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# Merced Groundwater Sustainability Plan

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**Merced Subbasin GSA Board Meeting – April 11, 2019**

Image courtesy: Veronica Adrover/UC Merced



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# Agenda

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1. GSP Development Overview
2. Water Budget
3. Water Allocation Framework Recommendation from Coordinating Committee
4. Questions



Image courtesy: Veronica Adrover/UC Merced



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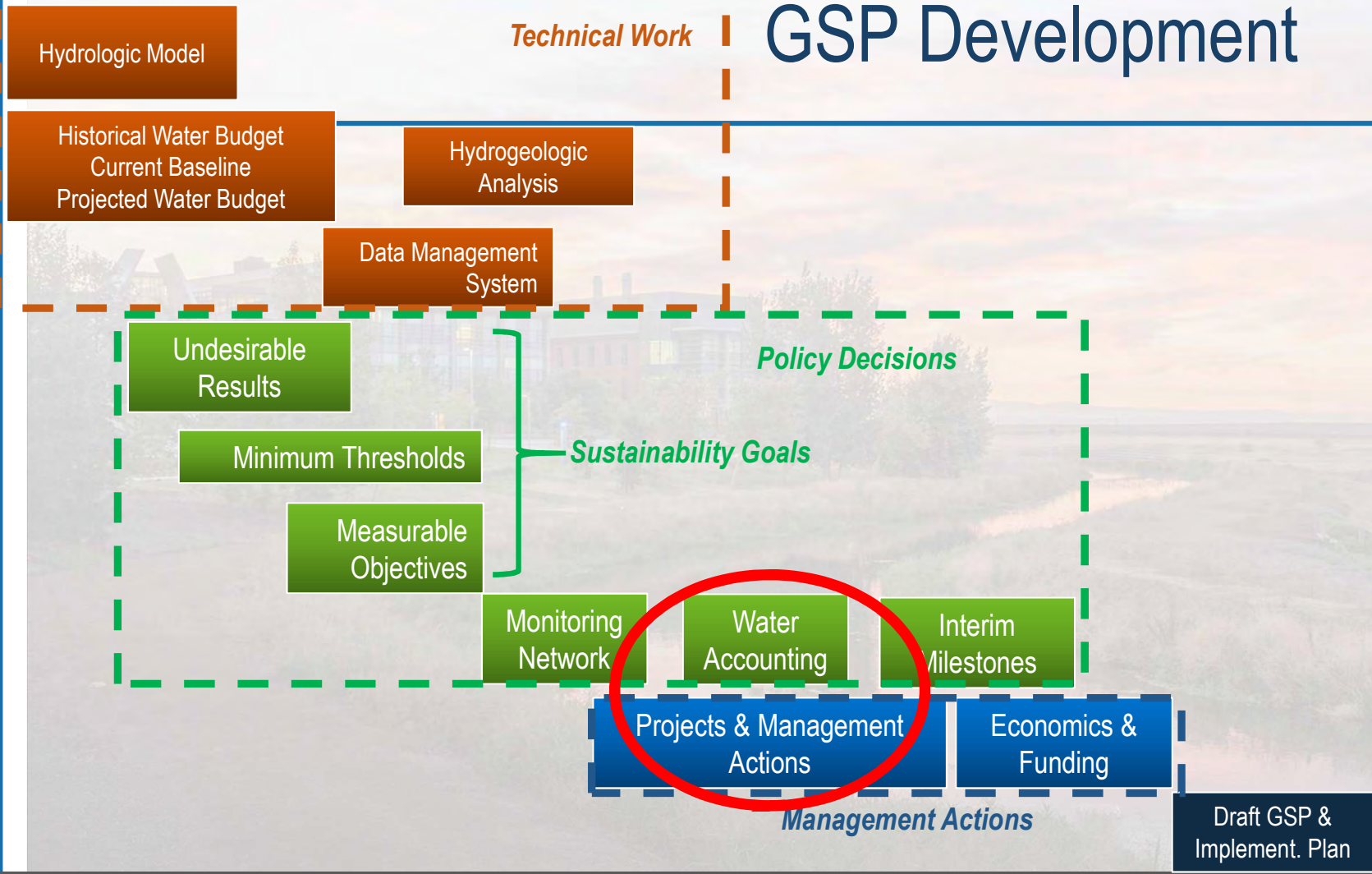
# GSP Development Overview

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Image courtesy: Veronica Adrover/UC Merced



# GSP Development



Jun 2018 Jul 2018 Aug 2018 Sep 2018 Oct 2018 Nov 2018 Dec 2018 Jan 2019 Feb 2019 Mar 2019 Apr 2019 May 2019 Jun 2019 Jul 2019

Image courtesy: Veronica Adrover/UC Merced



# SGMA Focuses on Halting Overdraft While Protecting Basin Health

## ■ SGMA has two main focus areas:

- Halt the overdraft by “balancing the water budget” (basin inputs = basin outputs)
- Establish objectives for six “sustainability indicators”



Chronic lowering of groundwater levels indicating a significant and unreasonable depletion of supply



