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Merced Subbasin GSA  
Joint Technical and Advisory Committee Meeting  
February 21, 2019

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# Water Allocation Framework

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Image courtesy: Veronica Adrover/UC Merced

# Conceptual GSP Implementation Timeline

Implementation will be phased over 20 years, with 5-yr updates.

2020	2025	2030	2035	2040
<b>Monitoring and Reporting</b>	<b>Preparation for Allocations and Low Capital Outlay Projects</b>	<b>Prepare for Sustainability</b>	<b>Implement Sustainable Operations</b>	
<ul style="list-style-type: none"><li>• Establish Monitoring Network</li><li>• Install New Wells</li><li>• Develop Metering Program</li><li>• Extensive public outreach</li><li>• Funded and smaller projects implemented</li></ul>	<ul style="list-style-type: none"><li>• GSAs conduct 5-year evaluation/update</li><li>• Planning/ Design/ Construction for small to medium sized projects</li><li>• Monitoring and reporting continues</li><li>• Metering program continues</li><li>• Outreach continues</li></ul>	<ul style="list-style-type: none"><li>• GSAs conduct 5-year evaluation/update</li><li>• Planning/ Design/ Construction for larger projects begins</li><li>• Monitoring and reporting continues</li><li>• Outreach continues</li><li>• Allocation program begins phase-in</li></ul>	<ul style="list-style-type: none"><li>• GSAs conduct 5-year evaluation/update</li><li>• Project implementation completed</li><li>• Allocations fully implemented/enforced</li></ul>	

Image courtesy: Veronica Adrover/UC Merced



# Groundwater Water Rights in Overdrafted Basins

## Overlying (or “Correlative”) Rights

“Overlying rights are used by the landowner for reasonable and beneficial uses on land they own overlying the subbasin from which the groundwater is pumped”

## Prescriptive Rights

“...(a groundwater right acquired adversely by appropriators)...If a pumper extracts water for a non-overlying use from an overdrafted basin, the right may ripen into a prescriptive right if the basin overdraft is notorious and continuous for at least five years.”

Source: *Groundwater Pumping and Allocations under California's Sustainable Groundwater Management Act*, Environmental Defense Fund, July 2018

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# Rights to Groundwater Imported to a Subbasin

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“Water for which a credit is derived is water from outside the watershed or water which is captured that would have been otherwise lost to the subbasin and which is recharged into the groundwater basin...Assuming no prescriptive rights have attached to imported water used to recharge a basin, the imported water generally belongs solely to the importer, who may extract (even if the basin is in overdraft) and use or export it without liability to other basin users....”

Source: *Groundwater Pumping and Allocations under California's Sustainable Groundwater Management Act*, Environmental Defense Fund, July 2018

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Groundwater pumped in Merced Subbasin comes out of one of these “buckets”, and we cannot double-count

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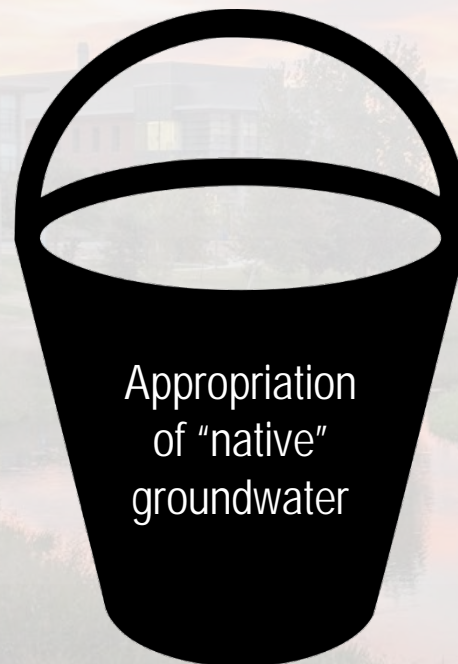
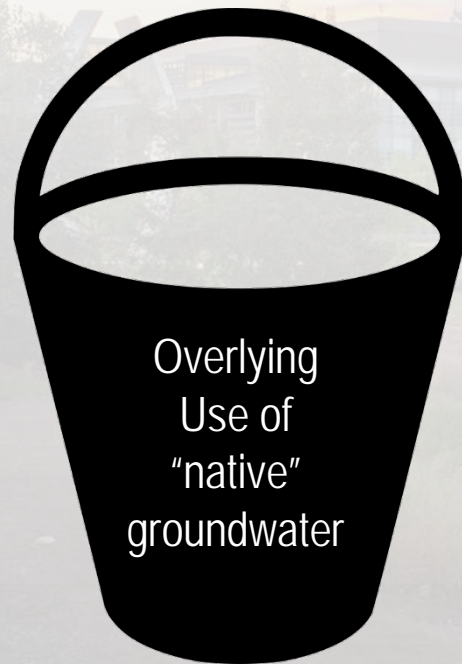


Image courtesy: Veronica Adrover/UC Merced



# Merced GSP Allocation Methodology under Discussion

1. Determine **Sustainable Yield** of the Basin
2. Subtract groundwater originating from **Developed Supply** (seepage of developed/imported surface water) to obtain sustainable yield of native groundwater
3. Allocate Remaining Sustainable Yield to **Overlying Users** and **Appropriative Users** based on their proportional historical use
  - a) Decide on historical period to use for determining proportional use
  - b) Appropriative and Overlying Use allocated based on relative percent of historical use
    - a) Appropriators allocated based on fraction of historical use among appropriators
    - b) Overlying users allocated based on acres (allocation per acres) – need to determine allocation method for historically unirrigated acres
4. GSAs can modify implementation and allocation within GSA, but framework establishes basis for basin-wide management

Numbers shown in the slides that follow are draft and are based on a basin-wide analysis looking at changes in overall storage without considering minimum thresholds and undesirable results. Future refinements will consider these effects and may result in adjustments to these estimates.

