Merced Groundwater Sustainability Plan

Public Meeting – February 25, 2019

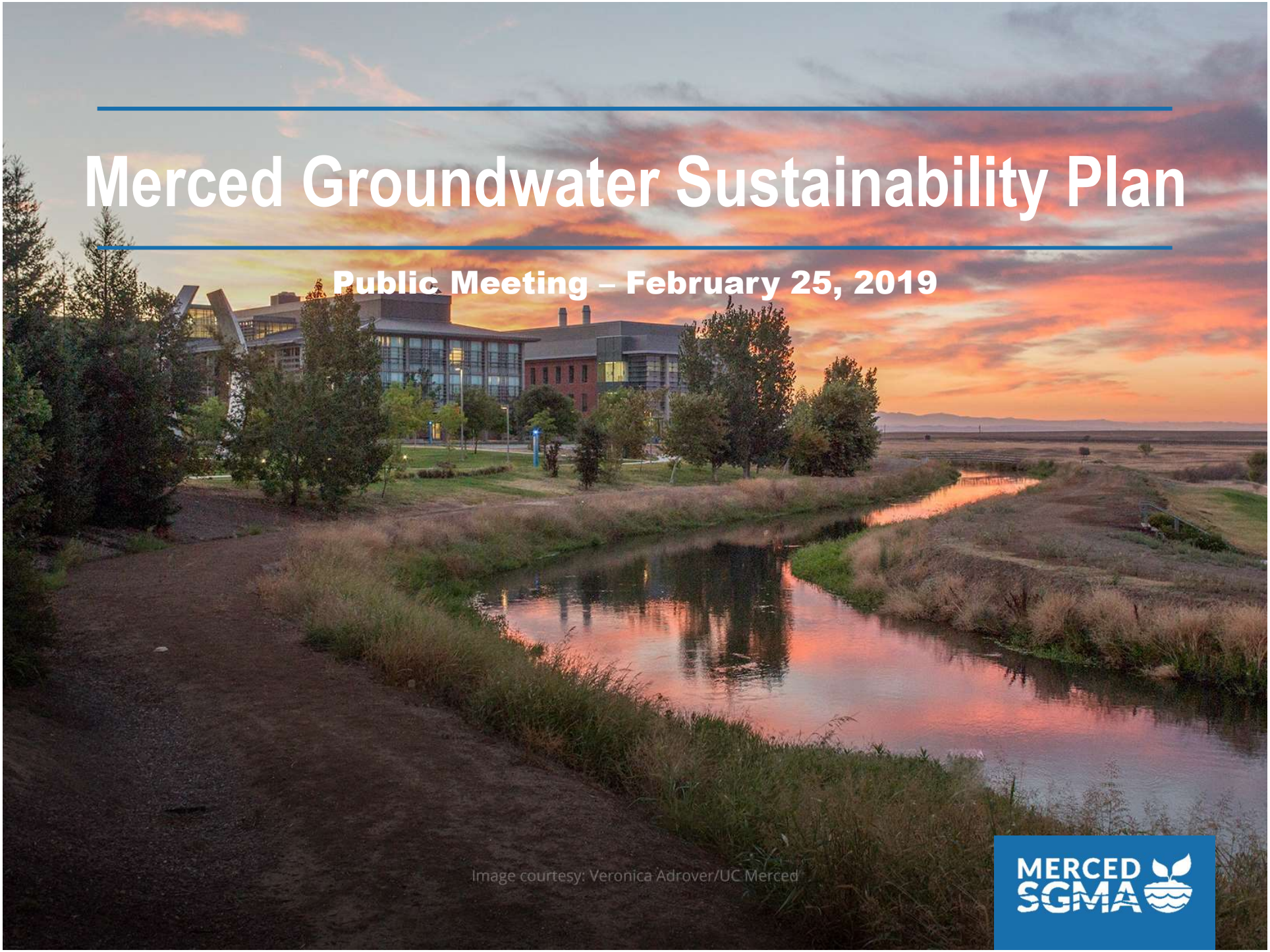

Image courtesy: Veronica Adrover/UC Merced

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Welcome, Introductions, and GSP Overview

Image courtesy: Veronica Adrover/UC Merced

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Agenda

1. Informal Discussion Time

2. Welcome, Introductions, and GSP Overview
    1. Sustainable Groundwater Management Act and Groundwater Sustainability Plan
    2. Current and Projected Groundwater Conditions
    3. Groundwater in the Livingston Area
    4. Discussion & Questions

3. Sustainable Management for the Merced Subbasin Groundwater
    1. Sustainable Yield of the Merced Subbasin
    2. Groundwater Allocation Frameworks under SGMA
    3. Discussion – Groundwater Allocation Considerations
    4. Projects and Management Actions

Image courtesy: Veronica Adrover/UC Merced

4. Wrap-up and Next Steps

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Sustainable Groundwater Management Act and Groundwater Sustainability Plan

Common Abbreviations:

- SGMA = Sustainable Groundwater Management Act
- GSA = Groundwater Sustainability Agency
- GSP = Groundwater Sustainability Plan (developed and implemented by GSAs)

Image courtesy: Veronica Adrover/UC Merced

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Guidelines for Successful Meetings

- Creativity is encouraged.
  - Think outside the box and welcome new ideas.
  - Build on the ideas of others to improve results.
  - Disagreements are problems to be solved rather than battles to be won.
- Efficiency is important.
  - Participate fully, without distractions.
  - Respect time constraints and be succinct.
  - Let one person speak at a time.
- Civility is required.
  - Treat one another with courtesy and respect.
  - Be honest, fair, and as candid as possible.
  - Be respectful of all viewpoints

Image courtesy: Veronica Adrover/UC Merced

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Sustainable Groundwater Management Act and Groundwater Sustainability Plan

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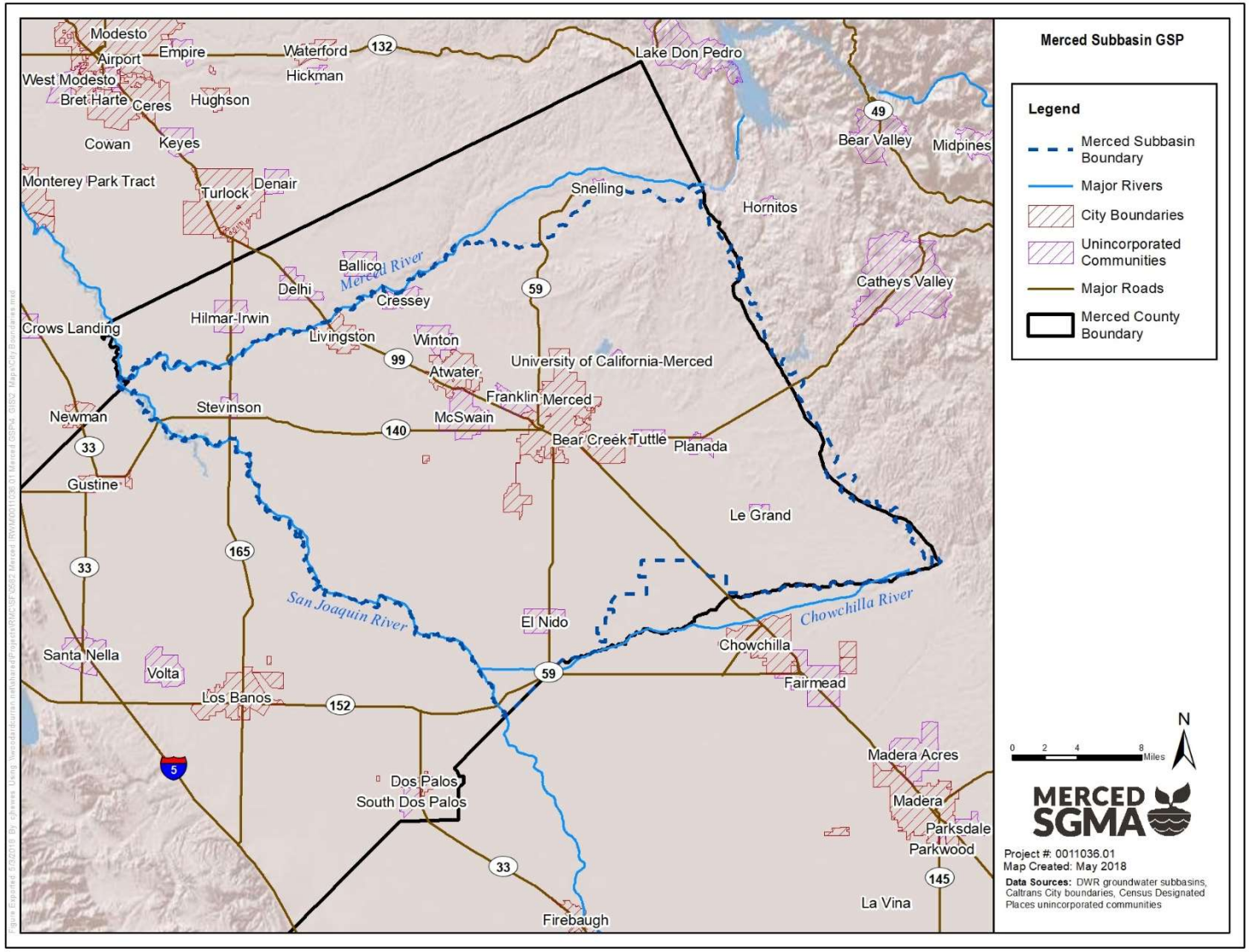
Merced Subbasin Boundaries



Sustainable Groundwater Management Act and Groundwater Sustainability Plan

- The Merced Subbasin was identified by the State as a "**critically overdrafted**" basin
  - Critical overdraft means that "continuation of present water management practices would probably result in significant adverse overdraft-related environmental, social, or economic impacts."'