Significant and unreasonable degraded water quality



Significant and unreasonable reduction of groundwater storage



Significant and unreasonable land subsidence



Significant and unreasonable seawater intrusion

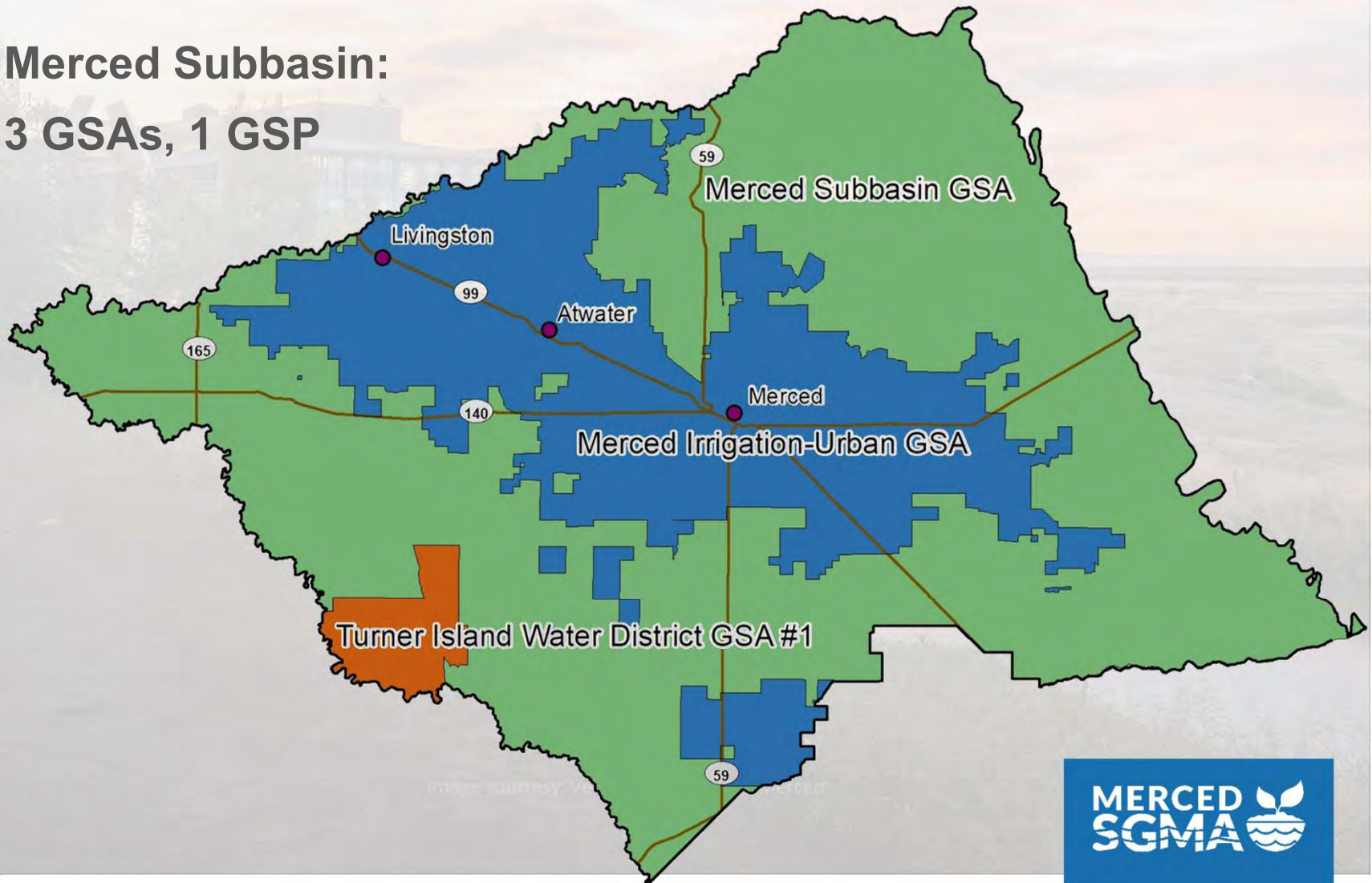


Depletions of interconnected surface water that have significant and unreasonable adverse impacts on beneficial uses of the surface water

Image courtesy: Veronica Adrover/UC Merced

# Sustainable Groundwater Management Act and Groundwater Sustainability Plan

Merced Subbasin:  
3 GSAs, 1 GSP





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# Water Budget

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Image courtesy: Veronica Adrover/UC Merced



# Historical, Current, and Projected Water Budgets Summarize Basin Conditions

- Inputs and outputs – surface and groundwater supplies and demands
- Estimate the extent of overdraft now and in the future