Image courtesy: Veronica Adrover/UC Merced



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# 1. Determine Sustainable Yield of Basin

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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

530,000 AF

\* Numbers shown are draft and are based on a basin-wide analysis looking at changes in overall storage without considering minimum thresholds and undesirable results. Future refinements will consider these effects and may result in adjustments to these estimates.

## 2. Subtract Developed Seepage from Surface Water Supplies

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

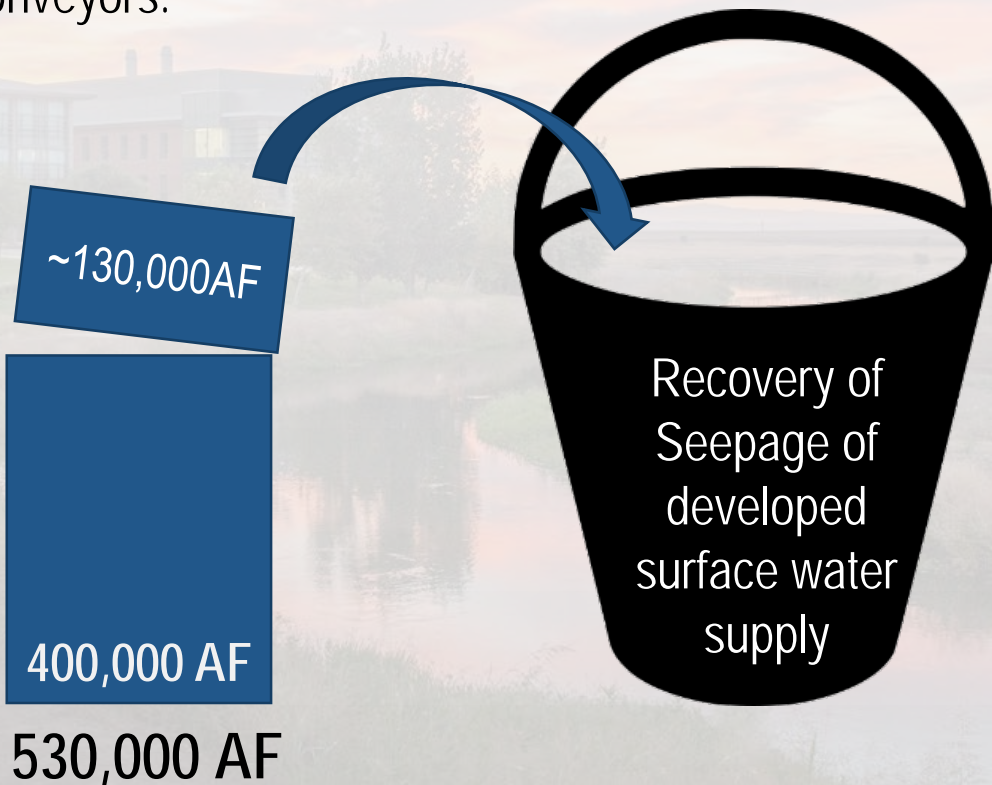


Image courtesy: Veronica Adrover/UC Merced

\*Seepage estimates currently being refined.



# Proposed Methodology for Estimating Imported Supply Contributions to Groundwater Basin

- MID – has estimates of their conveyance seepage to the basin based on their Agricultural Water Management Plan and the difference between water imported and delivered
- The total MID unlined distribution system is 563 miles. It consists of unlined canal, creeks, and drains.
- SWD – has provided an estimate of their canal seepage
- For smaller surface water conveyors,
  - Request they provide documentation of losses;
  - Otherwise, seepage loss will be estimated based on volume of imported/developed surface water delivered and length of unlined canals.

