



the Almond
CONFERENCE
2019

SGMA and Recharge: How to Make Lemonade Out of Groundwater Regulation



california
almonds[®]
Almond Board of California

Session Speakers

Jesse Roseman, ABC

Kamyar Guivetchi, DWR

Joe Choperena, Sustainable Conservation

Matt Efird, Efird Ag Enterprises, Inc. and Double E Farms

Don Cameron, Terranova Ranch

Tony Savant, Savant Holsteins





Flood-MAR

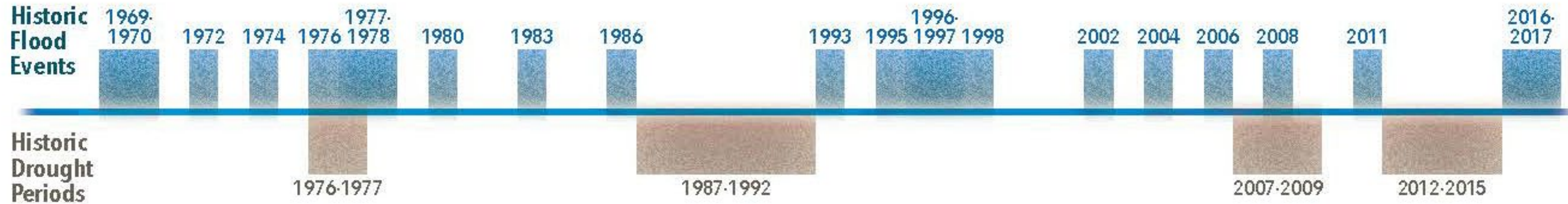
Using Floodwater for Managed Aquifer Recharge

Almond Conference

December 12, 2019

California's Water Management

A Tale of Extremes



Sustainability Requires Big Collaboration, Agency Alignment & Sector Co-Management