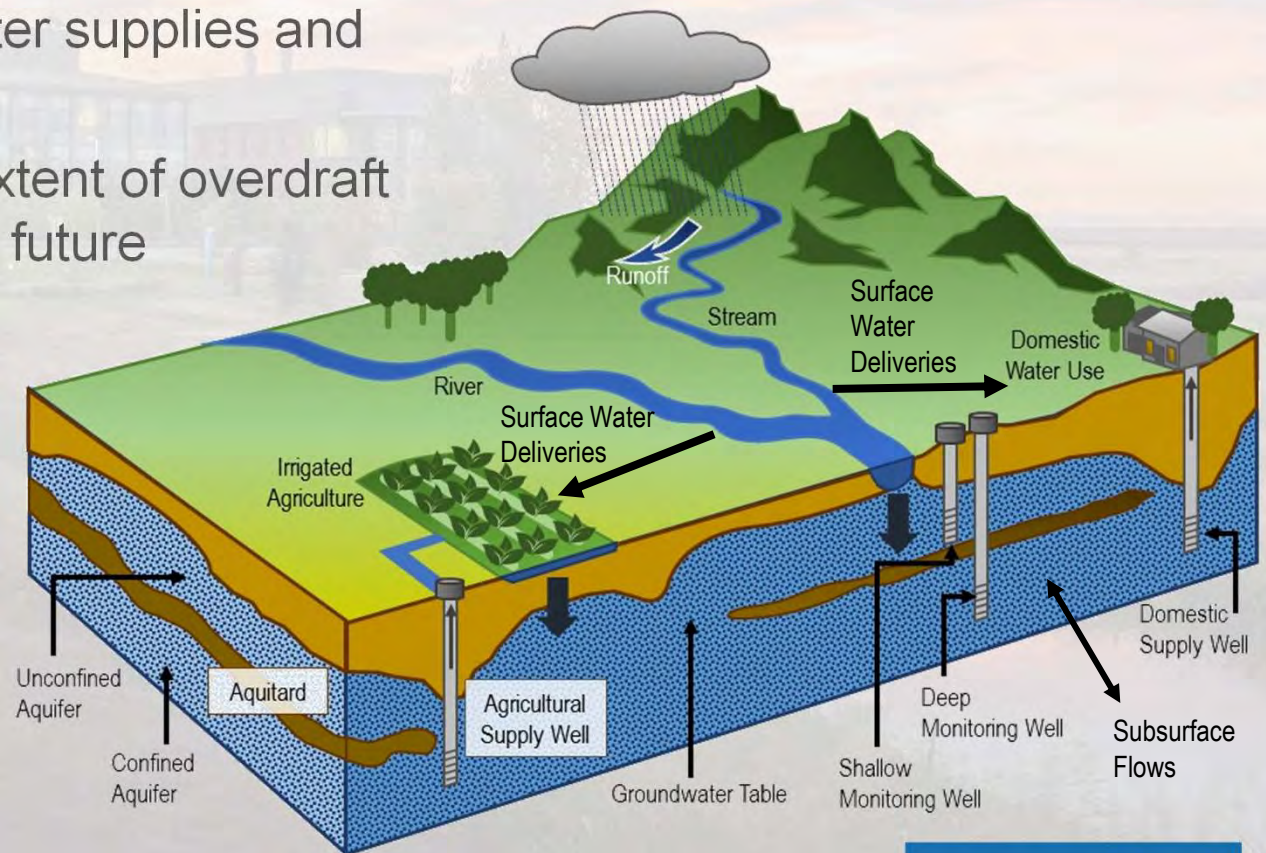


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# Updates to Water Budget

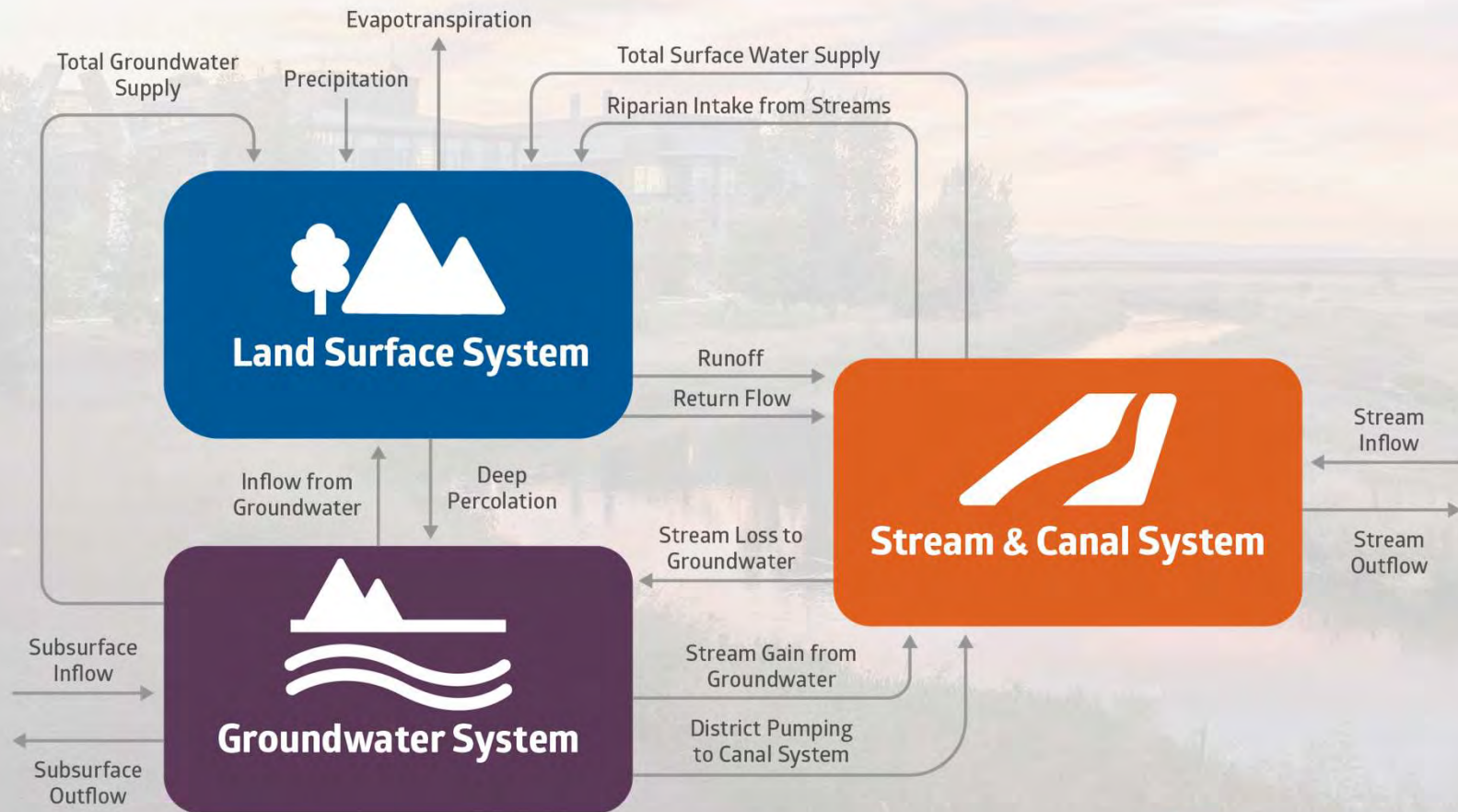
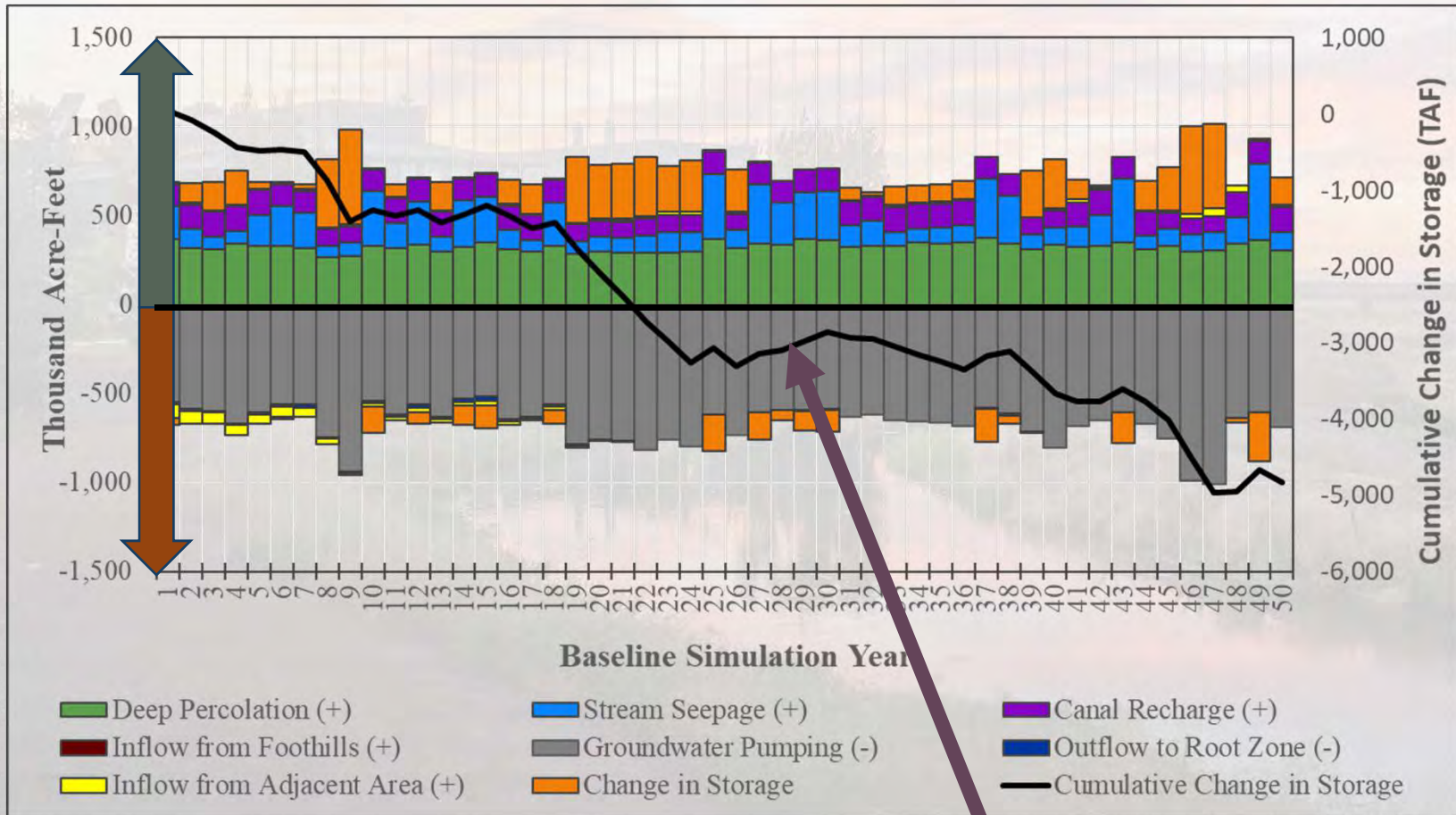