*Seepage credit = Volume delivered x loss factor (x%/mile unlined conveyance)*

Image courtesy: Veronica Adrover/UC Merced



### 3. Apportion sustainable yield between overlying and appropriative users based on historical use

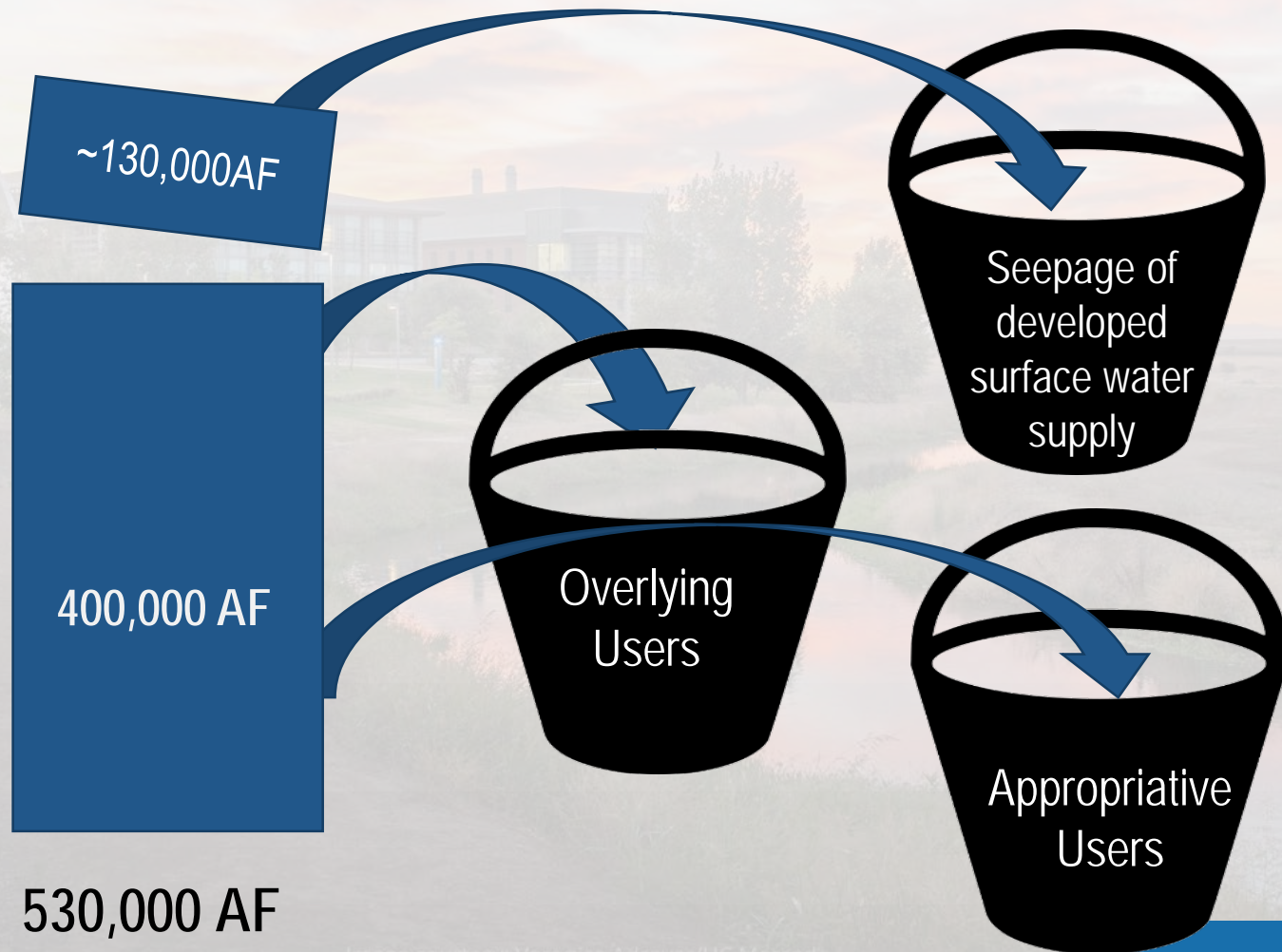


Image courtesy: Veronica Adrover/UC Merced

# Proportion of historical use

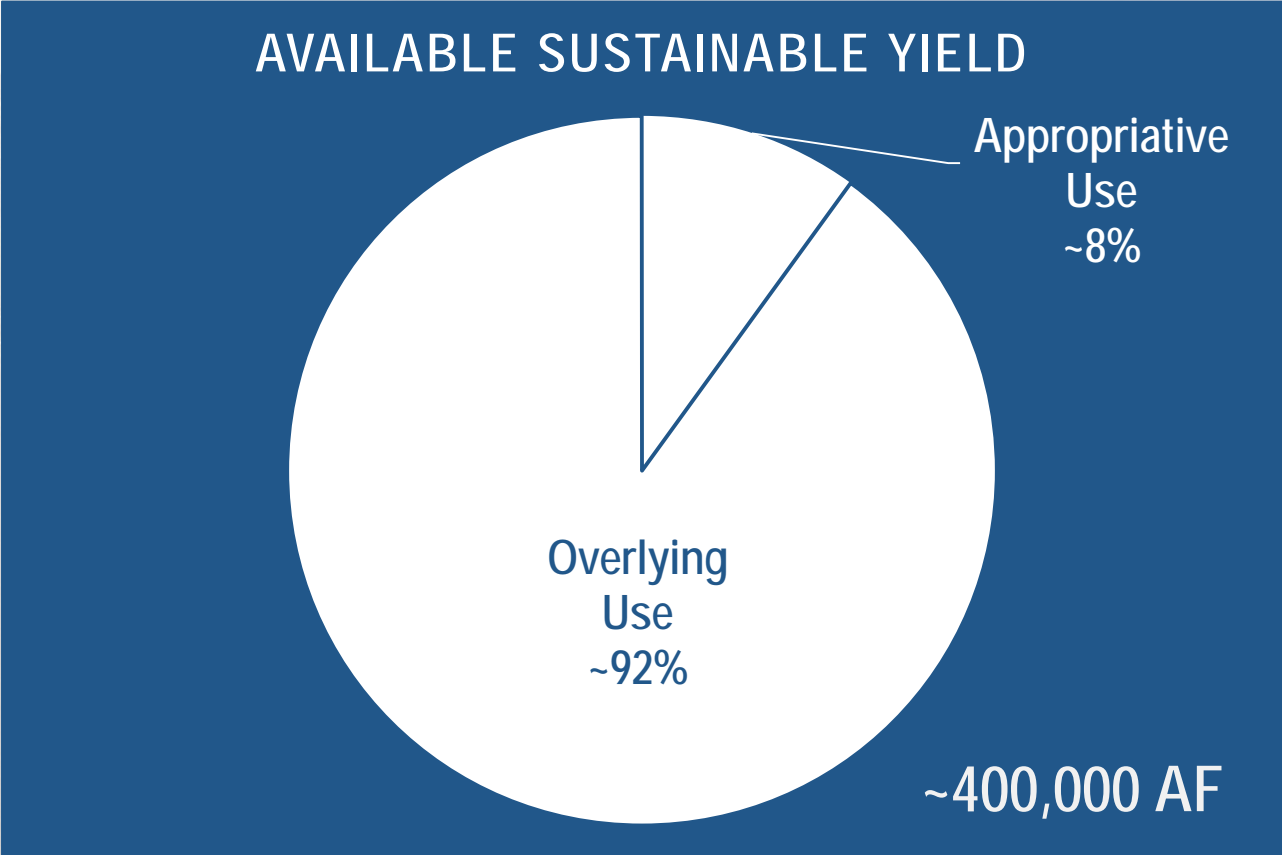


Image courtesy: Veronica Adrover/UC Merced

# Analysis of different historical averaging periods

Year	Appropriative Pumping	Overlying Pumping	Total Pumping	Appropriative Pumping	Overlying Pumping	Total Pumping
<b>20-Year Hist 1996-2015</b>	44,000	527,000	571,000	8%	92%	100%
<b>10-Year Hist 2006-2015</b>	45,000	621,000	666,000	7%	93%	100%
<b>5-Year Hist 2011-2015</b>	45,000	674,000	719,000	6%	94%	100%
<b>15-Year Hist (Exc. Drought) 1996-2010</b>	43,000	478,000	521,000	8%	92%	100%
<b>10-Year Hist (Exc. Drought) 2001-2010</b>	44,000	505,000	549,000	8%	92%	100%
<b>5-Year Hist (Exc. Drought) 2006-2010</b>	44,000	569,000	613,000	7%	93%	100%

All units are in acre-feet per year  
 Appropriative Pumping is estimated based on Municipal Use





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## 4. GSAs can modify implementation and allocation within GSA, but framework establishes basis for basin-wide management

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- Determine amount available for allocation:
  - Sustainable Yield: ~530,000AF
  - Imported Supply: ~130,000AF
  - **Base Allocations:** ~**400,000AF**