Integrated Watershed Management

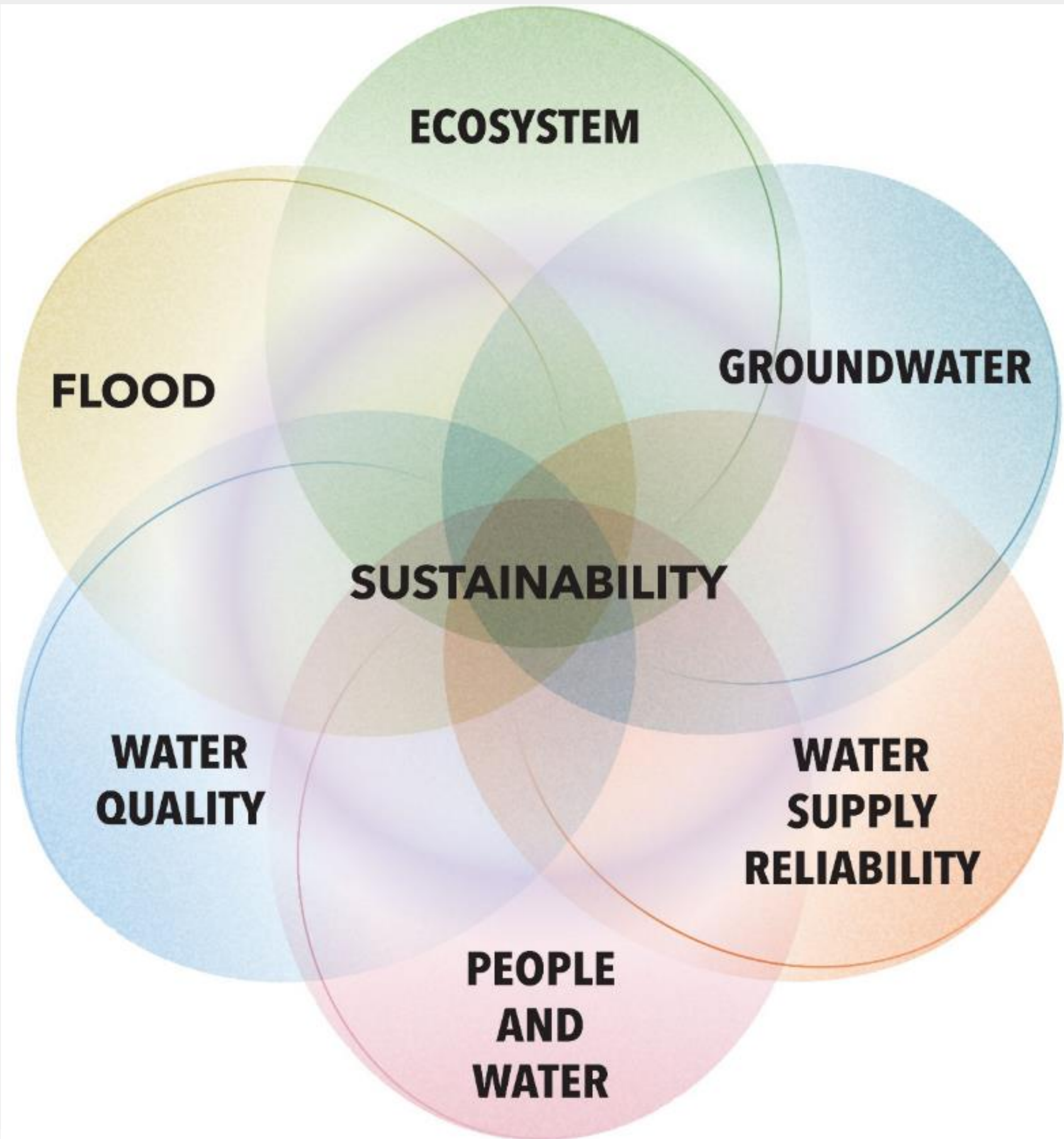
~ ~ ~

Multi-Sector Collaboration

Multi-Discipline Planning

Multi-Benefit Projects

Multi-Fund Investments

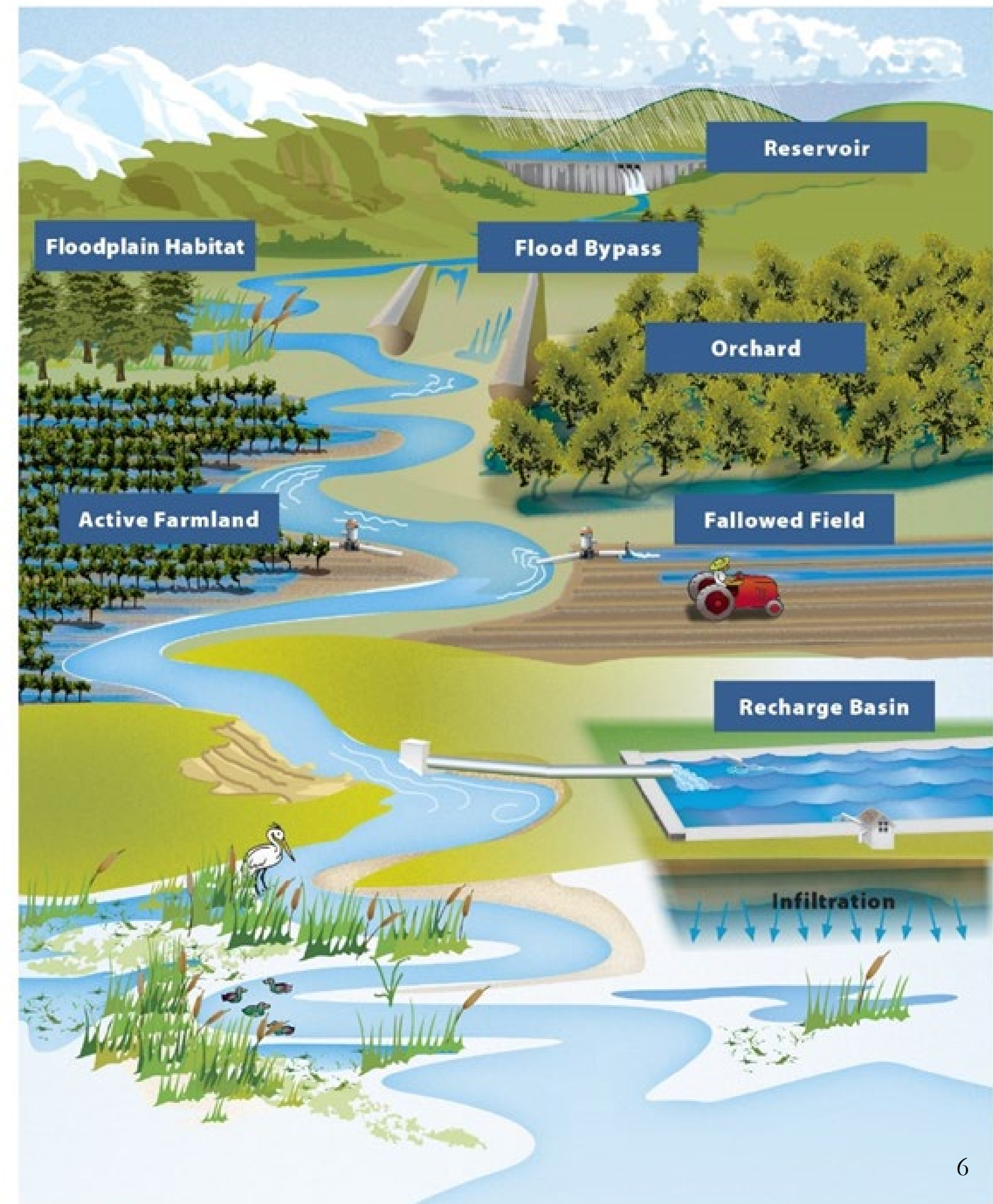


Flood-MAR is the Epitome