Image courtesy: Veronica Adrover/UC Merced

# The Groundwater Model Estimates Flows Into and Out of the Groundwater Basin



Water Leaving Subbasin

Water Entering Subbasin

Amount of Stored Groundwater is Projected to Decrease Over Time



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# Water Allocation Framework

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Image courtesy: Veronica Adrover/UC Merced

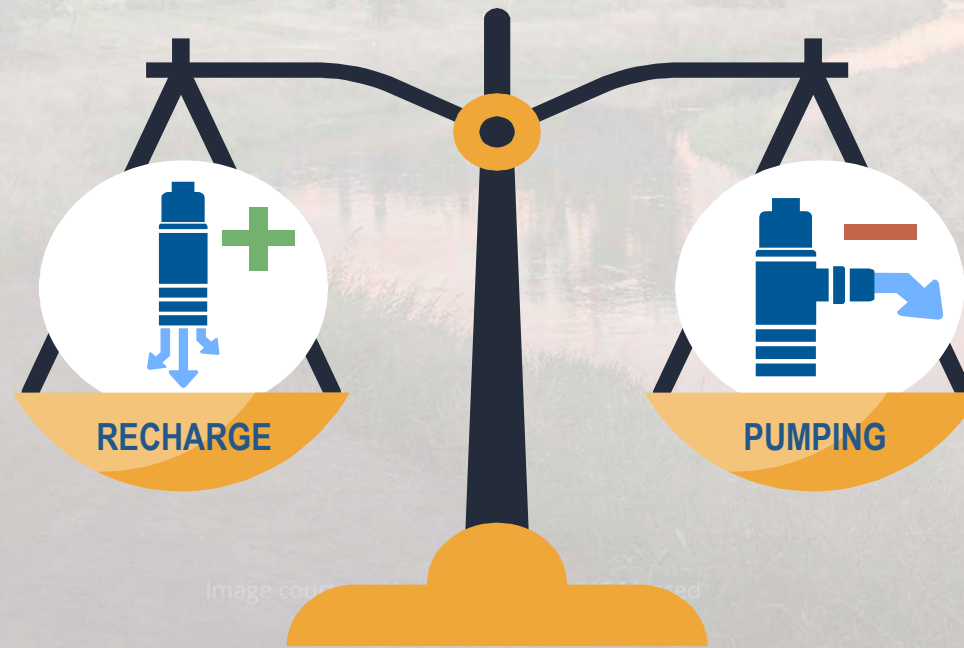


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# Merced GSP Sustainability Goal

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The sustainability goal for the Merced Subbasin is *to achieve sustainable groundwater management on a long-term average basis by increasing recharge and/or reducing groundwater pumping, while avoiding undesirable results.*



# Sustainable Yield = How much can be sustainably pumped

- **What is sustainable yield?**

- Per SGMA, sustainable yield is “the maximum quantity of water, calculated over a base period representative of long-term conditions in the basin and including any temporary surplus, that can be withdrawn annually from a groundwater supply without causing an undesirable result.”

- **How do we develop this?**

- We have estimated this using a groundwater model, modifying conditions to balance out the change in stored groundwater over time

Image courtesy: Veronica Adrover/UC Merced

# An “Allocation Framework” is Simply a way to Share the Basin’s Sustainable Yield

- Under SGMA, GSAs have authority to establish groundwater extraction allocations
- SGMA and GSPs adopted under SGMA cannot alter water rights



Image courtesy: Veronica Adrover/UC Merced

# Groundwater Budget

[Sustainable Yield Analysis – Updated to Reflect FERC Flows]