- Base allocations are split proportionally between appropriative and overlying users
  - Appropriative Allocation: ~30,000AF
  - Overlying Allocation: ~370,000AF
- Attribute allocations to each GSAs based on imported supplies, appropriative, and overlying users

Image courtesy: Veronica Adrover/UC Merced

# Addressing Unirrigated Lands

- Landowners who are not pumping may have what is sometimes referred to in groundwater law as a dormant overlying right (also called “sleeping” right or an unexercised right). There is no standard practice in adjudications or guidance on how to address dormant overlying rights in a GSP allocation.
- Options can include attempting to quantify future rights to pump, or establishing a future process for allowing dormant overlayers to start pumping (e.g. Mojave Adjudication)

Image courtesy: Veronica Adrover/UC Merced

# Illustration of Partial Allocation Options

- Last month the group requested we analyze how different partial allocations to currently unirrigated land would effect the overall allocation to overlying users.
- We have limited land use data. Based on what we have:
  - Total supply available to overlying users ~370,000 acre-feet
  - Developed/Irrigated ~300,000 acres
  - Undeveloped: ~200,000 acres

	Developed Allocation (AF/Acre)	Undeveloped Allocation (AF/Acre)
Partial Allocation at 100%	0.70	0.70
Partial Allocation at 50%	0.90	0.45
Partial Allocation at 25%	1.00	0.25
Allocation only to currently irrigated/developed land	1.25	0.00