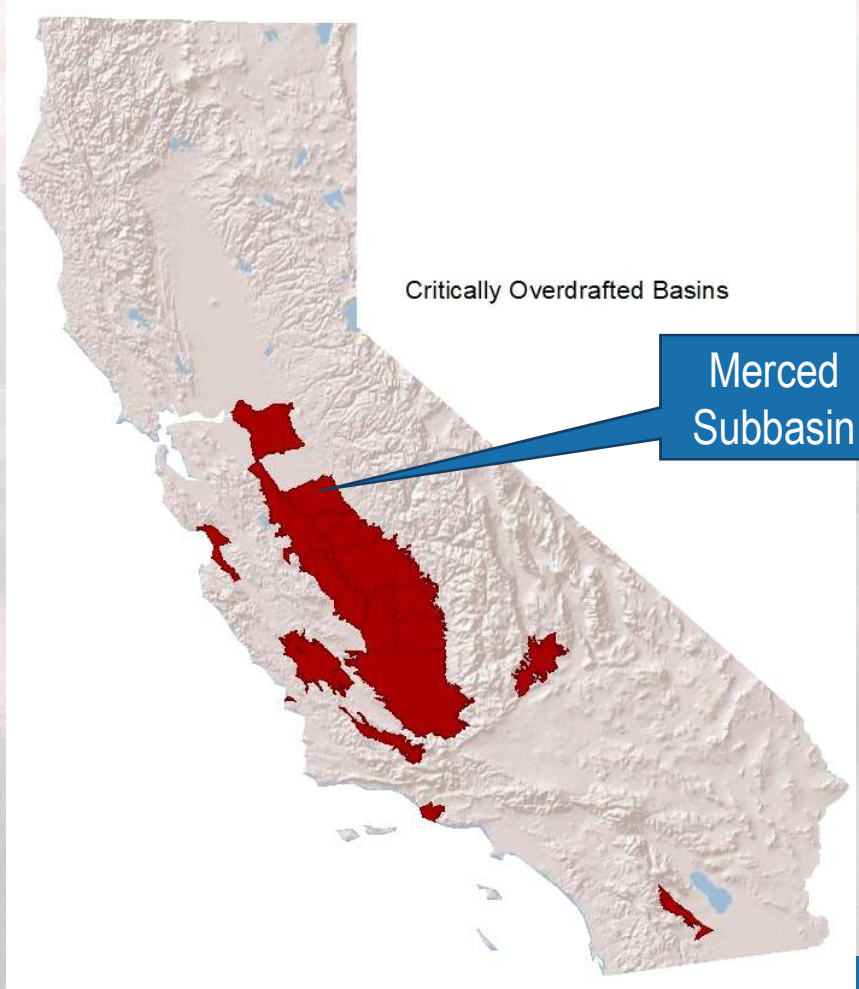


Image courtesy: Veronica Autover/UC Merced

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Sustainable Groundwater Management Act and Groundwater Sustainability Plan

The Sustainable Groundwater Management Act was passed in 2014 and requires the following:

- Groundwater Sustainability Agencies (GSAs) must be formed
- A Groundwater Sustainability Plan (GSP) must be prepared and submitted by
  - **January 2020 for critically overdrafted basins**
  - January 2022 for remaining high and medium priority basins
- GSPs must include measurable objectives and milestones in increments of five years to achieve sustainability within 20 years of GSP adoption
- GSP development must be open and transparent, with stakeholder and public input

Image courtesy: Veronica Adrover/UC Merced

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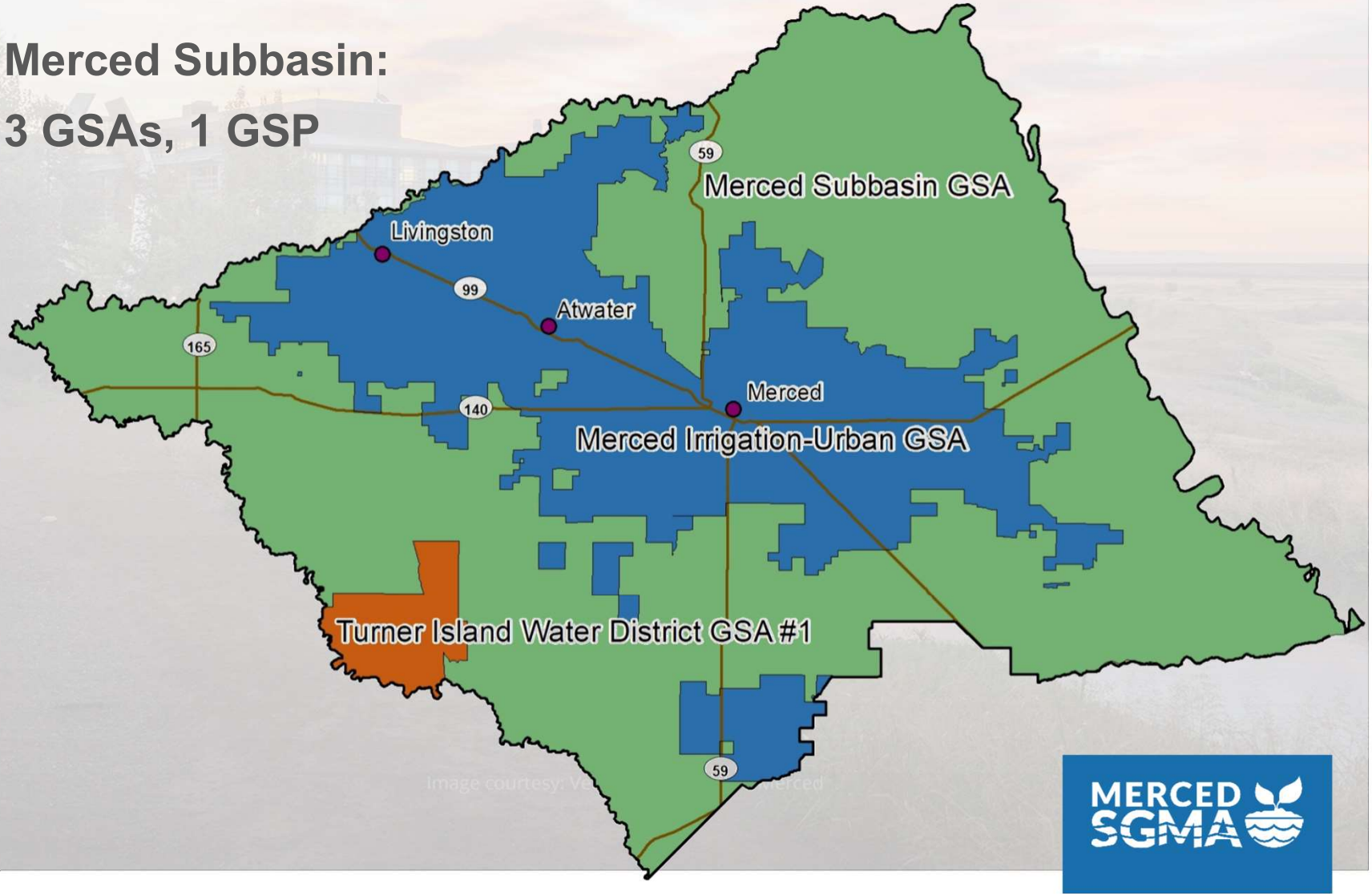
Sustainable Groundwater Management Act and Groundwater Sustainability Plan

Merced Subbasin:

3 GSAs, 1 GSP



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Sustainable Groundwater Management Act and Groundwater Sustainability Plan

Groundwater Sustainability Agencies:

- Merced Irrigation-Urban Groundwater Sustainability Agency
  - **Hicham ElTal**
- Merced Subbasin Groundwater Sustainability Agency
  - **Bob Kelley**
- Turner Island Water District Groundwater Sustainability Agency
  - **Larry Harris**

Groundwater Sustainability Plan:

- Woodard & Curran, Inc. (Consultant Team)
  - **Alyson Watson**

Image courtesy: Veronica Adrover/UC Merced

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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"

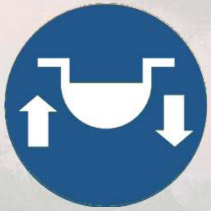
Chronic lowering of groundwater levels indicating a significant and unreasonable depletion of supply

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

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Merced GSP Outreach Structure

- *GSA Leadership* – Overall authority for decision-making, GSP development, and implementation
- *Coordinating Committee* – Advise on plan development and make recommendations to decision-makers
- *Stakeholder Committee* – Represent diverse stakeholders in basin and provide input to inform plan development
- *Public workshops* – Building awareness and understanding; emphasis on engagement of DACs

Image courtesy: Veronica Adrover/UC Merced

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GSP Development

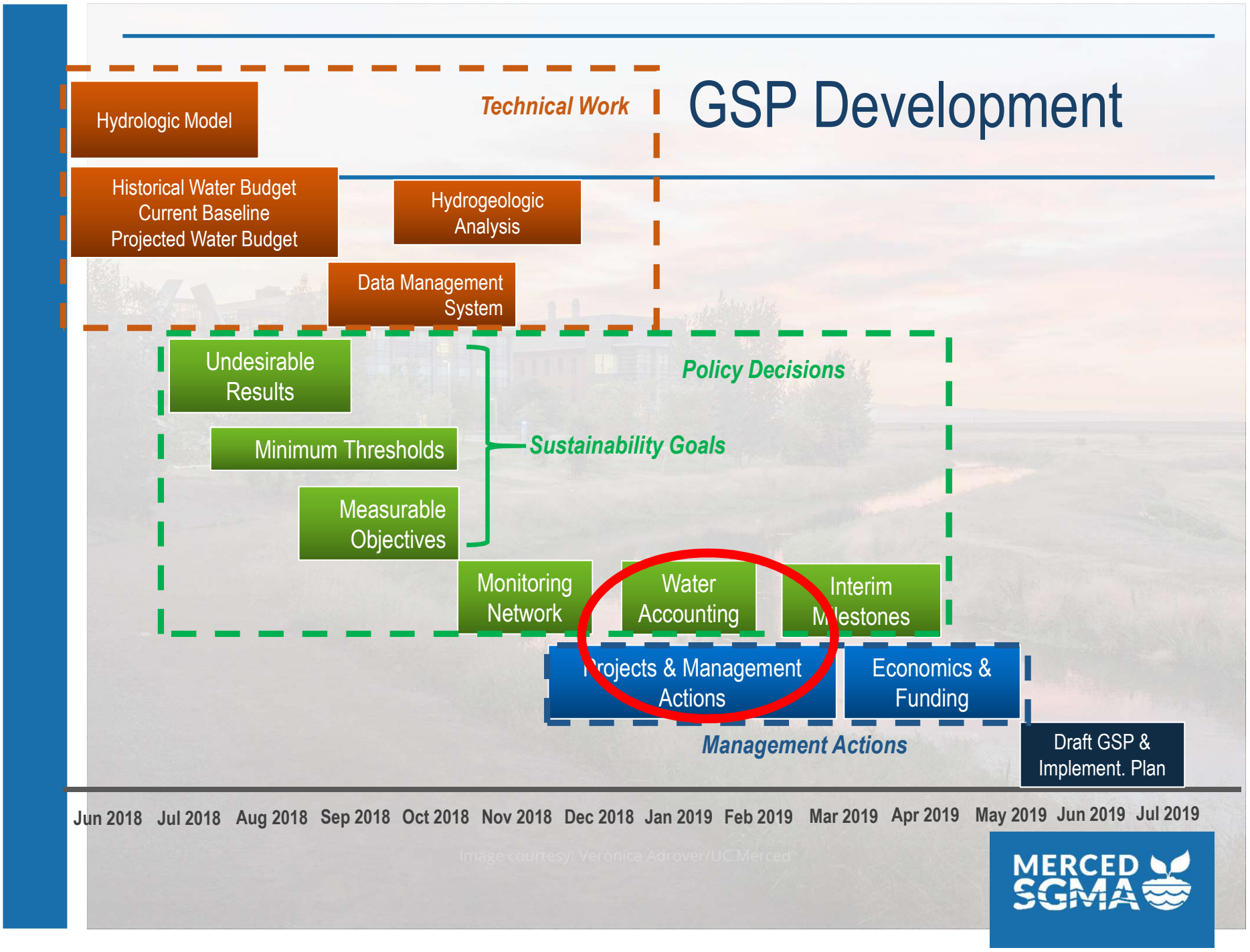

Image courtesy: Veronica Adrover/UC Merced

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Current and Projected Groundwater Conditions