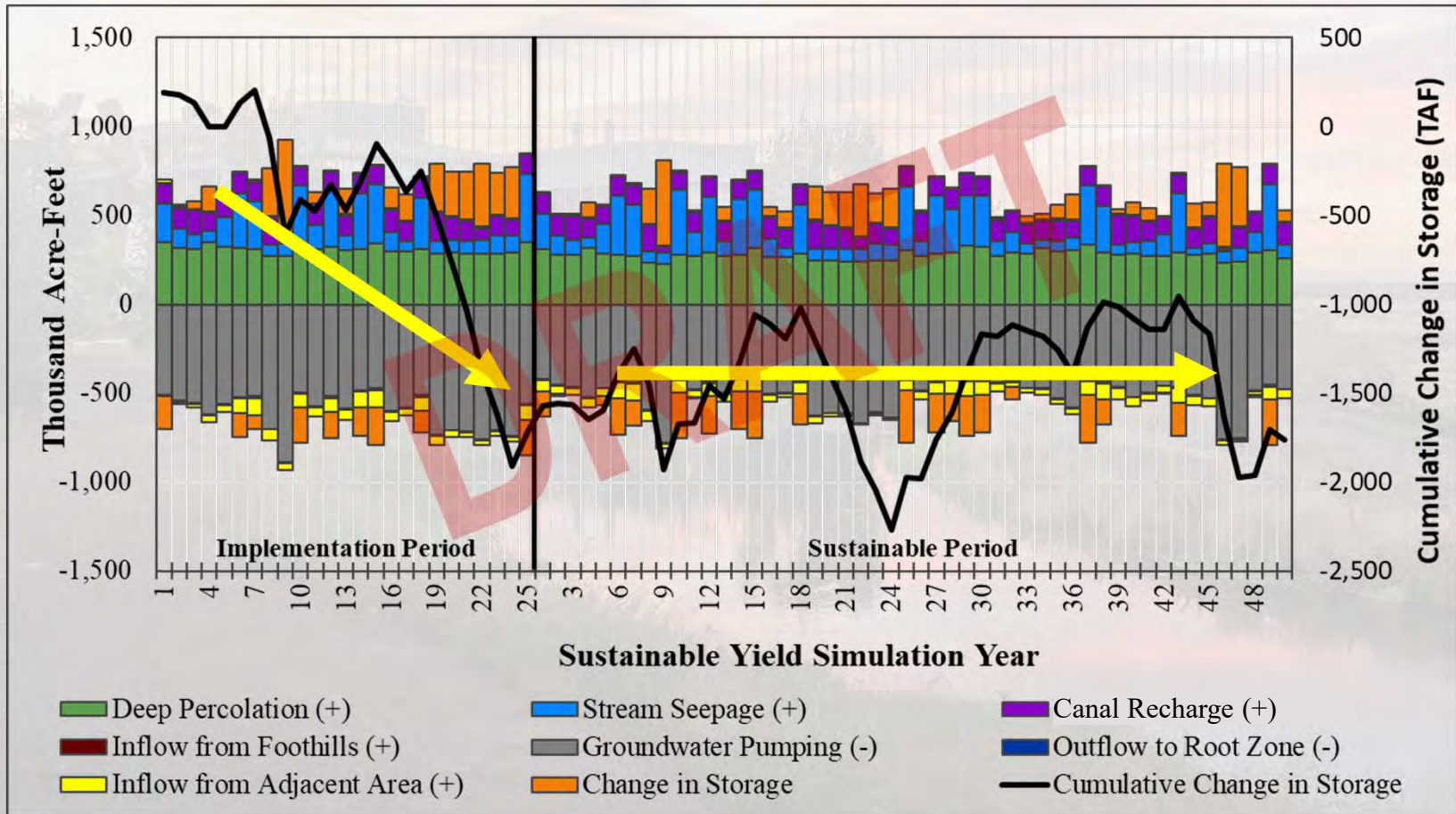


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# Sustainable Yield Analysis Groundwater Budget