An integrated strategy to manage water resources for sustainability & climate resiliency ...

... using high flows from (or in anticipation of) rainfall or snowmelt for managed aquifer recharge ...

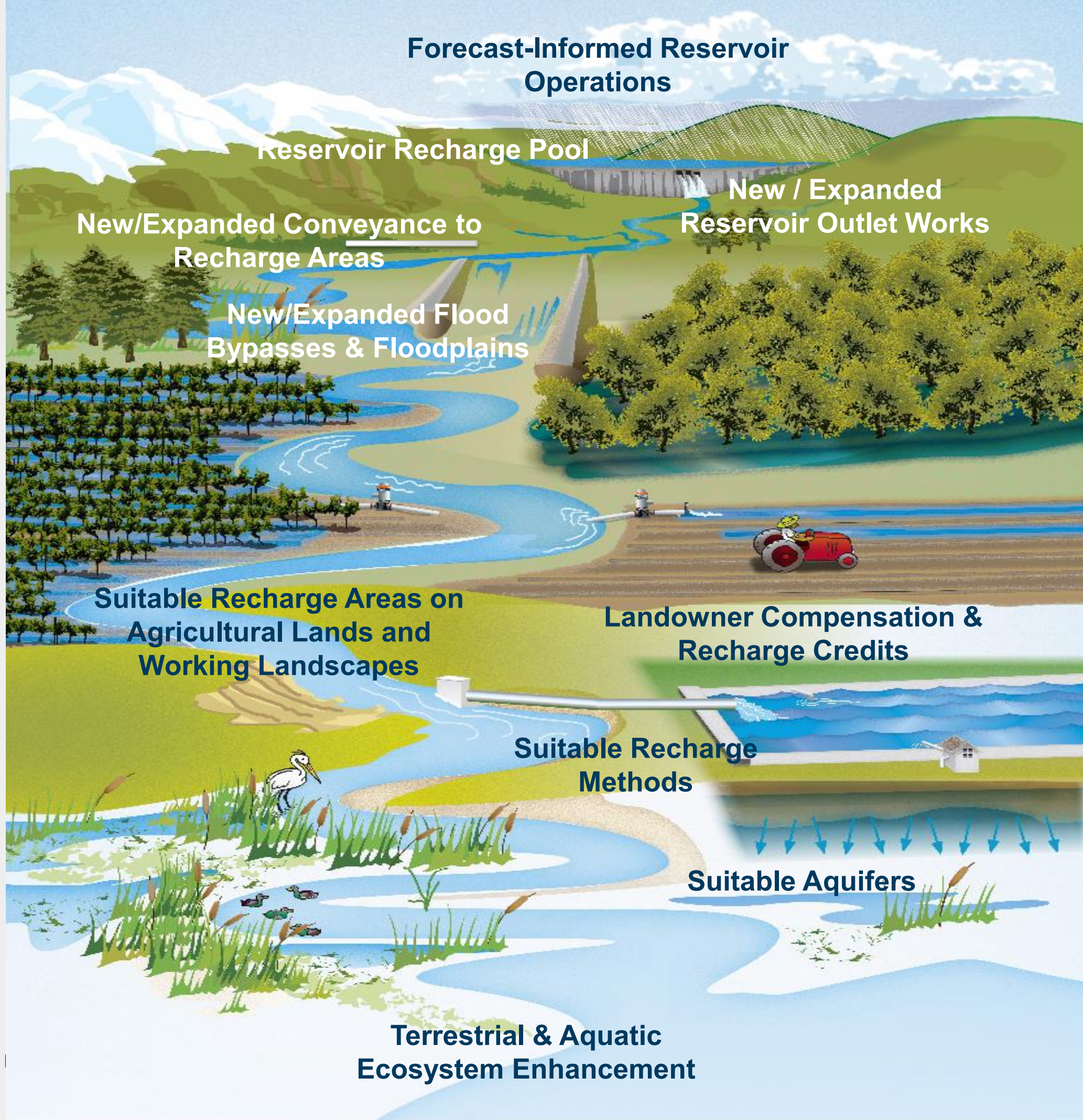
... on agricultural lands, working landscapes, and managed natural lands