Image courtesy: Veronica Adrover/UC Merced



# Illustration of Land Use Distribution

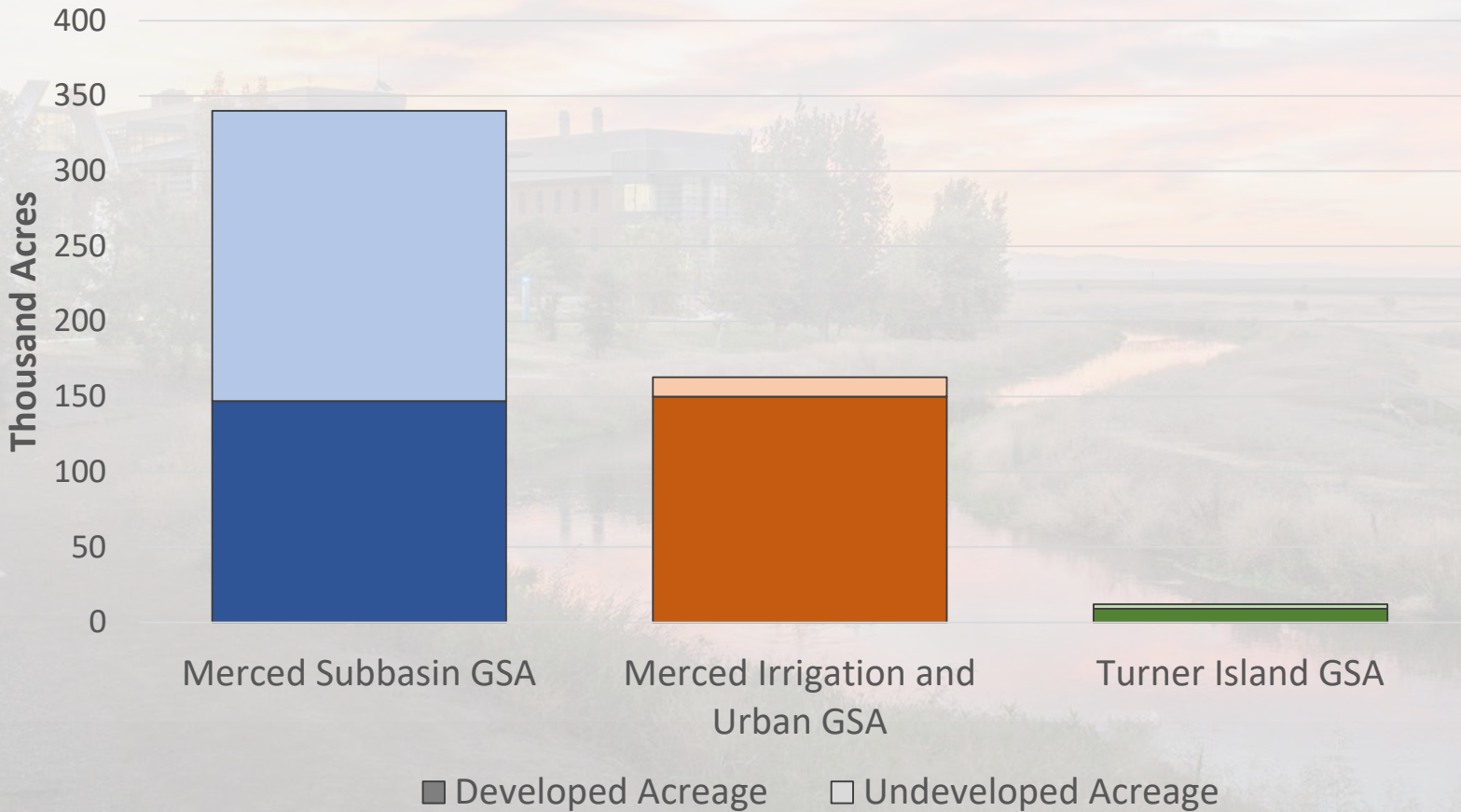
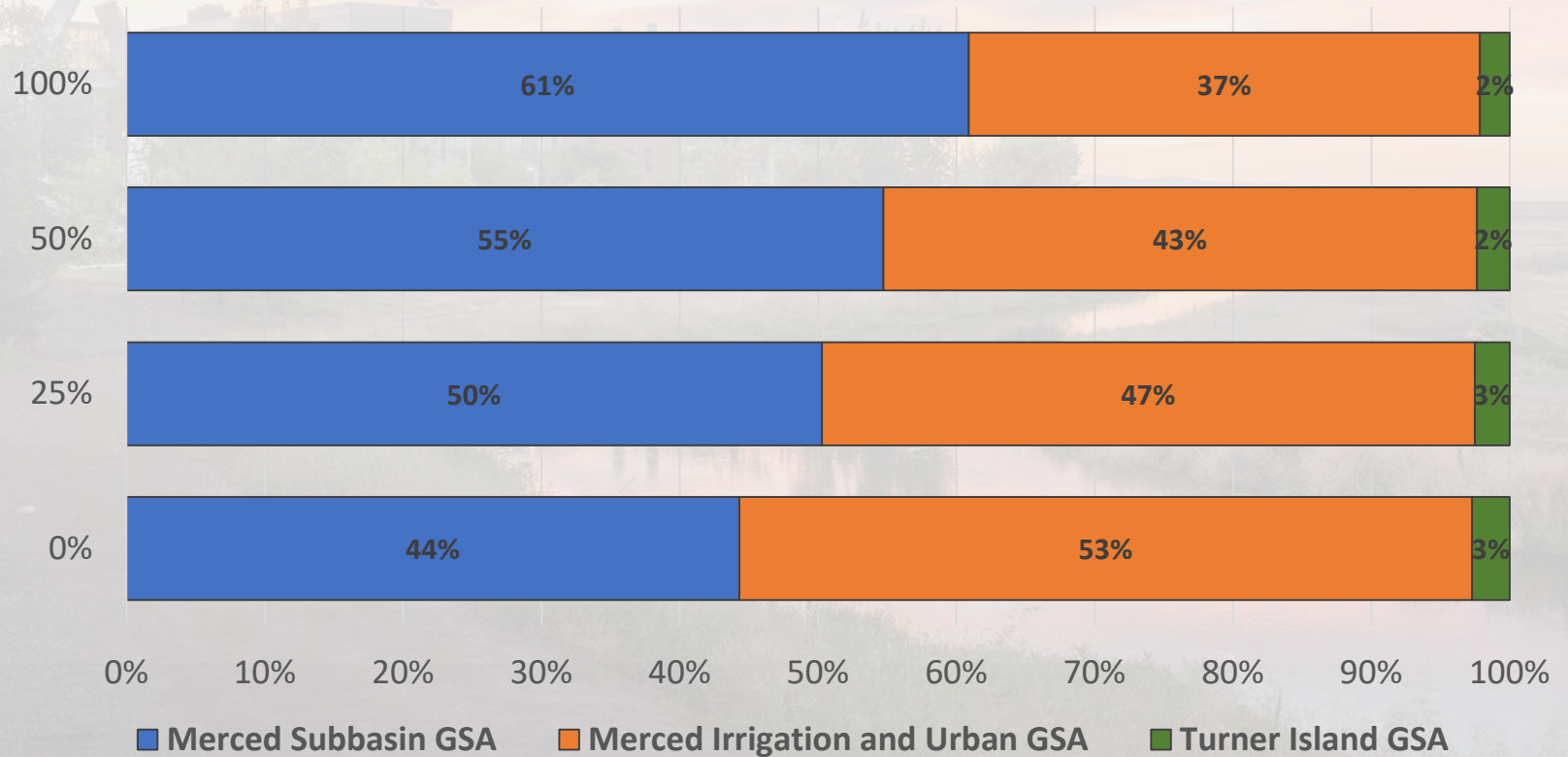