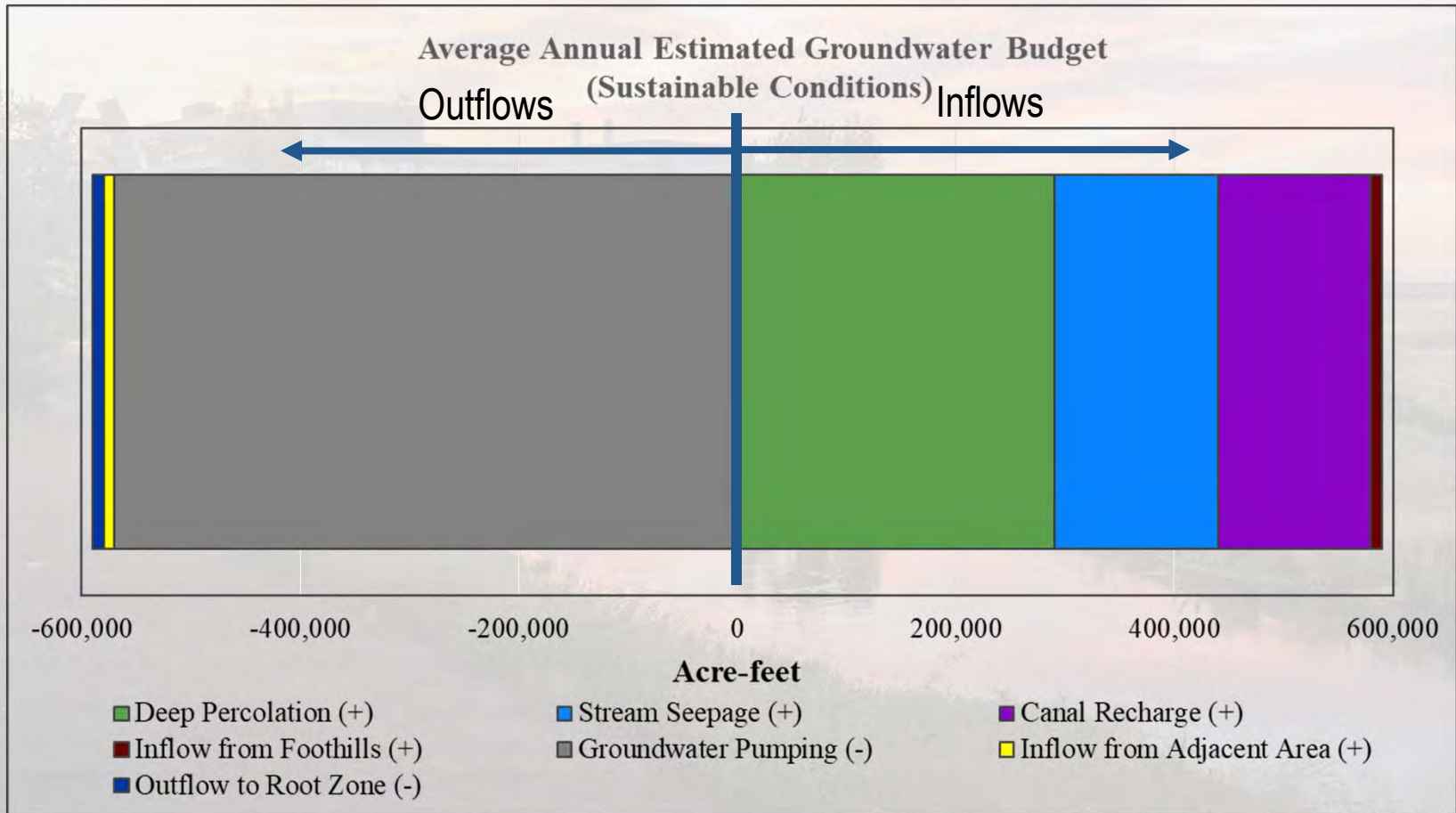


Image courtesy: Veronica Adrover/UC Merced

# Sustainable Yield needs to be Allocated Among these 3 buckets



Overlying  
Use of  
“native”  
groundwater

Primarily  
Agricultural  
Users



Appropriation  
of “native”  
groundwater

Primarily  
Municipalities



Recovery of  
seepage of  
developed  
surface water  
supply

Some supply from  
MID, TIWD, SWD,  
and other surface  
water conveyors

Image courtesy: Veronica Adrover/UC Merced

# Determination of Sustainable Yield

Estimated using MercedWRM simulations for projected basin conditions and reducing pumping until long-term average change in storage is zero. Includes native groundwater and imported water.

**Sustainable Yield =  
long term average  
annual groundwater  
pumping sustainable  
without causing  
undesirable results**

Image courtesy: Veronica Adrover/UC Merced

# Account for Developed Surface Water

Estimate seepage to groundwater of surface water supplies from MID and other surface water conveyors.

Sustainable Yield = long term average annual groundwater pumping sustainable without causing undesirable results

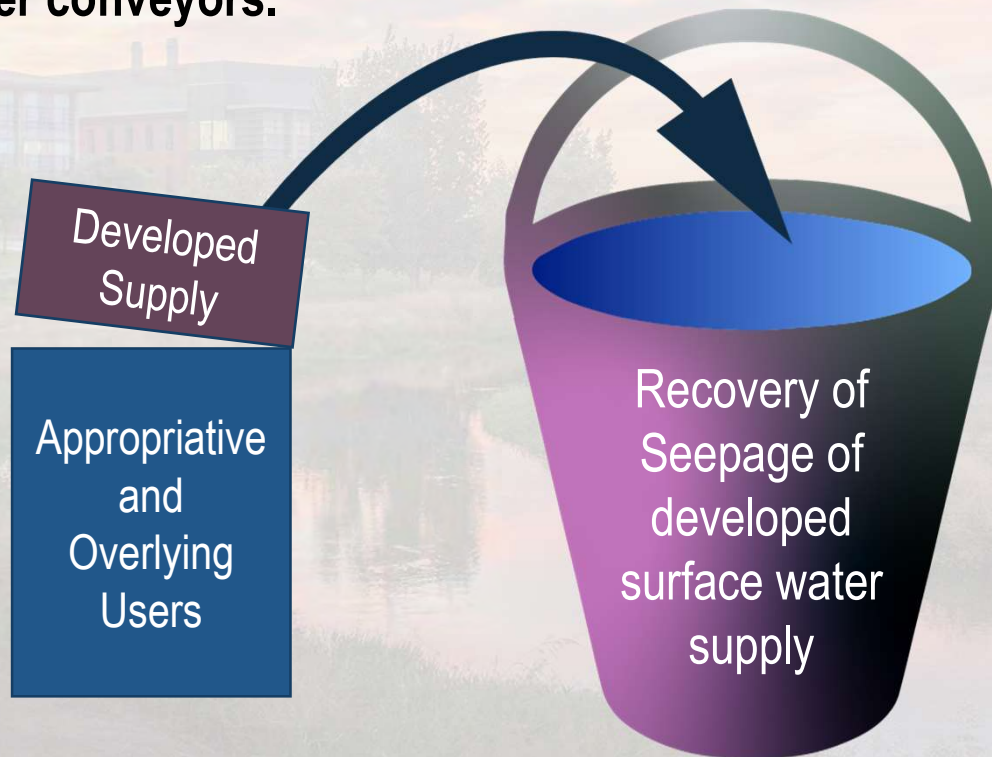


Image courtesy: Veronica Adrover/UC Merced

# Allocate Appropriative and Overlying Users

**Sustainable Yield =  
long term average  
annual groundwater  
pumping sustainable  
without causing  
undesirable results**