Flood-MAR is ...

- ... **partnerships & voluntary** (public-private partnerships among private landowners, public agencies, and governments)
- ... **multi-sector** (co-management of flood, surface & groundwater, ecosystem & quality)
- ... **scalable** (on-farm, GSA, basin, region, watershed)
- ... **multi-faceted** (reoperation, conveyance, storage, recharge, banking, transfers, cultivation, restoration, etc.)
- ... **untapped** part of California's water portfolio





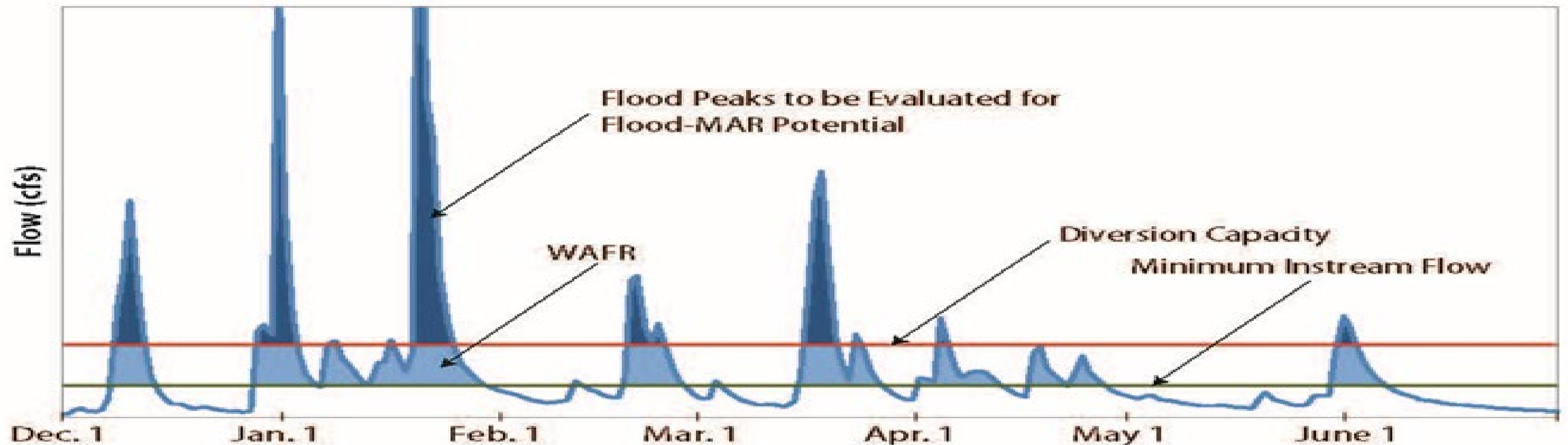
A Headwaters to Groundwater Strategy



Example Components of Flood-MAR Projects

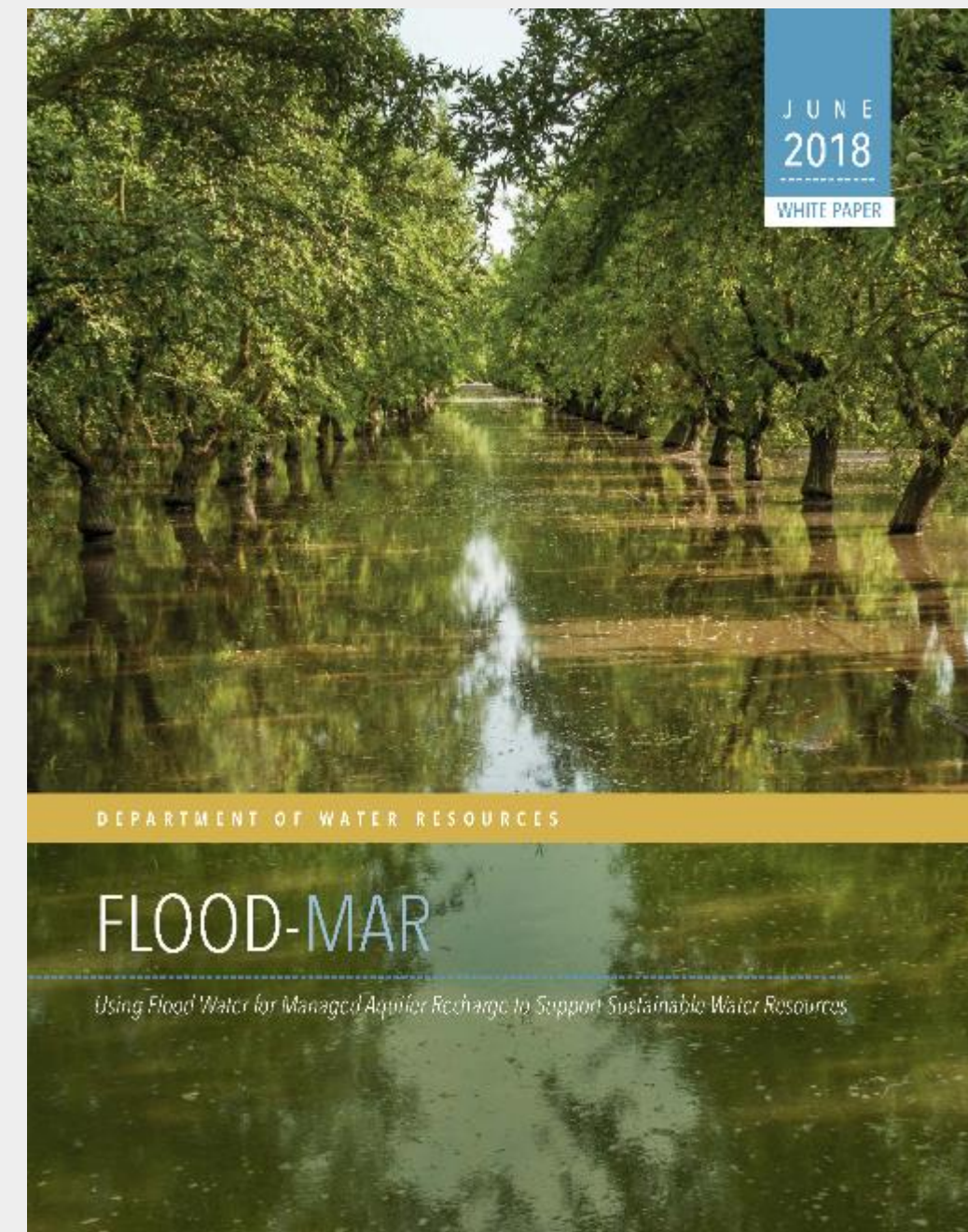
State Recommends Flood-MAR

- 2017 CV Flood Protection Plan Update (Aug. 2017)
- System Reoperation Study Phase 3 Report (Aug. 2017)
- State Board of Food & Agriculture letter (May 2018)
- Final CA Water Plan Update 2018 (July 2019)



DWR Flood-MAR Activities

- Outreach & Technical Assistance
- Fact Sheet & White Paper
- Merced River Basin Flood-MAR Reconnaissance Study
- Tuolumne River Climate Vulnerability Study & Adaptive Planning
- Draft Research & Data Development Framework
- Research Advisory Committee Research & Data Development Plan
- Flood-MAR Project Grants (Prop 50 & 68)
- Convening Flood-MAR Network & seeking partnerships for studies & pilots





Research Advisory Committee



Al Costa, Grower
Almond Board
American Rivers
Audubon California
Bachand & Associates
Bryan-Morris Ranch
California Chapter American Planning Association
California Department of Conservation
California Department of Fish and Wildlife
California Department of Food and Agriculture
California Department of Pesticide Regulation
California Department of Water Resources
California Geologic Survey
California Governor's Office of Planning and Research
California Rice Commission
California State University, Chico
California State University, East Bay
California State University, Fresno
California State University, Sacramento
California Trout
Caltech Jet Propulsion Laboratory
cbec eco engineering
Central Coast Regional Water Quality Control Board
Central Valley Flood Protection Board

City of Benicia
Civil Engineering Solutions
Clean Water Action
Colorado River Board
Community Water Center
Cornell University
Ducks Unlimited
Earth Genome
East Bay Municipal Utility District
Environmental Defense Fund
ESA
Flow West
GeoSystems Analysis
Grasslands Water District
Grower-Shipper Association of Central California
HDR
Intera Consulting
Kathy Wood-Mclaughlin, Consultant
Kautz Farms
Kern Water Bank Authority
Kings County California
Kings River Conservation District
Lawrence Berkeley National Laboratory
Lawrence Livermore National Laboratory
Local Government Commission
Loyola Marymount University

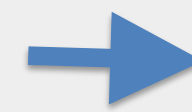
Luhdorff & Scalmanini
MBK Engineers
Merced Irrigation District
Montgomery & Associates
National Aeronautics and Space Administration
National Audubon Society
National Oceanic and Atmospheric Administration
North Coast Regional Water Quality Control Board
Northern California Water Association
Orange County Water District
PLANWELL Consulting
Point Blue Conservation Science
R. M. Gailey Consulting Hydrogeologist PC
Resource Conservation District of Monterey County
Resource Conservation District of Santa Cruz County
River Partners
RMA
San Mateo County Resource Conservation District
Sohagi Law Group
South Yuba River Citizens League
Southern AgCoalitions
Stanford University

Stanford Water in the West
Stantec
State Water Resources Control Board
Stillwater Science
Stockholm Environment Institute
Sustainable Conservation
Terranova Ranch
The Nature Conservancy
Trout Unlimited
Turlock Irrigation District
University of California, Berkeley
University of California Cooperative Extension, Monterey County
University of California, Davis
University of California Division of Agriculture and Natural Resources
University of California, Irvine
University of California, Merced
University of California, Santa Cruz
U.S. Army Corps of Engineers
U.S. Bureau of Reclamation
U.S. Geological Survey
U.S. Fish and Wildlife Service
Water Education for Latino Leaders
Western Regional Climate Center
Woodard and Curran
Yolo County Flood Control & Water Conservation District

Flood-MAR Research Advisory Committee's R&DD Plan

13 Subcommittee Themes

1. Hydrology Observation and Prediction
2. Reservoir Operation
3. Infrastructure Conveyance and Hydraulics
4. Crop Suitability
5. Soils, Geology and Aquifer Characterization
6. Land Use Management
7. Water Quality
8. Recharge and Extraction Methods & Measures
9. Environment – Terrestrial/Riparian/Aquatic
10. People and Water
11. Economic Analysis
12. Local, State, Federal Policies and other Legal Constraints
13. Tool and Application Development



130 Gaps



39 Priority Actions

8 implementation factors



Governance and Coordination
How will the project be coordinated?