Image courtesy: Veronica Adrover/UC Merced

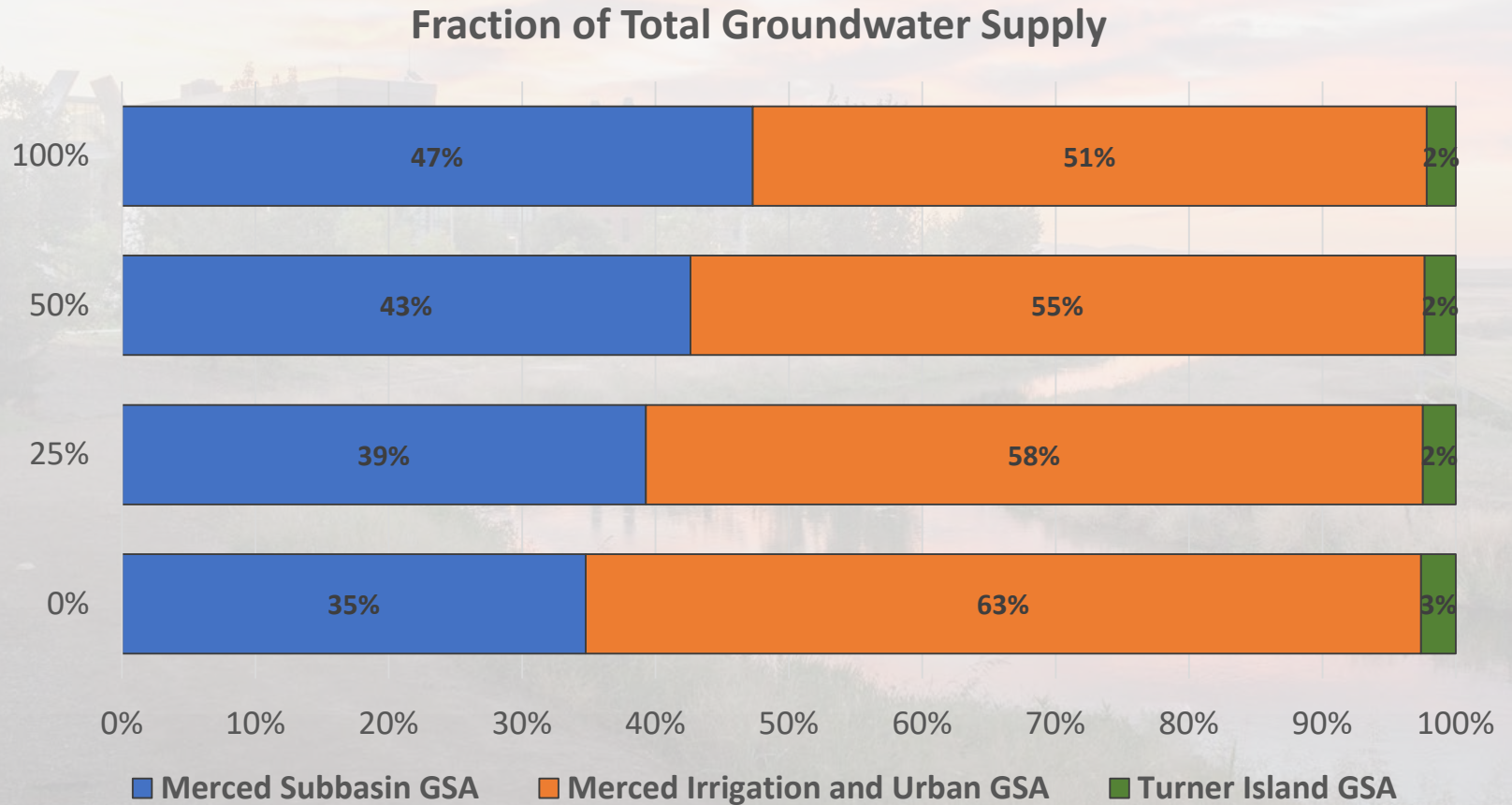
# Draft Estimated Allocation by GSAs

Fraction of Total Overlying & Appropriative Allocation



\*\*Allocation fractions include overlying and appropriative water use totaling approximately 400,000AFY. Does not include developed supplies.

# Draft Estimated Allocation by GSAs



\*\* Allocation fractions include developed supply, overlying and appropriative water rights totaling approximately 530,000AFY.





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# Projects and Management Actions

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Image courtesy: Veronica Adrover/UC Merced