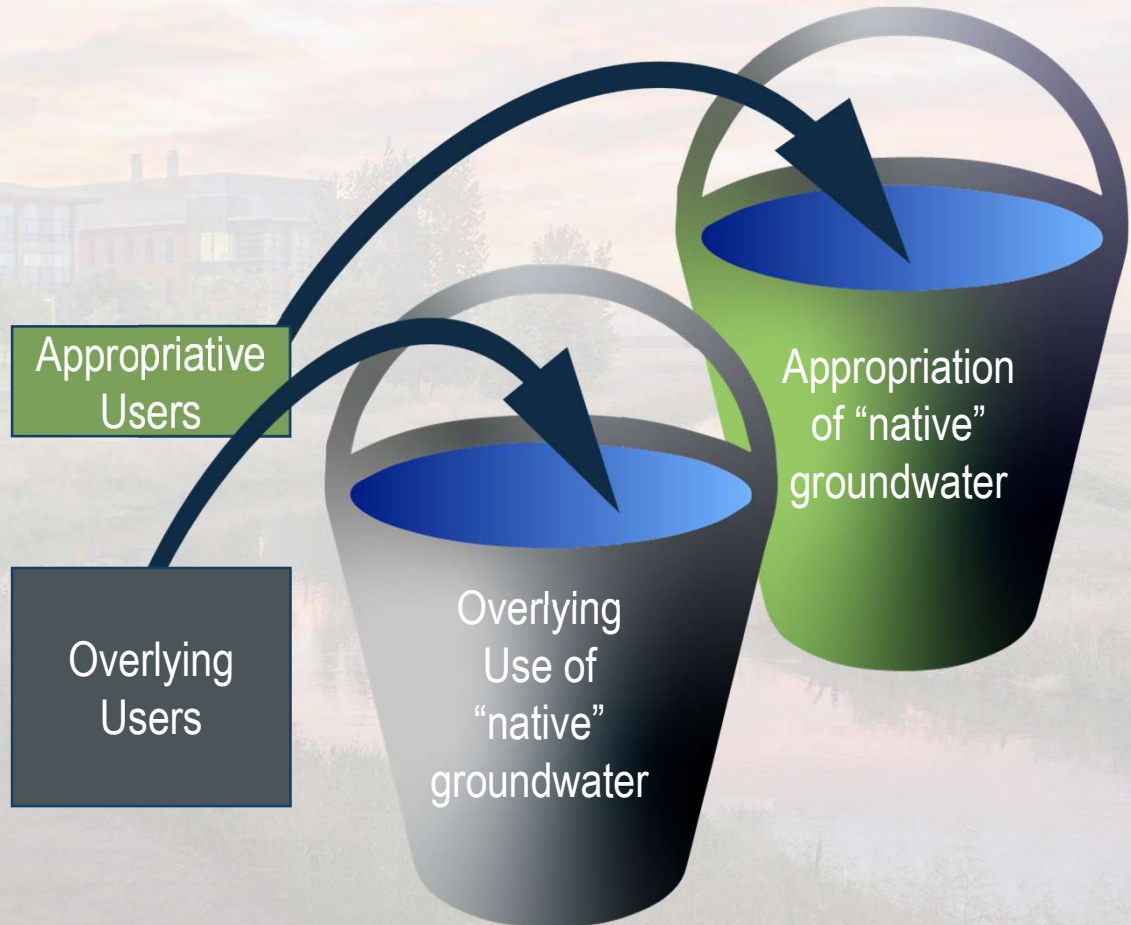


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# Sustainable Yield Analysis Groundwater Budget

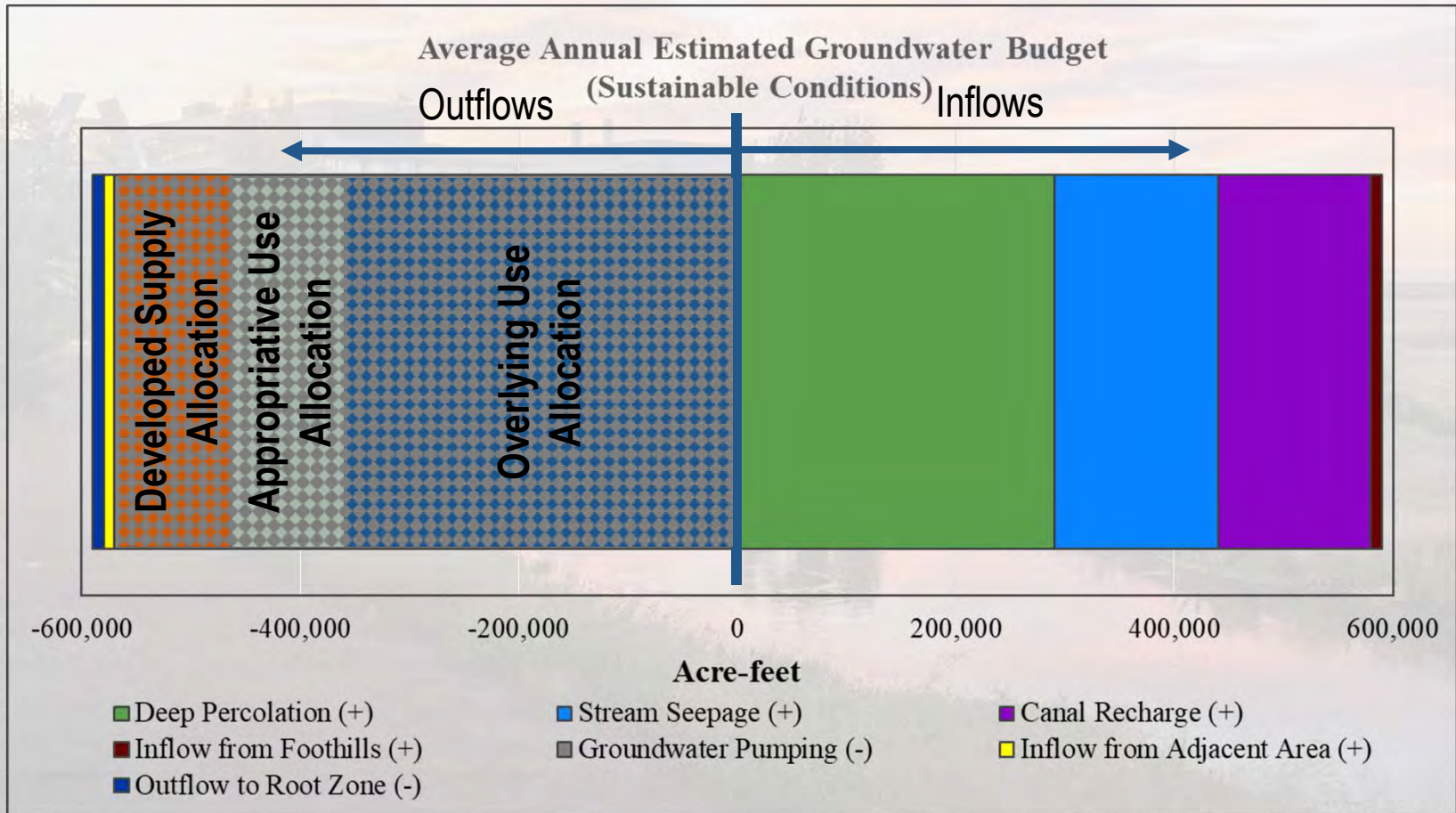


Image courtesy: Veronica Adrover/UC Merced

# CC Recommendation to GSA Boards Regarding Water Allocation Framework

- Determine the Sustainable Yield of the Basin
- Subtract groundwater originating from Developed Supply to obtain sustainable yield of native groundwater
- Allocate sustainable yield of native groundwater to overlying users and appropriative users based on their proportionate historical use.
  - Use 2006 through 2015 as the averaging period for historical use
  - Appropriative user allocations based on fraction of historical use among appropriators
  - Allocation to overlayers will be based on acreage. All developed and undeveloped acreage (not including federal lands) to receive an allocation initially. GSAs agree that no water supply credits can be exchanged until and unless all three GSAs agree on parameters for trading and key data gaps are filled.
- Use framework above to establish total allocations to each GSA. GSAs can modify the implementation and allocations within their GSA Boundary.