- Landowner willingness
- Water system needs and opportunities
- Project lead
- Partnerships and agreements
- Coordination and operations decisions
- Legal/regulatory setting



Funding and Incentives
How will the project be funded and landowners be compensated?

- Available funding sources, including additional support for low income areas
- Landowner incentive or compensation programs
- Recharge quantification and compensation
- Land use and avoided costs



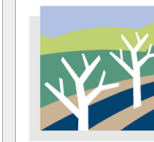
Source Water
Where will the water come from?

- Hydrology - base and high flows
- Reservoir reoperation
- Timing, quantity, and quality of flows
- Water rights
- How are flows expected to change in the future?



Conveyance
How will the surface water get to the site?

- Existing natural and built infrastructure location and capacity
- New infrastructure needs
- Water quality, such as sediment transport, suspended sediment, algae.
- Maintenance and management of natural or built infrastructure



Site Suitability
Where are good candidate sites for recharge?

- Soil suitability
- Crop suitability
- Aquifer suitability, capacity, and water quality
- Vadose zone water quality
- Site history, use, and access
- Social needs and impacts



Recharge Method and Site Management
How will water get into the ground?

- Potential methods, including on-farm (active or fallowed land), dedicated basins, in lieu, direct injection, floodplains, urban infrastructure
- Site preparation
- Land management and cultural practices (e.g., planting and plant care)
- Headwater management



Groundwater Use
How will groundwater be recovered and otherwise used?

- Groundwater extraction wells
- Beneficial uses, such as water supply for human and environmental uses
- Augmentation of river baseflows
- Water quality improvement/objectives



Feasibility Analysis and Adaptive Management
Is the project feasible?

- Benefits and beneficiaries
- Costs and impacts
- Final agreements, assurances, and assigning responsible parties
- Permitting and environmental analyses
- Monitoring and evaluating project outcomes, adapting methods as necessary



Flood-MAR Research & Data Development Plan
Needed Data, Info, Tools & Guidance



CALIFORNIA DEPARTMENT OF
WATER RESOURCES

How State Can Expand & Fast-track Flood-MAR Projects

- Recognize California's aquifers as natural infrastructure and their replenishment as a public benefit
- Make multi-benefit actions for replenishing over-drafted / degraded aquifers — like groundwater recharge — eligible for State grants, technical assistance, and/or regulatory alignment
- Provide information and incentives to public and private landowners to continue and expand groundwater recharge on current and *repurposed* land uses
- Support regions with self-established expenditure plans and funding mechanisms for multi-benefit water resiliency projects and programs

What Can (Will) I Do ?

- **Landowners** –
Seek project opportunities and expand partnerships
- **Academia and Private Researchers** –
Fill data gaps and conduct pilot projects
- **NGOs and Other Stakeholders** –
Encourage project partnerships w/ broad public benefits
- **Gov't Agencies** –
Provide facilitation, technical, and financial assistance
- **Regulators** -- Streamline permitting & provide compliance assistance
- **Policy- and Decision-Makers** –
Authorize & fund agencies to remove barriers, conduct studies, support project implementation, and join public-private partnerships
- **ALL** – Help build & participate in a *Flood-MAR Network*