Image courtesy: Veronica Adrover/UC Merced

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Historical 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

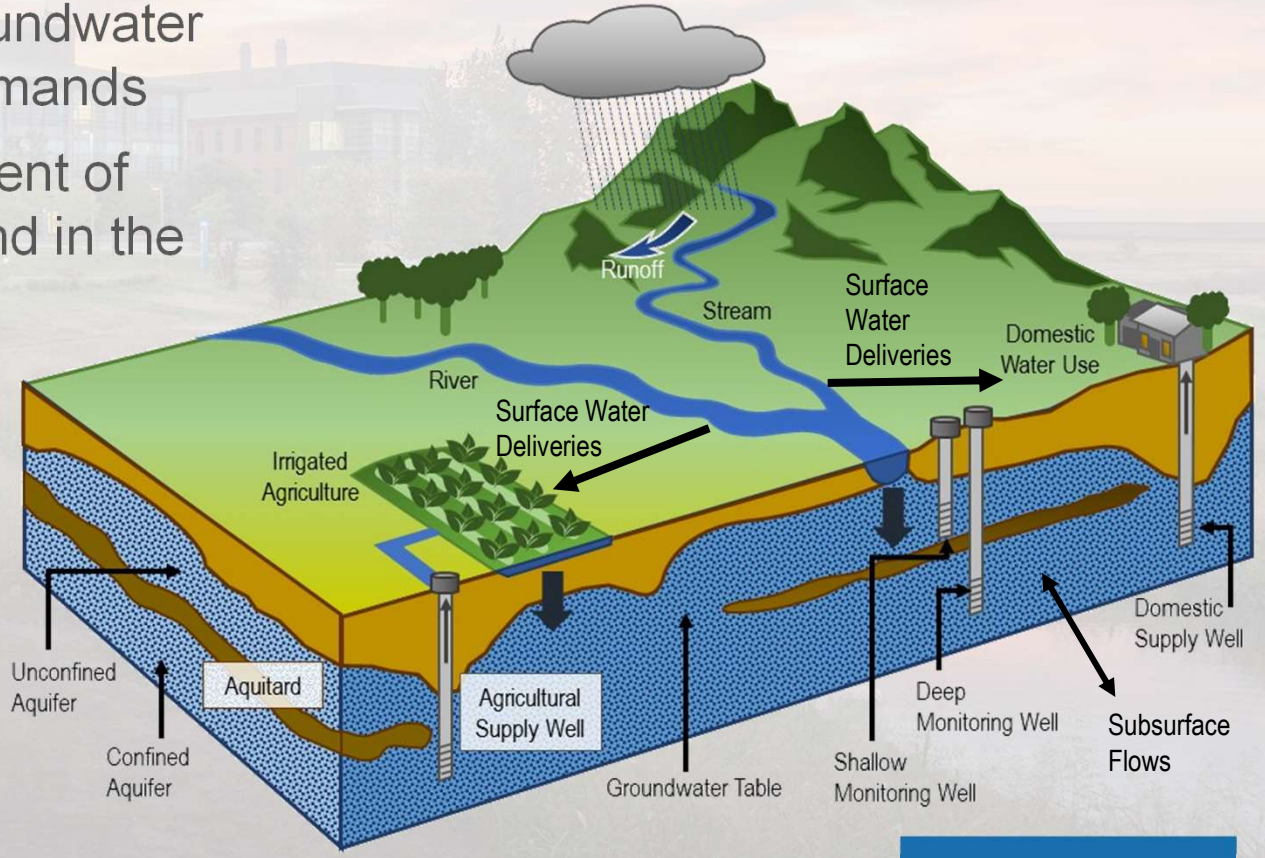

Image courtesy: Veronica Adrover/UC Merced

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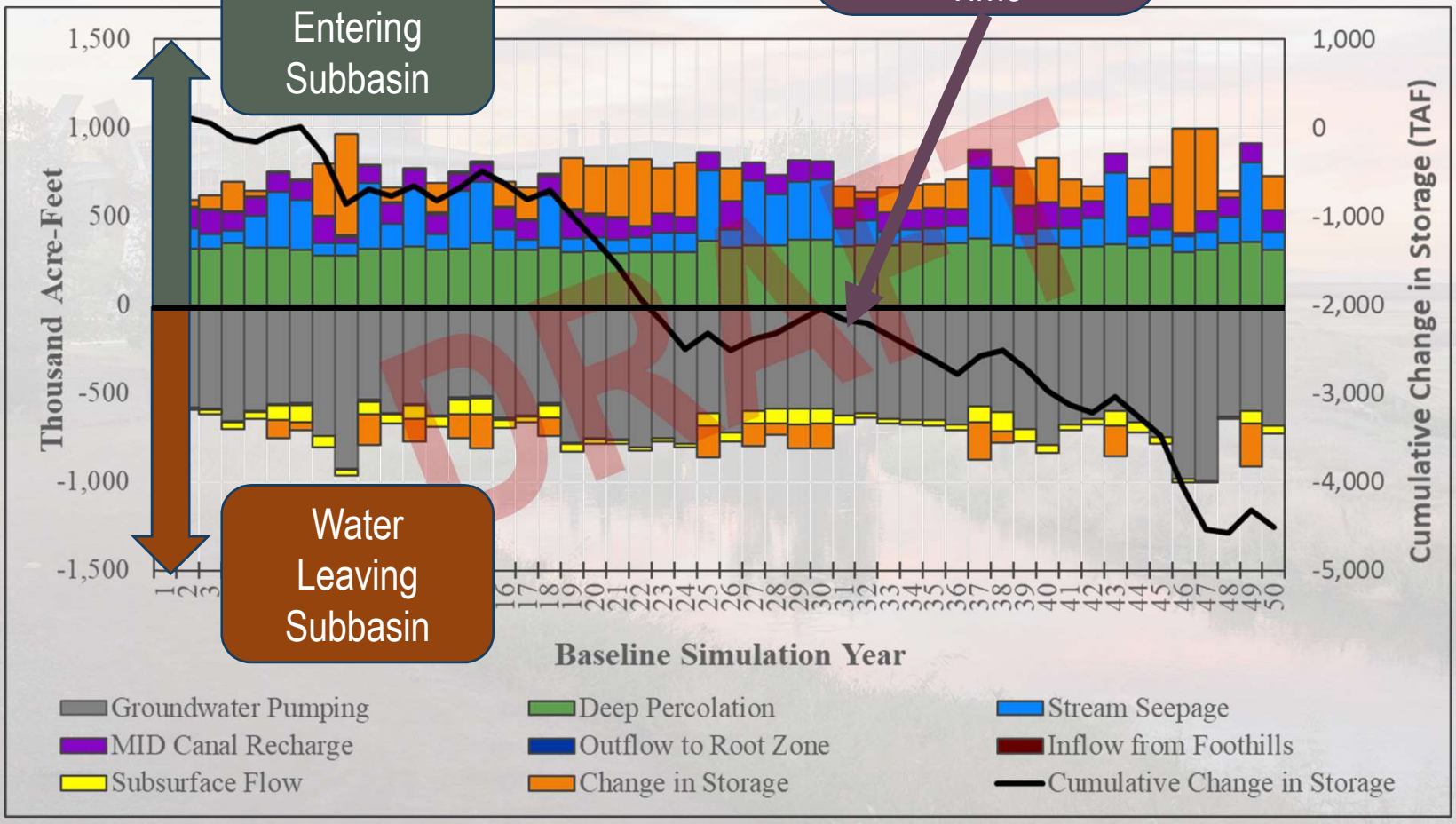
The Groundwater Model E lows Into and Out of the Groun in