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# Projects and Management Actions

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Image courtesy: Veronica Adrover/UC Merced





# Projects and Management Actions will be Considered to Provide Additional Water

## Groundwater Recharge Projects

Increase stored groundwater to allow increased pumping for participating agencies

## Surface Water Projects

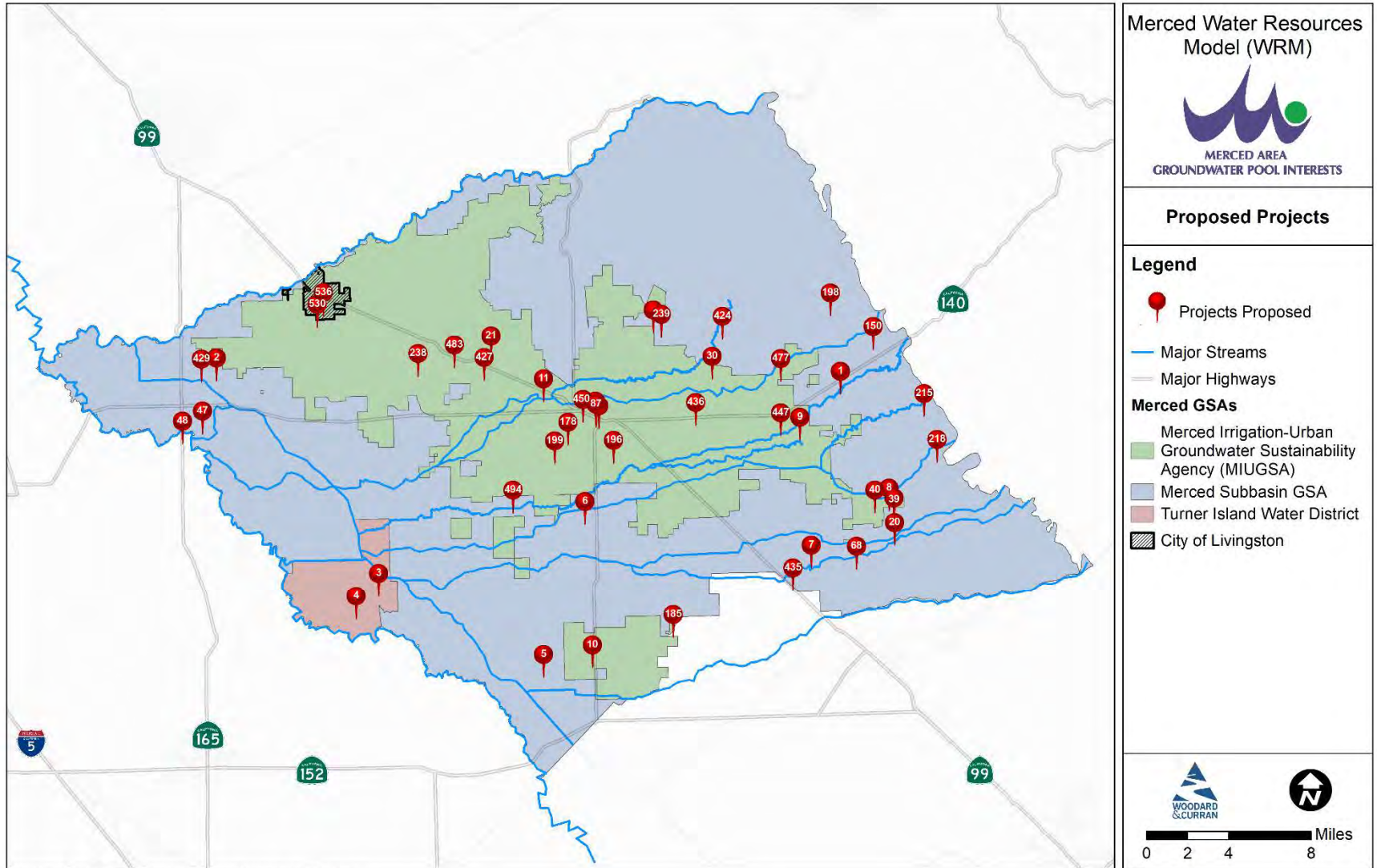
Increase availability of surface water to meet water demands (e.g., flood/stormwater management)

## Projects to Reduce Demand:

Decrease water use to reduce need for water beyond available groundwater and surface water (e.g., improved water use efficiency)

Image courtesy: Veronica Adrover/UC Merced

# Projects & Management Actions: Currently 50+ Projects on Draft List



# GSP Development: Sections Review Schedule

#	Section	Admin Review Draft Sent Out	Deadline for Consolidated Comments (2 wks)	SC and CC Review Period	Relevant Mtg for Discussion	Final Public Draft Deadline (June mtg on 6/24)
1	<b>Plan Area and Authority</b>	29-Jun-18	20-Jul-18	N/A		24-Jun-2019
2	<b>Basin Setting</b>	(in sections, see below)				24-Jun-2019
2.1	<i>Hydrogeologic Conceptual Model</i>	6-Nov-18	30-Nov-18	N/A		
2.2	<i>Current and Historical Groundwater Conditions</i>	15-Mar-19	29-Mar-19	15-Apr - 29-Apr-19	22-Apr-19	
2.3	<i>Water Budget Information</i>	5-Mar-19	19-Mar-19	26-Mar - 9-Apr-19		
2.4	<i>Climate Change Analysis</i>	22-Apr-19	6-May-19	13-May - 27-May-19	27-May-19	
3	<b>Sustainable Management Criteria</b>	15-Apr-19	29-Apr-19	6-May - 20-May-19	22-Apr-19	24-Jun-2019
4	<b>DMS</b>	15-Mar-19	29-Mar-19	15-Apr - 29-Apr-19	22-Apr-19	24-Jun-2019
5	<b>Water Allocation Framework</b>	29-Apr-19	13-May-19	27-May - 10-Jun-19	24-Jun-19	24-Jun-2019
6	<b>Projects and Management Actions to Achieve Sustainability Goal</b>	15-Apr-19	29-Apr-19	6-May - 20-May-19	27-May-19	24-Jun-2019
7	<b>Plan Implementation</b>	6-May-19	20-May-19	27-May - 10-Jun-19	24-Jun-19	24-Jun-2019

Image courtesy: Veronica Adrover/UC Merced



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**Thank You!**

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Image courtesy: Veronica Adrover/UC Merced