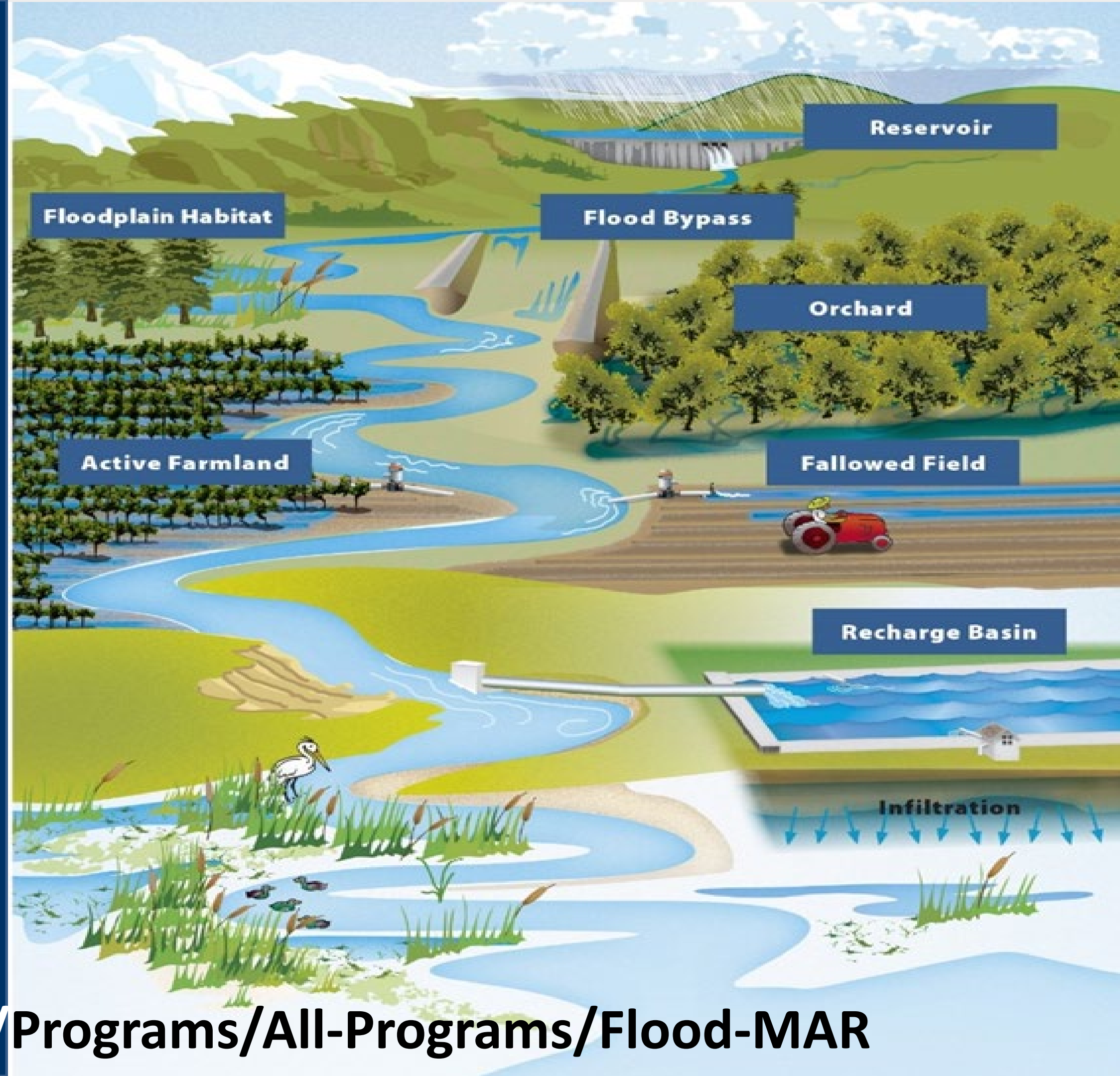


We are Launching a Moonshot !

Kamyar Guivetchi, Manager DWR
Division of Planning

FloodMAR@water.ca.gov

www.water.ca.gov/Programs/All-Programs/Flood-MAR



The Almond Conference

SGMA and On-farm Recharge Grower Panel

December 12, 2019



**On-Farm Recharge:
Examples, Incentives, and
How Growers Can Get Involved**

Joe Choperena, Project Director
Central Valley Groundwater Recharge

Sustainable Conservation



Sustainable Conservation



Outline

1. Examples
2. Infrastructure
3. Recharge incentives
4. Growers' roles

On-Farm Recharge

Aggressive Applications



On-Farm Recharge

Conservative Applications



Nitrate Leaching & Water Quality

1. Sound NMP.
2. Avoid recharge on cropland with liquid manure applications.
3. Recharge same fields to reduce legacy N leaching.
4. Avoid recharge near domestic wells meeting drinking water standards.

Water Application Flexibility





On-Farm Recharge

Temporary Infrastructure



On-Farm Recharge

Temporary Infrastructure



Water District Recharge Incentives

- Financial incentives
 - Payments
 - Discounted water
- Pumping credits
- Lease options with both



Alternative On-Farm Recharge Examples

Dedicated Basins

- Existing and newly constructed basins
- Multipurpose:
 - Surface runoff
 - Sediment control
 - Recharge



Alternative On-Farm Recharge Examples

Subterranean Recharge

- Reverse tile drain
 - 3 known ag producers in Kern County

Growers' Roles In Creating Incentives

- Communicate with your GSAs, water districts, and agencies
- Want to be part of the solution
- Develop OFR policies and incentives

Matt Efird,
Efird Ag Enterprises, Inc.
and Double E Farms



SW Application thru micro irrigation

Efird Ag Enterprises, Inc.



Flood Mar- On Farm Groundwater Recharge

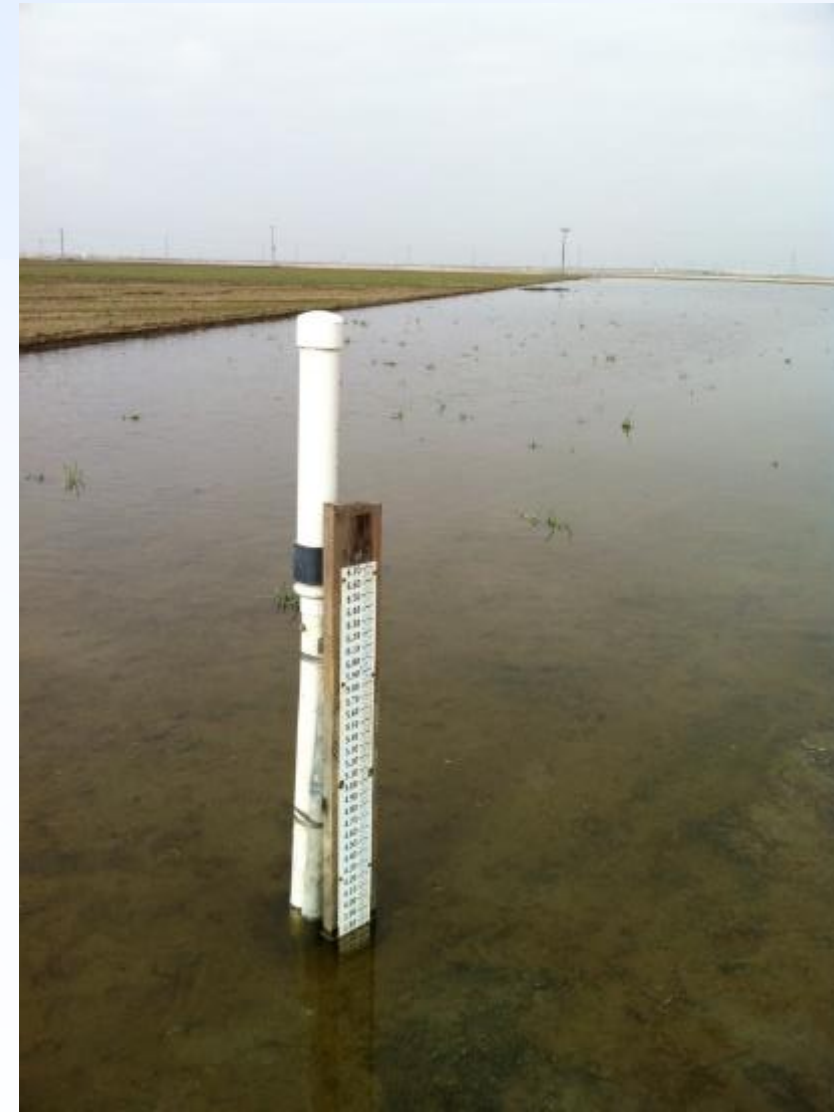
Don J Cameron
VP Terranova Ranch Inc.
dcameron@terranovaranchinc.com