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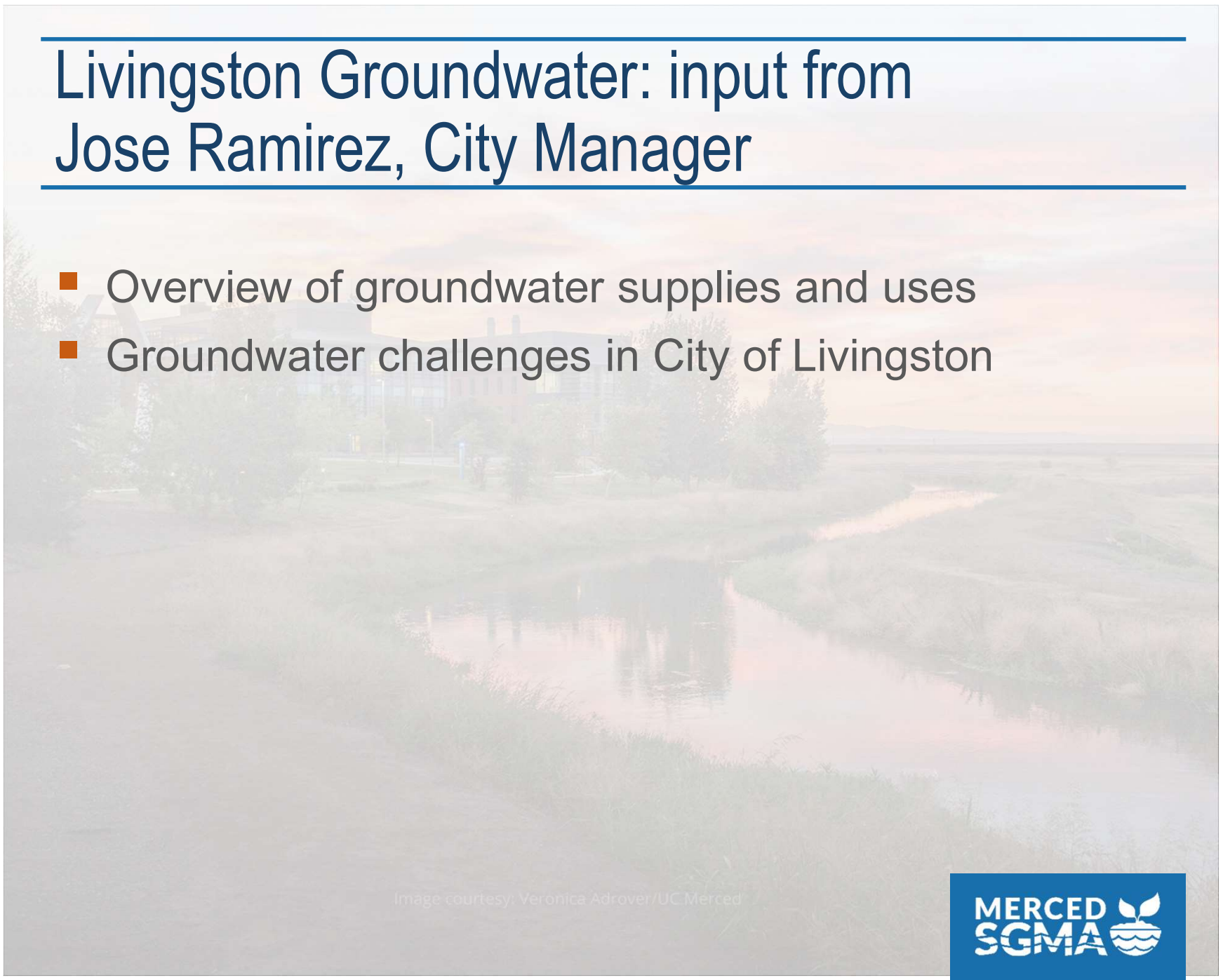
Livingston Groundwater: input from Jose Ramirez, City Manager

- Overview of groundwater supplies and uses
- Groundwater challenges in City of Livingston



Discussion & Questions

- Do you have questions about:
  - What SGMA requires and the agencies preparing the Groundwater Sustainability Plan?
  - The 50-year groundwater forecasts for the Merced Subbasin?
  - Livingston groundwater conditions?

Image courtesy: Veronica Adrover/UC Merced

Sustainable Management for the Merced Subbasin Groundwater

Image courtesy: Veronica Adrover/UC Merced

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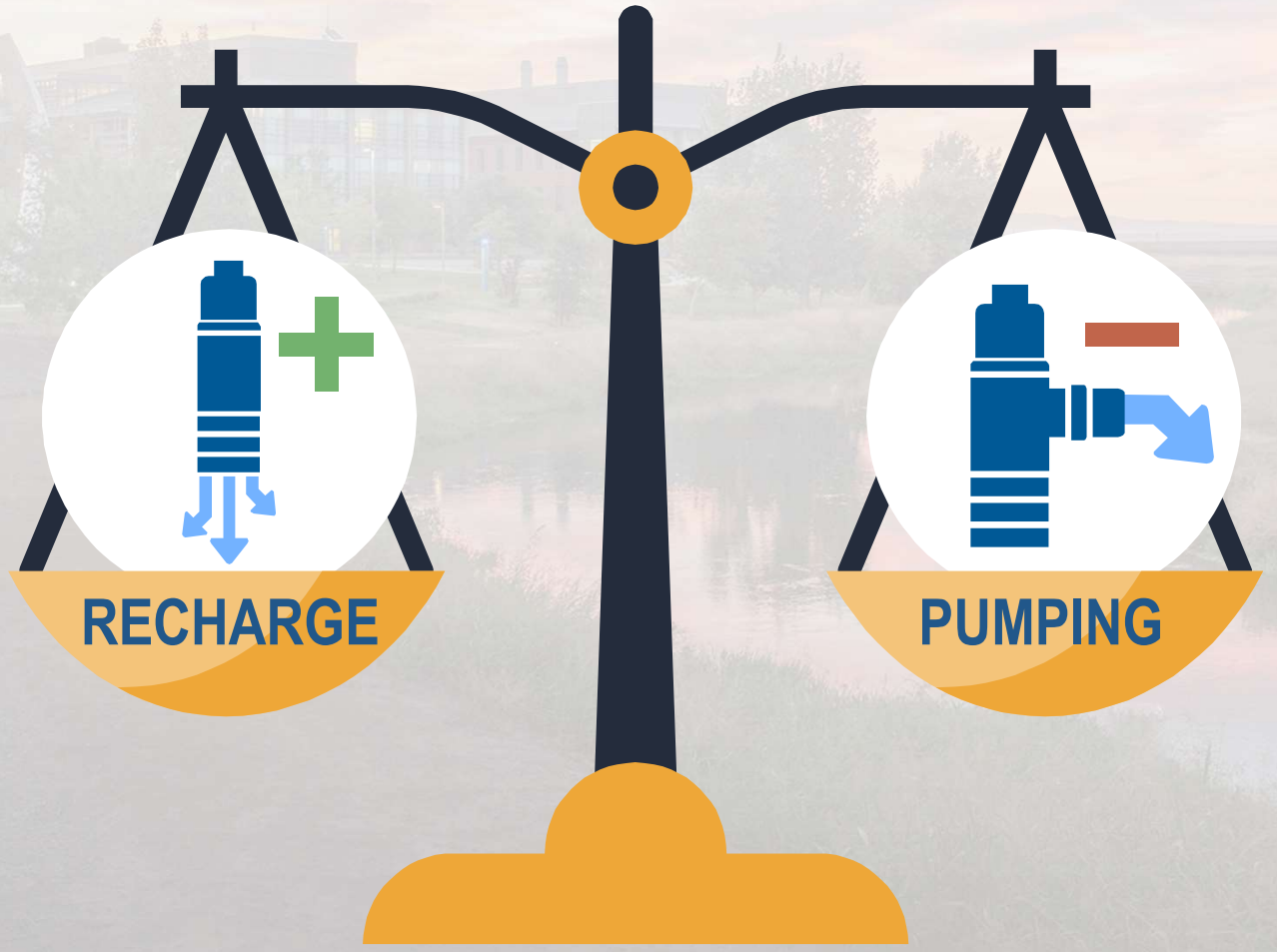
The ultimate goal of the GSP is to put the basin on a path toward sustainable groundwater management – where pumping is balanced by recharge over the long term



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

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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

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Within each GSA, major groundwater users will have an allocation

Cities

Will be allocated a % of their historical use and will work with customers to reduce water use as needed

Agricultural Users
Agricultural Districts

Ag users will likely get a pumping allocation based on acreage (e.g. AF/irrigated acre)

De Minimus Users

(Well owners that pump 2 af/yr or less for domestic use)

GSAs can decide whether to include. Cannot require metering.

Image courtesy: Veronica Adrover/UC Merced

Sustainable Yield needs to be Allocated Among these 3 buckets

Primarily Agricultural Users

Primarily Cities

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

Image courtesy: Veronica Adrover/UC Merced

Merced GSP Allocation Framework 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
4. **Establish framework** as basis for basin-wide management. GSAs can use this and can modify the implementation and allocation within their GSA boundary.

Image courtesy: Veronica Adrover/UC Merced

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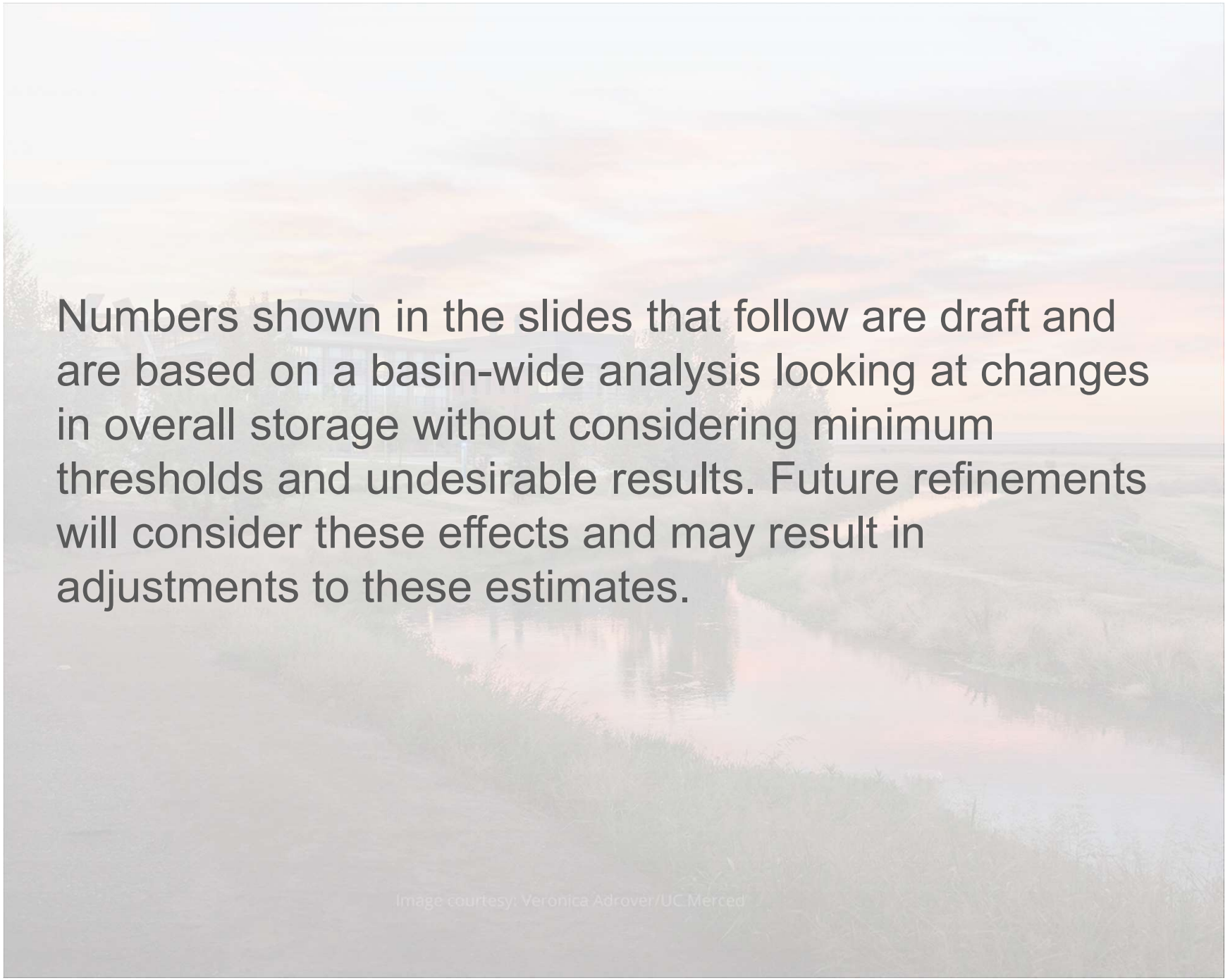
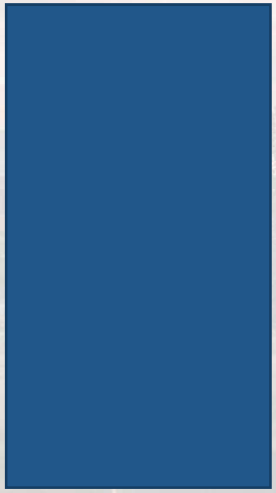
Numbers shown in the slides that follow are draft and are based on a basin-wide analysis looking at changes in overall storage without considering minimum thresholds and undesirable results. Future refinements will consider these effects and may result in adjustments to these estimates.