# Projects & Management Actions: Update on quantifying and comparing

- Factors to be considered include benefits to water quality and supply, DACs, the environment, local economy, and **cost per acre foot**.
- Cost per acre foot takes into account the total costs of the project and the amount of water produced or saved depending on project type.

Cost per Acre Foot

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Capital Cost + (Annual O&M Cost x Estimated Project Life)

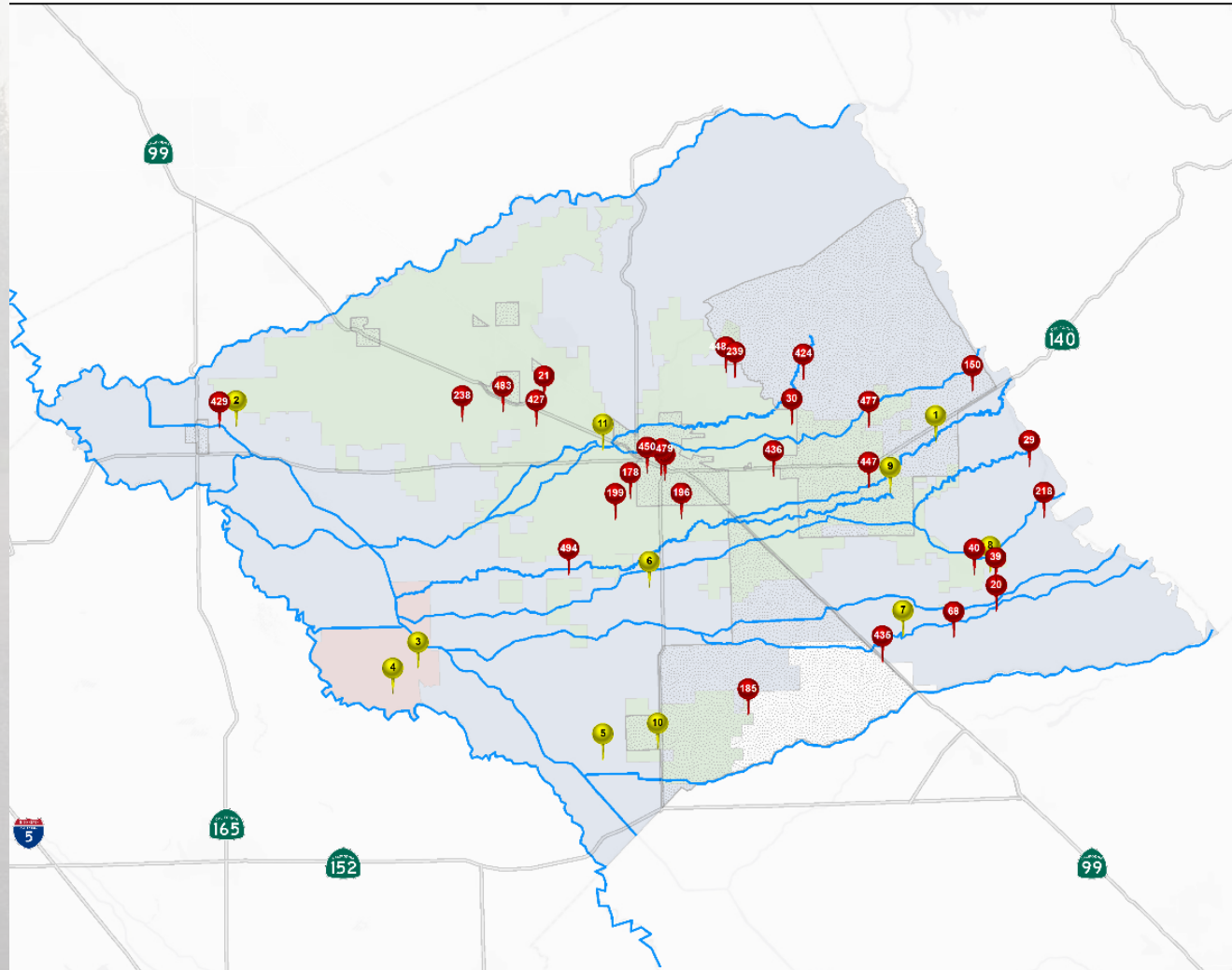
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(Annual Water Produced x Estimated Project Life)

