Flood-MAR
Using Floodwater for Managed Aquifer Recharge

State Board of Food & Ag
September 4, 2018
California’s Water Management
A Tale of Two Extremes

Historic Flood Events:
- 1969-1970
- 1972
- 1974
- 1976-1978
- 1980
- 1983
- 1986
- 1993
- 1995
- 1997
- 1998
- 2002
- 2004
- 2006
- 2008
- 2011
- 2016-2017

Historic Drought Periods:
- 1976-1977
- 1987-1992
- 2007-2009
- 2012-2015

TOO LITTLE
Folsom Reservoir, 1976

TOO MUCH
Effects of Climate Change Necessitate Wholesale System Changes
Systemic Challenges - Root Cause of Others
Overcoming them Increases Return on Investment

- Fragmented and uncoordinated decisions, initiatives & actions
- Inconsistent, inflexible, & conflicting regulations
- Insufficient capacity for data-driven decision-making
- Insufficient & unstable funding
Sustainable and Integrated Water Resources Management

- Governor’s Water Action Plan
- Sustainable Groundwater Management Water Act
- 2017 Central Valley Flood Protection Plan Update
- California Water Plan Update 2018

Call for multiple benefit projects that include ecosystem enhancements to move California’s water resources toward sustainability
Sustainability Requires Alignment

Multi-Sector Collaboration
Multi-Discipline Planning
Multi-Benefit Projects
Multi-Fund Investments
What is Flood-MAR?

Using high flows from, or in anticipation of, rainfall or snowmelt, for managed aquifer recharge on agricultural lands and working landscapes.
Flood-MAR is...

- an integrated & voluntary management strategy to improve water resources sustainability & climate resiliency
- multi-sector (flood, groundwater, ecosystem, quality)
- scalable (farm, GSA, basin, regional, watershed)
- multi-faceted (reoperation, conveyance, storage, recharge, banking, transfers, cultivation, restoration, etc)
- an untapped part of California’s water portfolio
State Recommends Flood-MAR

- State Board of Food & Agriculture letter (May 2018)
- CA Water Plan Update 2018 Public Draft (July 2018)
Potential Project Components for Flood-MAR Project Formulation

** Graphic does not represent an exhaustive list/representation of potential components of Flood-MAR projects
Public Benefits of Flood-MAR

- Flood risk reduction ★
- Drought preparedness ★
- Aquifer replenishment
- Ecosystem enhancement ★
- Groundwater remediation/water quality ★
- Working landscape preservation and stewardship
- Climate change adaptation ★
- Recreation and aesthetics ★

Public benefits defined in Proposition 1

Green Infrastructure
Flood-MAR Implementation Factors

**Governance and Coordination:** How will project needs be coordinated?
- Landowner willingness
- Local or system needs and opportunities
- Partnerships and agreements
- Coordination and operations decisions
- Legal/regulatory framework

**Funding and Incentives:** How will project be funded and landowners compensated?
- Available funding sources
- Landowner incentive or compensation programs
- Recharge quantification

**Source Water:** Where will the surface water come from?
- High flows
- Reservoir reoperation
- Timing and quantity of flows
- How are flows expected to change in the future?

**Conveyance:** How will surface water get to the site?
- Existing infrastructure
- New infrastructure

**Site Suitability:** Where are good candidate sites for recharge?
- Soil suitability
- Crop suitability
- Aquifer suitability
- Aquifer capacity
- Aquifer water quality
- Vadose zone water quality

**Recharge Method:** How will the water get into the ground?
- On-farm
- Fellowed land
- Dedicated basin
- In-lieu
- Direct injection

**Groundwater Use:** How will groundwater be recovered or otherwise used?
- Groundwater extraction wells
- Beneficial Uses
- Augmentation of groundwater for replenishment/restoration

**Feasibility Analysis:** Is the project feasible?
- Benefits and beneficiaries
- Costs and impacts
- Agreements and assurances
Potential Barriers to Flood-MAR Implementation

- **Cooperation and Governance** – trust, sector coordination, operations agreements
- **Legal** – water rights, regulations, permitting
- **Policy** – public benefit, beneficial use, landowner compensation/incentives
- **Implementation** – land use, recharge/recovery suitability, conveyance, reservoir operations, economics, funding
Current Plans and Activities

• Fact Sheet
• White Paper
• Draft Research & Data Development Framework
• Convening Research Advisory Committee
• Merced River Basin Conceptual Study
• Tuolumne River Climate Vulnerability Study
Current Program Funding

• DWR has early funding for:
  – Conducting reconnaissance studies
  – Providing technical assistance
  – Convening potential partners and stakeholders
  – Framing research and data needs

• DWR is soliciting information on local and regional project needs
Research & Data Development Framework

- Frame body of knowledge
- Inventory, develop, and coordinate technical expertise
- Convene Flood-MAR Research Advisory Committee
- Improve availability of research and technical expertise for all stakeholders
- Frame long-term research and data development
- Provide guidance to stakeholders
Research Themes

1. Hydrology Observation and Prediction
2. Reservoir Operations
3. Infrastructure Conveyance and Hydraulics
4. Crop Suitability
5. Soil Suitability, Geology & Aquifer Characterization
6. Land Use Management
7. Water Quality
8. Recharge and Extraction Methods
9. Environment (Aquatic & Terrestrial)
10. People & Water
11. Economic Analysis
12. Local, State, Federal Policies and Legal
13. Tool & App Development
Merced River Flood-MAR Study

- Investigate white paper concepts and research themes
- Integrates surface and groundwater modeling
- Multi-benefit analysis and economic assessment

- Analyze multiple scenarios within 3 Flood-MAR levels
  - Level 1 > Existing Water Operations & Existing Infrastructure
  - Level 2 > Revised Water Operations & Existing Infrastructure
  - Level 3 > Revised Water Operations & Expanded Infrastructure
Tuolumne Climate Vulnerability

- Quantify deep uncertainties in flood prediction, water supply and ecosystem vulnerability under climate change

- Formulate a systematic framework for assessing future risks and developing economically efficient, robust, and flexible plans to mitigate risk

- Inform other projects and planning efforts

Bottom Up Systems Analysis (Study Approach)

- System performance prediction
- Climate Model Ensemble
- System response surface
- Operations and Planning Models
How to Stay Involved

- Signup to Flood-MAR Listserve
- Comment to FloodMAR@water.ca.gov
- Follow DWR on social media
- Participate in future meetings
- Join a RAC Subcommittee
- Partner with DWR on future studies
- Work with DWR to develop and implement Flood-MAR projects
What Can I Do?

- **Landowners** -- Look for project opportunities and expand partnerships
- **Academia and Private Researchers** -- Continue to fill data gaps and conduct pilot projects
- **NGOs and Other Stakeholders** -- Encourage broad public benefits and look for partnership opportunities
- **Gov’t Agencies** -- Provide technical and facilitation assistance (financial assistance, when available)
- **Regulators** -- Streamline processes and provide compliance assistance
- **Policy- and Decision-Makers** -- Authorize & fund agencies to remove barriers, conduct research, and support projects
Next Steps

- Roll-out White Paper and draft Research & Data Development Framework
- Engagement – RAC, stakeholders, public
- Incorporate comments on R&D Framework
- Complete Merced River Study & Tuolumne R. Climate Vulnerability Study
- Planning and Implementation Guidance
- Identify and implement Flood-MAR studies, pilots, and projects
Questions?

Kamyar Guivetchi, Manager
Statewide Integrated Water Management
FloodMAR@water.ca.gov

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