1. Determine Sustainable Yield of Basin

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



530,000 AF*

***Estimated using MercedWRM model simulations. Future refinements will consider effects to minimum thresholds and undesirable results.**

Image courtesy: Veronica Adrover/UC Merced

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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

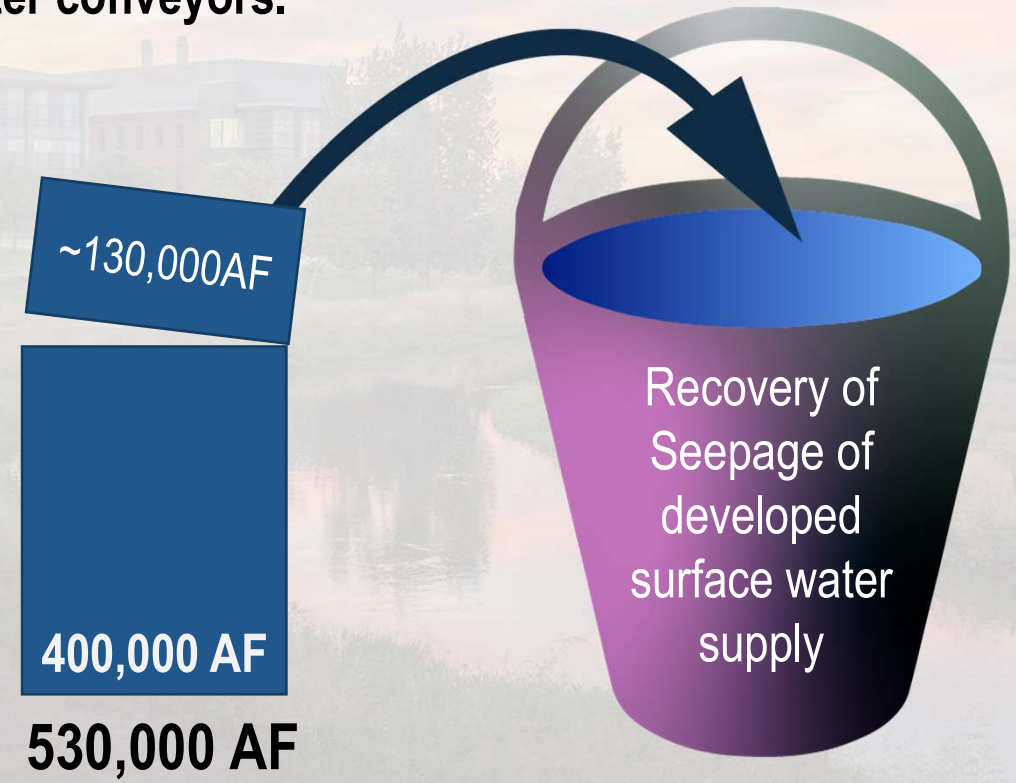

Image courtesy: Veronica Adrover/UC Merced

*Seepage estimates currently being refined.

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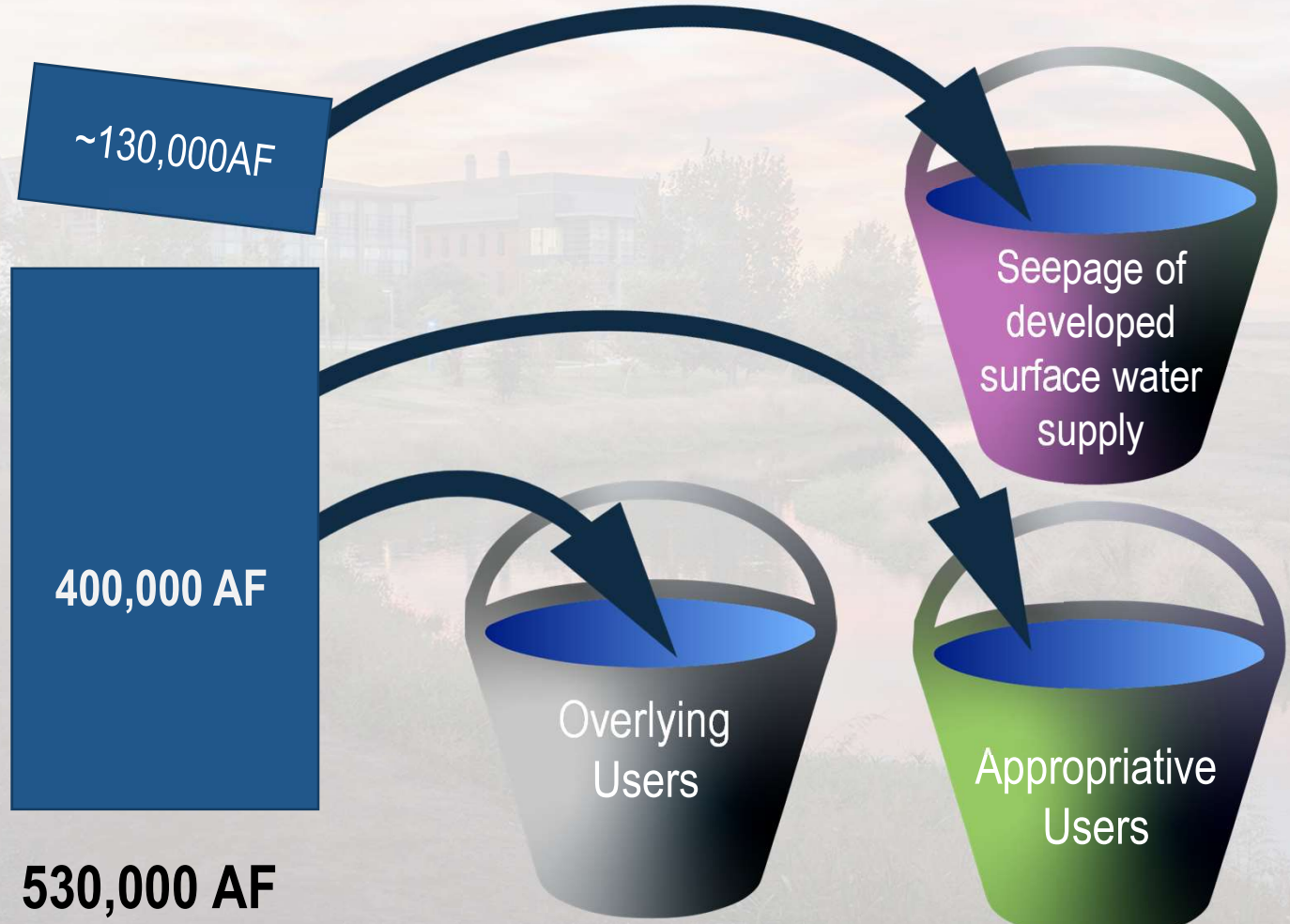
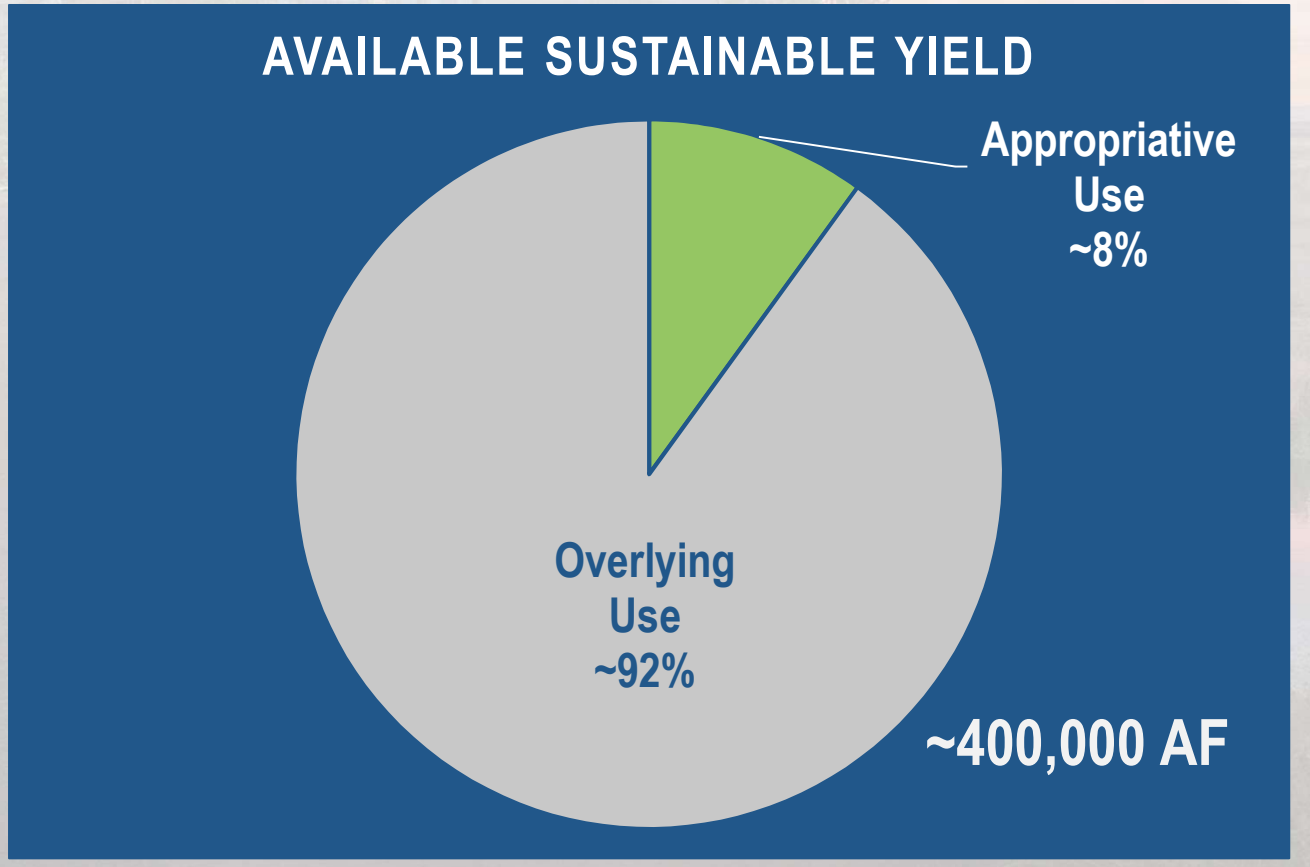
3. Apportion sustainable yield between overlying and appropriative users based on historical use