Image courtesy: Veronica Adrover/UC Merced



# Projects & Management Actions: Currently 40 Projects on Draft List







Merced Water Resources Model (WRM)







### Proposed Projects

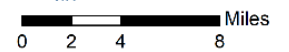
### Legend

-  Project Subset
-  Project

-  Major Streams
-  Major Highways

### Merced GSAs

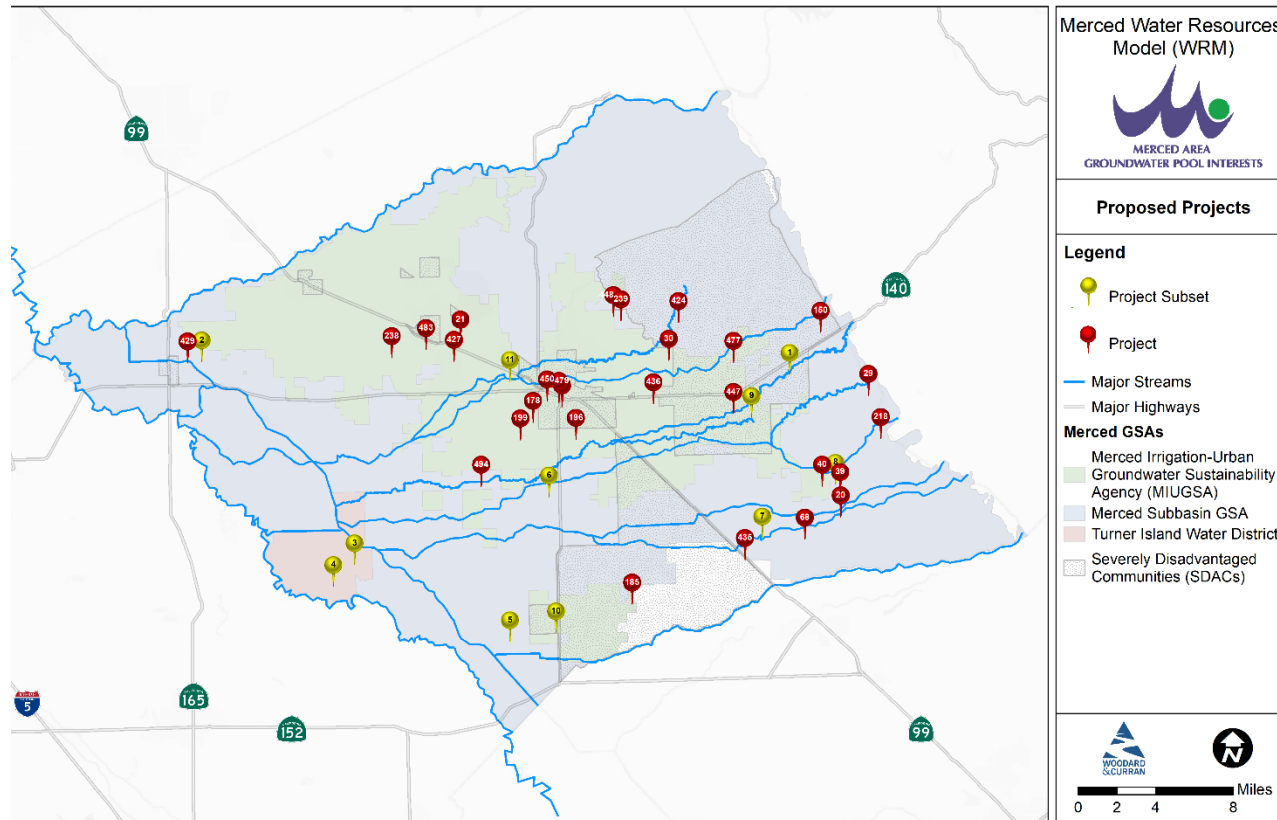
-  Merced Irrigation-Urban Groundwater Sustainability Agency (MIUGSA)
-  Merced Subbasin GSA
-  Turner Island Water District
-  Severely Disadvantaged Communities (SDACs)





# Projects & Management Actions:

## Projects provided by stakeholders and Prop 1 SDAC Projects Highlighted



#	Project Name
1	Super Connect
2	Brasil Recharge Project
3	TIWD Merced GSP Projects Reservoir
4	TIWD Merced GSP Projects Recharge
5	Merced I.D. to Lone Tree MWC conveyance canal
6	Vander Woude Dairy Offstream Temporary Storage
7	Go Big Super-Connect Conveyance Project
8	Marguerite Water Retention Facility
9	Planada Groundwater Recharge Basin Pilot Project (SDAC project)
10	El Nido Groundwater Monitoring Wells (SDAC project)
	Meadowbrook Water System
11	Intertie Feasibility Study (SDAC project)

Image courtesy: Veronica Adrover/UC Merced



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Next Meeting

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