Wine Grapes

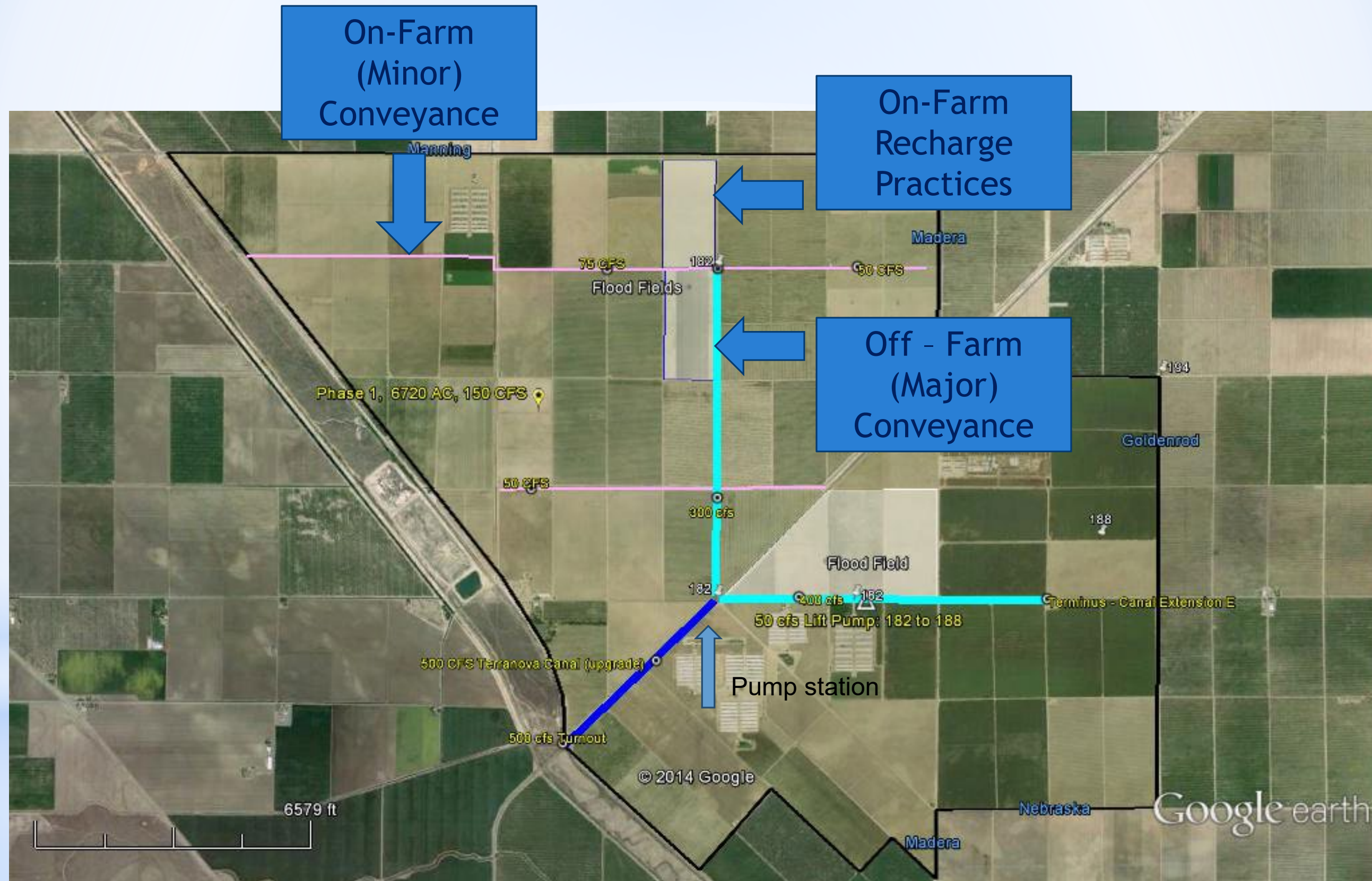


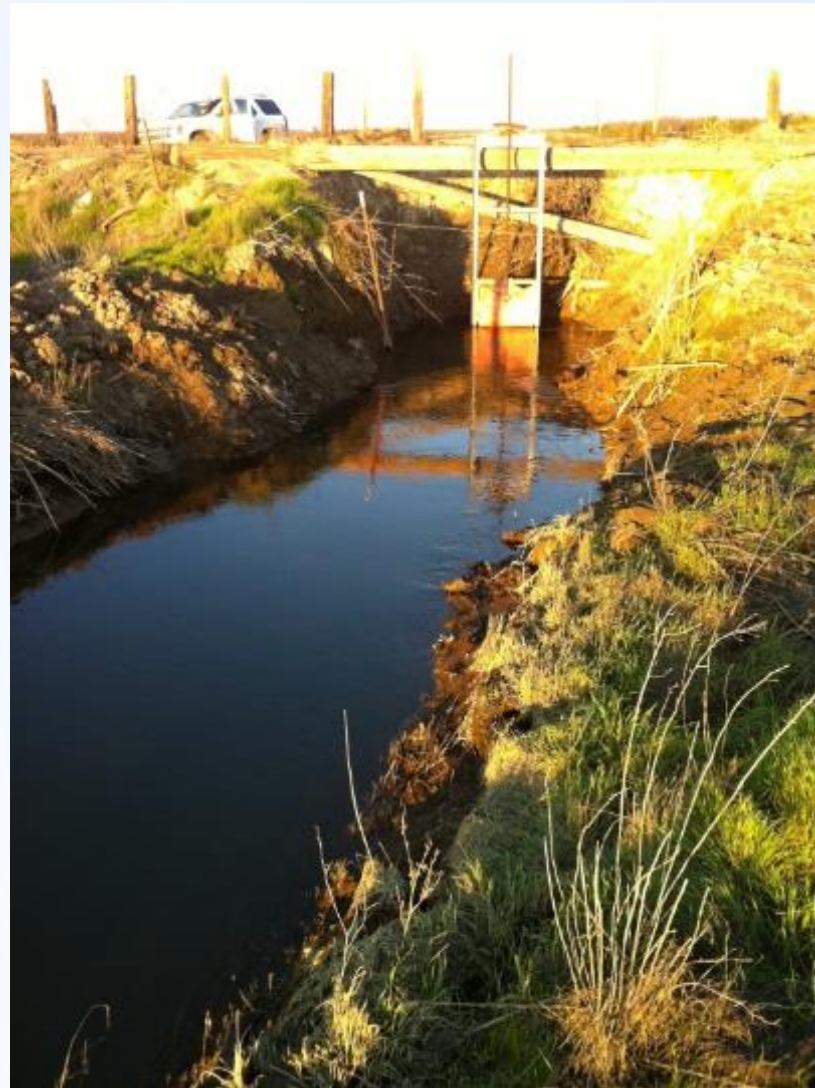
Almond and Pistachio



Young Pistachio & Open Fields

Phase 1 Off-Farm and On-Farm Conveyance and Capture Conservation Practices





Old vs New



Crossing Existing Canal



Spring 2019 First Water

SGMA & Recharge: How to Make Lemonade out of Groundwater Regulations

Tony Savant | Almond Farmer | Madera, CA

Almond Conference
December 12, 2019