Proportion of historical use in Merced Subbasin

- Most appropriative groundwater use in basin is Municipal
  (e.g. Cities of Merced, Atwater, Livingston)
- Most overlying use is Irrigation.



4. Establish a basin-wide management framework GSAs can use as a basis for allocation and implementation

To establish this framework, it is necessary to:

- Consider how to account for imported supplies
- Determine total amount available for allocation in the Merced Subbasin
- Figure out how to split allocation proportionally between appropriative and overlying users
- And use the above to attribute an allocation to each GSA based on imported supplies, appropriative, and overlying users

Image courtesy: Veronica Adrover/UC Merced

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GSAs must agree upon the historical averaging period used for allocation framework

- Need to consider different historical averaging periods and how these will change allocation

- Considerations included:
  - Varying historical lengths at 20-, 10-, and 5-year periods
  - Periods with and without drought years
  - What these periods mean for appropriative and overlying pumping

- Recommendation from Stakeholder Committee:
  - Use a 10-year period from 2006-2015
  - This includes recent enough years to encompass recent land use change
  - Period includes drought years

Image courtesy: Veronica Adrover/UC Merced

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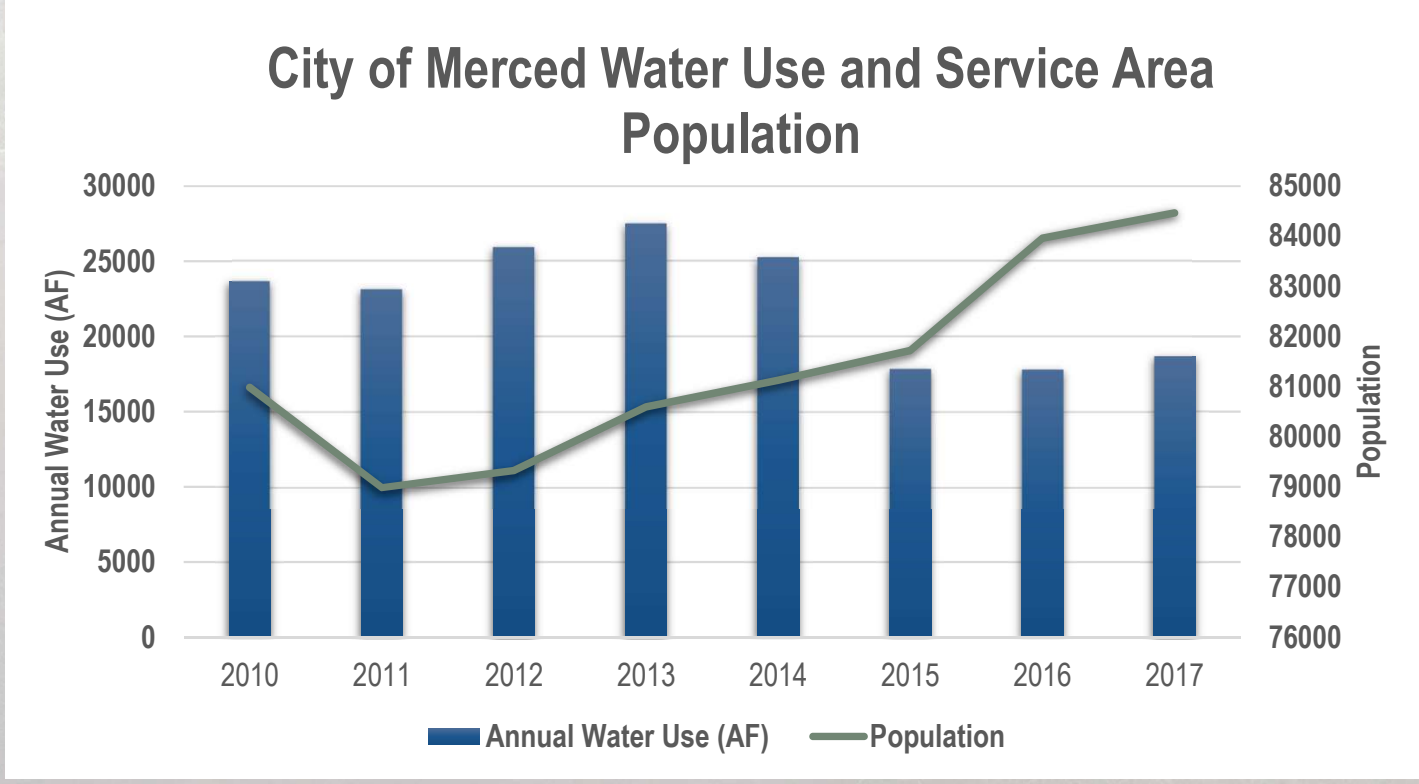
How will Cities live within their allocation? Urban Water Use Efficiency

Due to ongoing and recent conservation efforts, municipal use is currently substantially less than historical use. Growth and infill must be considered as GSP is developed.



Source: graph created by W&C based on table provided by City of Merced

How to Address Unirrigated Lands in Allocation

- Landowners who are not pumping may have a "dormant" overlying right.
- There is no standard practice or guidance to address dormant overlying rights.
- Options can include:
  - Quantifying future rights to pump
  - Establishing a future process for allowing dormant overliers to start pumping

Image courtesy: Veronica Adrover/UC Merced

Illustration of Partial Allocation Options for Unirrigated Lands

- Dormant overliers could receive a partial allocation
- Based on available land use data:
  - Total supply available to overlying users ~370,000 acre-feet
  - Irrigated ~300,000 acres
  - Unirrigated: ~200,000 acres

	Irrigated Allocation (AF/Acre)	Unirrigated 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

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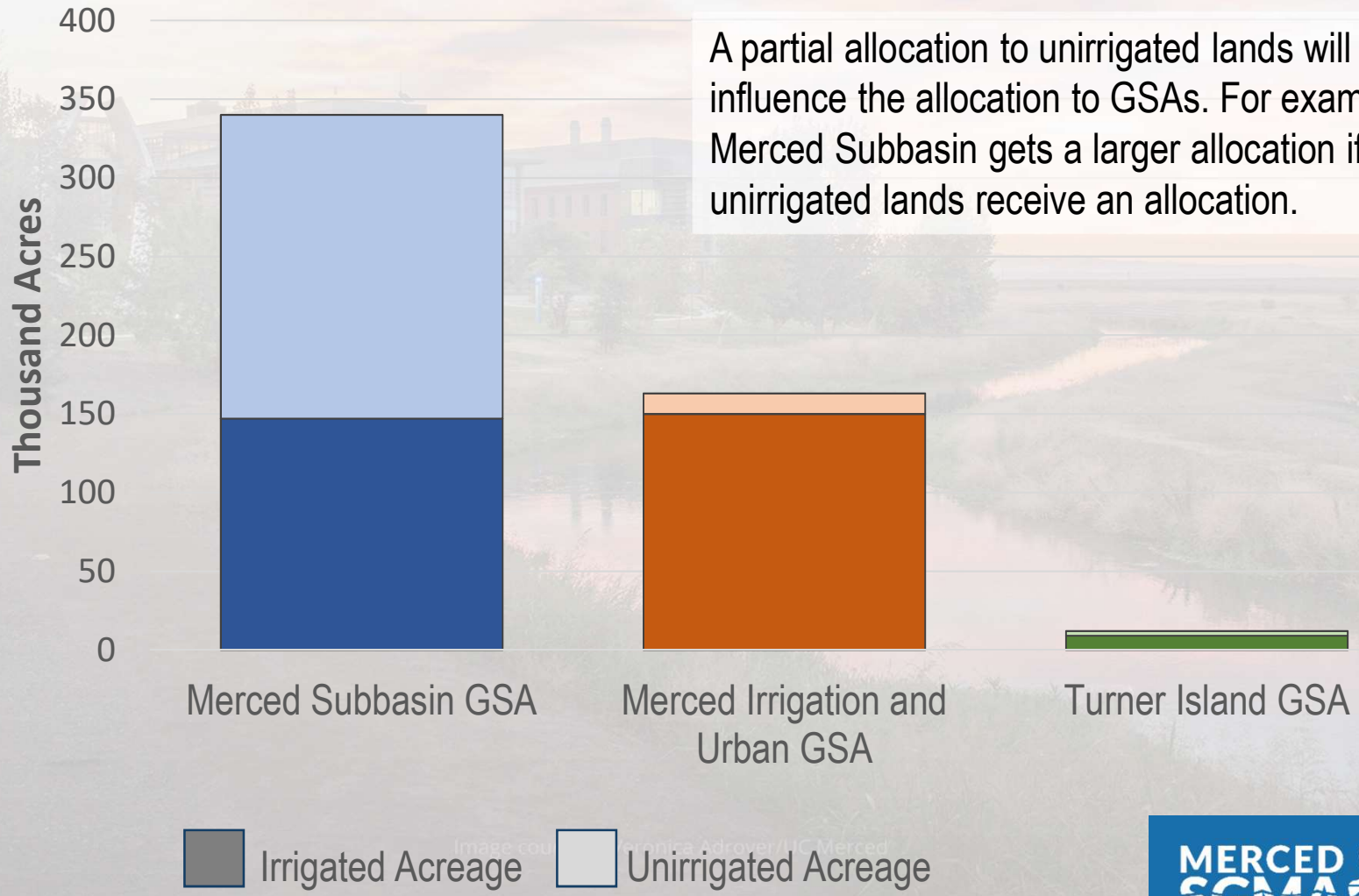
Illustration of Land Use Distribution



A partial allocation to unirrigated lands will influence the allocation to GSAs. For example, Merced Subbasin gets a larger allocation if unirrigated lands receive an allocation.

