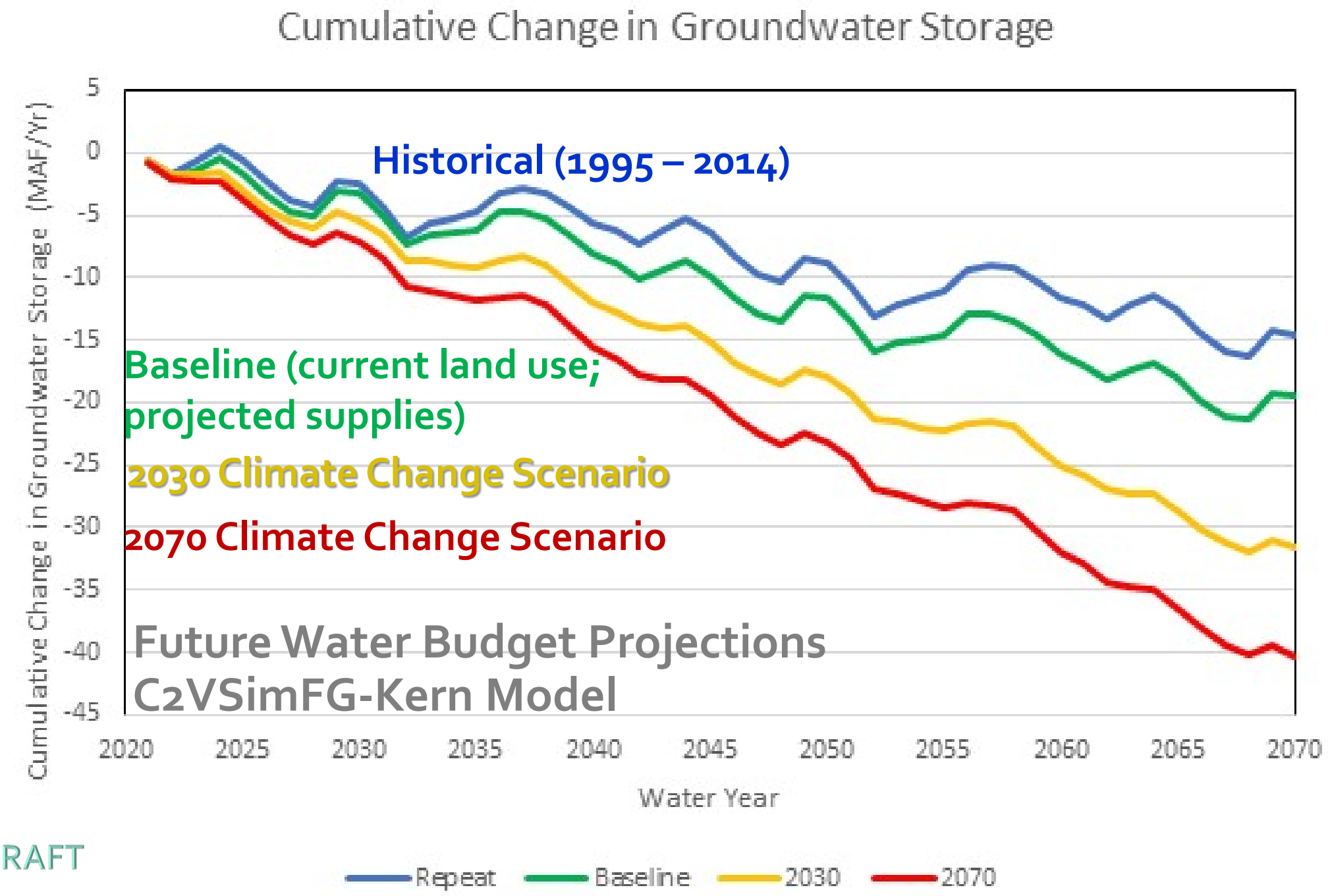
Cumulative Change in Groundwater Storage
Cumulative Change in Groundwater Storage (MAF/Yr)
5
0
-5
-10
-15
-20
-25
-30
-35
-40
-45
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
Water Year
Historical (1995 – 2014)
Baseline (current land use; projected supplies)
2030 Climate Change Scenario
2070 Climate Change Scenario
Future Water Budget Projections
C2VSimFG-Kern Model
Repeat
Baseline
2030
2070

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Draft KRGSA Sustainability Goal

Manage groundwater resources sustainably in the KRGSA Plan Area to:

- **support current and future beneficial uses of groundwater including municipal, agricultural, industrial, domestic, public supply, and environmental uses**
- **optimize conjunctive use of surface water and groundwater**
- **avoid or eliminate undesirable results throughout the planning horizon.**

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Next Steps

- Complete Baseline and projected water budget modeling
- Prepare and provide Administrative Draft GSP sections:
  - Chapters 1-3 (Administrative Information, Plan Area, Hydrogeological Conceptual Model) under review
  - Chapters 4 & 5 – Water Budgets and Sustainability Criteria – May 2019
  - Chapter 6 - Management Actions - June 2019
- Finalize Monitoring Network Wells (ongoing)
- Continue work with managers on Management Projects and Actions

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Discussion and Questions

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