From Flooding to Recharge



From Flooding to Recharge



From Flooding to Recharge



From Flooding to Recharge



From Flooding to Recharge



From Flooding to Recharge

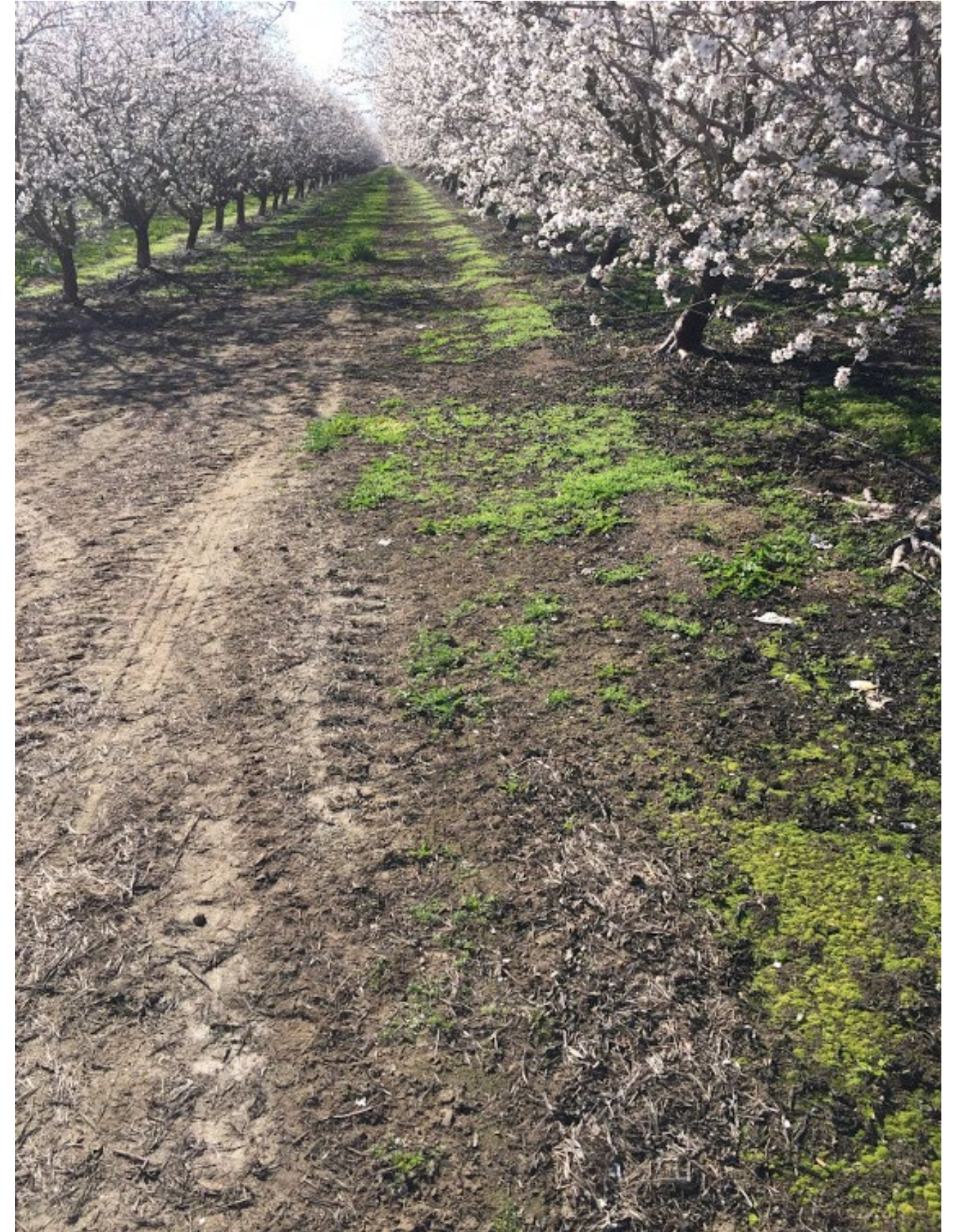


Questions?

Tony Savant | Almond Farmer | Madera, CA

Savant Holsteins

tonysavant@hotmail.com





the Almond
CONFERENCE
2019

SGMA and Recharge: How to Make Lemonade Out of Groundwater Regulation



california
almonds[®]
Almond Board of California