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Discussion

- What questions or recommendations do you have about the Allocation Framework Approach?
- What factors should be considered in developing allocations?
- How should future use be addressed in allocating sustainable yield?
  - How should population growth and expansion of Cities be accounted for?
  - How should unirrigated lands (dormant overliers) be addressed in allocating sustainable yield?

Image courtesy: Veronica Adrover/UC Merced

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Projects and Management Actions

Image courtesy: Veronica Adrover/UC Merced

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Conceptual GSP Implementation Timeline

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

2020	2025	2030	2035	2040
Monitoring and Reporting	**Preparation for Allocations and Low Capital Outlay Projects**	**Prepare for Sustainability**	**Implement Sustainable Operations**	
• Establish Monitoring Network • Install New Wells • Develop Metering Program • Extensive public outreach • Funded and smaller projects implemented	• GSAs conduct 5-year evaluation/update • Planning/ Design/ Construction for small to medium sized projects • Monitoring and reporting continues • Metering program continues • Outreach continues	• GSAs conduct 5-year evaluation/update • Planning/ Design/ Construction for larger projects begins • Monitoring and reporting continues • Outreach continues • Allocation program begins phase-in	• GSAs conduct 5-year evaluation/update • Project implementation completed • Allocations fully implemented/enforced	

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

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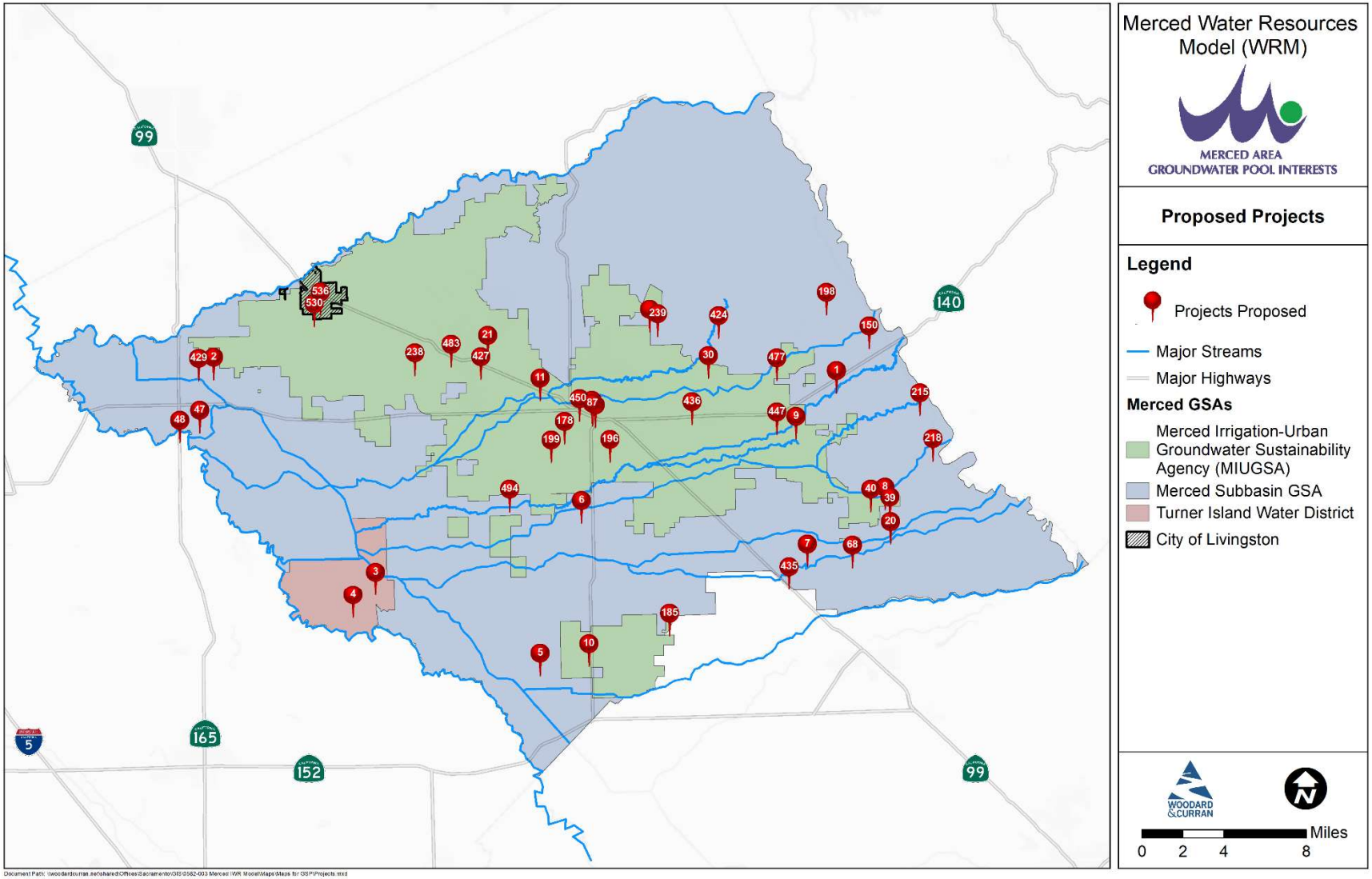
Projects & Management Actions:
Currently 47 Projects on Draft List



Projects & Management Actions:
Number of projects by GSA

GSA	Number of Projects on List*	Draft Range of Allocation (depending on historical period & allocation to unirrigated lands)
Merced Subbasin GSA	5	175,000 AFY to 245,000 AFY
Merced Irrigation-Urban GSA	40	150,000 AFY to 210,000 AFY
Turner Island Water District GSA1	2	5,000 AFY to 10,000 AFY

***Note: some projects benefit more than 1 GSA and are shown under the GSA in which they are primarily located. Total Merced Subbasin historical GW production is on the order of 611,000 AFY.**

- 47 projects in draft list: Most are conceptual or early planning stages
- Projects capital cost range: from $50K smaller scale less complex to $150M large scale complex
- Above numbers are estimates, subject to change

Image courtesy: Veronica Adrover/UC Merced

Projects & Management Actions:
Potential to capture flood waters

- How much could be captured? Example from Merced River
  (source: *Creating an Opportunity: Groundwater Recharge through Winter Flooding of Agricultural Land in the San Joaquin Valley*, RMC 2015)

Water Source	Recharge Period	Flood Flows AF/Y	Flood Flows that can be Conveyed AF/Y	Remaining Flood Flows beyond Conveyance Capacity AF/Y
Merced River	**Winter**	80,400	39,200	41,200
	Extended Winter	127,300	65,000	62,300

- Important considerations:
  - It is difficult to estimate flood flows because they are highly variable
  - Need to determine where and how to store it (e.g. groundwater recharge in recharge basins or on ag/refuge land)
  - More water can be captured using year round recharge basins than seasonal cropland
  - Must also consider water rights

Projects & Management Actions:
Distribution of Project Categories

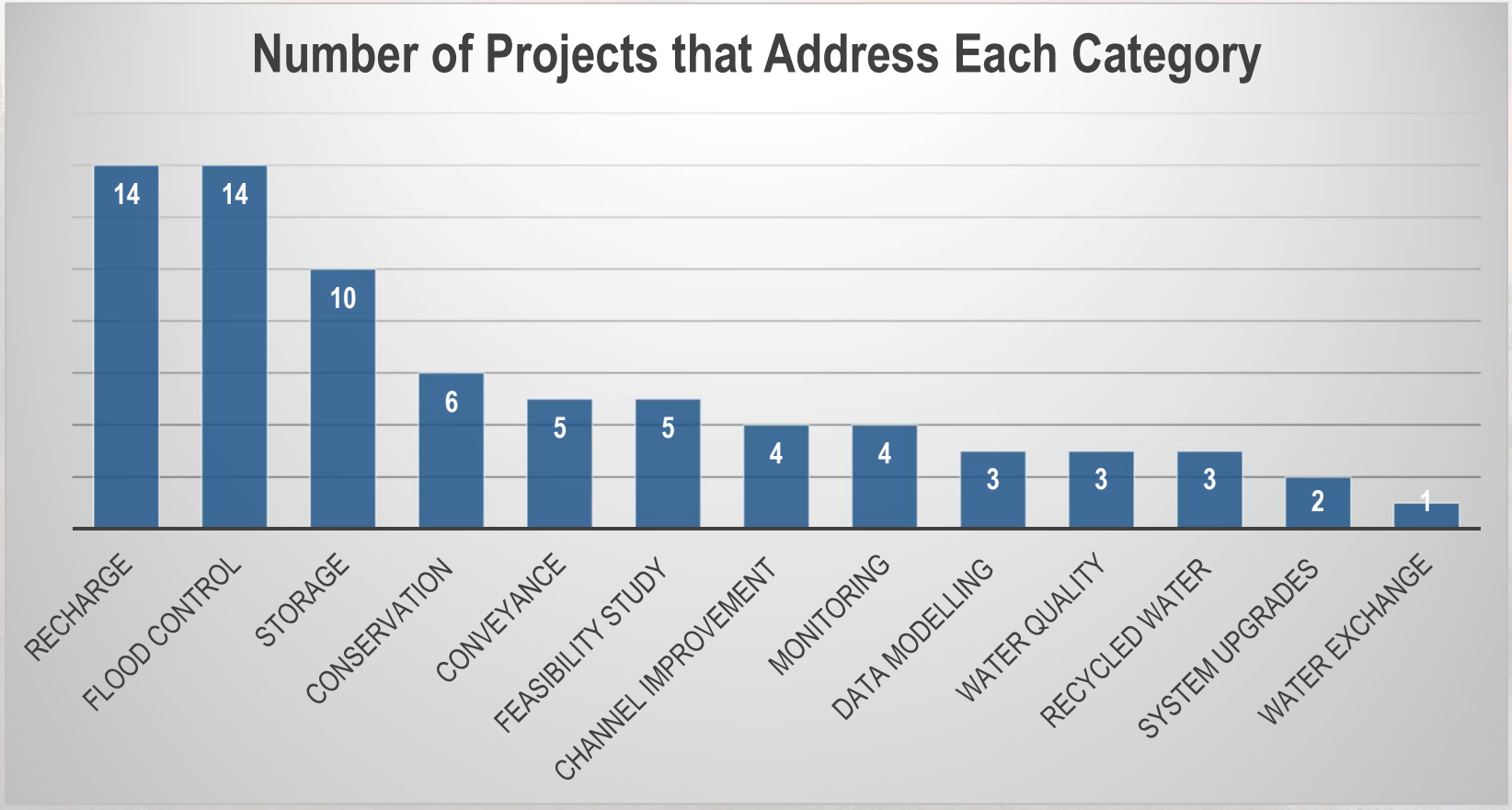


Image courtesy: Veronica Adrover/UC Merced

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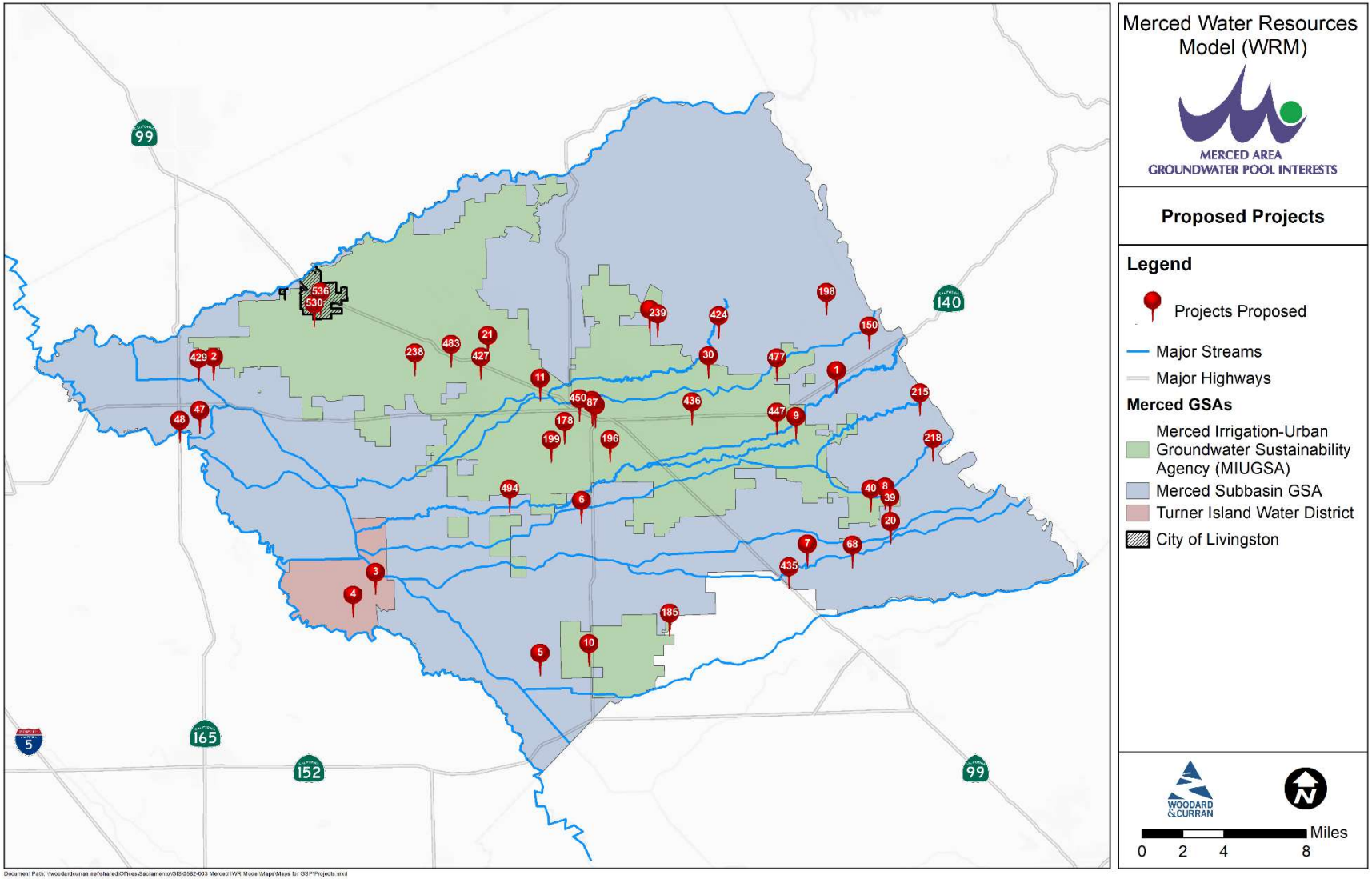
Projects & Management Actions:
Currently 47 Projects on Draft List



Projects & Management Actions:
Livingston Projects from Draft List

Project Title	Project Type
Permitting and Characterization of Merced River Water for Potable Water Supply	**Storage & Feasibility Study** (obtain water quality data to determine feasibility of Merced River Water to augment City's groundwater domestic water supply)
Livingston Canal Lining Project	**Channel Improvement (**lines portion of Livingston Canal through the City of Atwater)
Merced Irrigation Flood-MAR Canal Automation	**Recharge & Flood Control** (automation of facilities incl. Livingston Canal and expand areas to be recharged with stormwater events)
Surface Water for City Park Irrigation	**Recycled Water** (provide surface water for the irrigation of the City's two largest Parks: Gallo Park and Arakelian Park)
Various Storm Basin Improvements	**Flood Control** (improve & repair City's storm water basin pump stations)

Image courtesy: Veronica Adrover/UC Merced

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Discussion: Managing Groundwater for the Future

- What projects, programs, or actions do you see as the highest priority for the basin?
- Are there additional projects that can help the GSP address groundwater quality issues?
- What other or topics are important for the Groundwater Sustainability Plan?

Image courtesy: Veronica Adrover/UC Merced

Wrap-up and Next Steps

Image courtesy: Veronica Adrover/UC Merced

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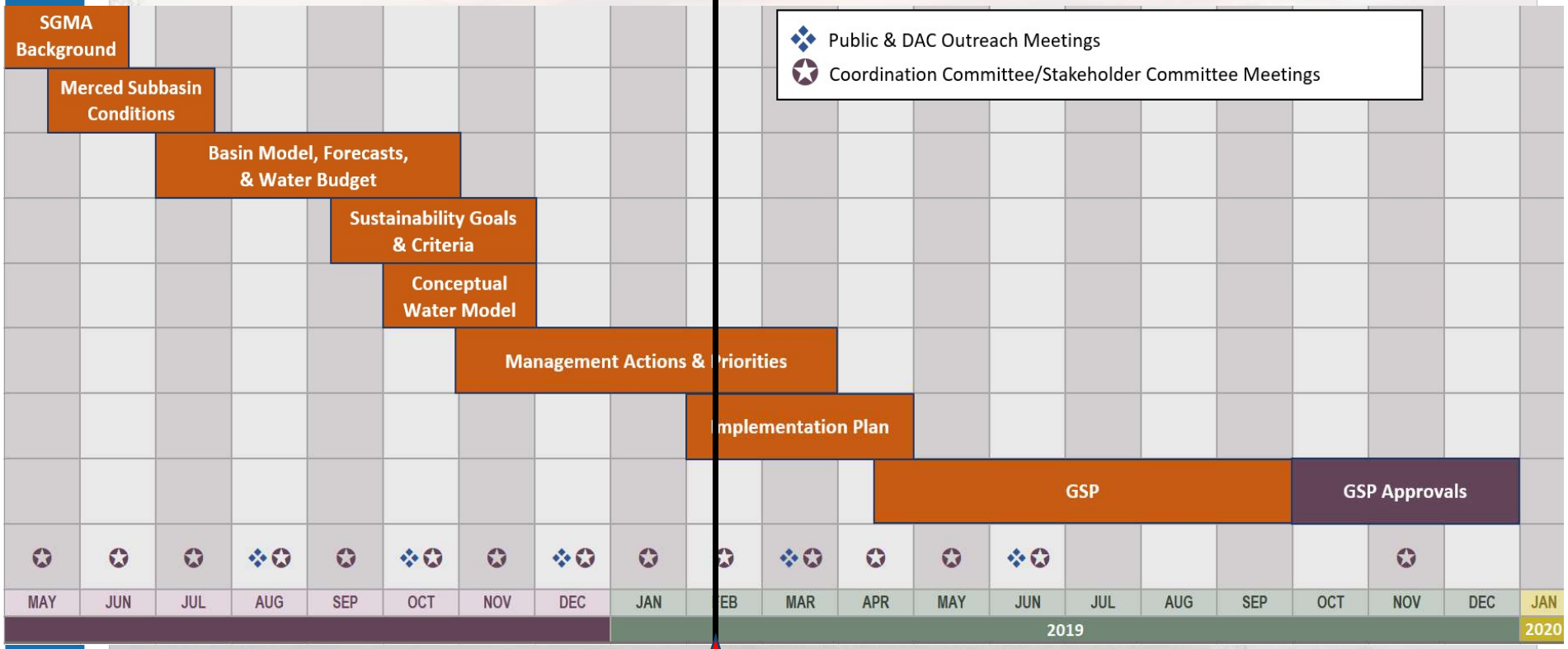
Timeline



We Are Here

Image courtesy: Veronica Adrover/UC Merced

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Ways to Stay Involved

- Stakeholder Committee and Coordinating Committee meetings
  - Fourth Monday of the month
  - Castle Conference Center, 1900 Airdrome Entry, Atwater, CA
- Merced SGMA Website
  - www.mercedsgma.org
- More (general) information resources:
  - CA DWR Groundwater Website: https://water.ca.gov/Programs/Groundwater-Management
  - California Water Boards: https://www.waterboards.ca.gov/water_issues/programs/gmp/sgma.html

Image courtesy: Veronica Adrover/UC Merced

Thank You!

Image courtesy: Veronica Adrover/UC Merced

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