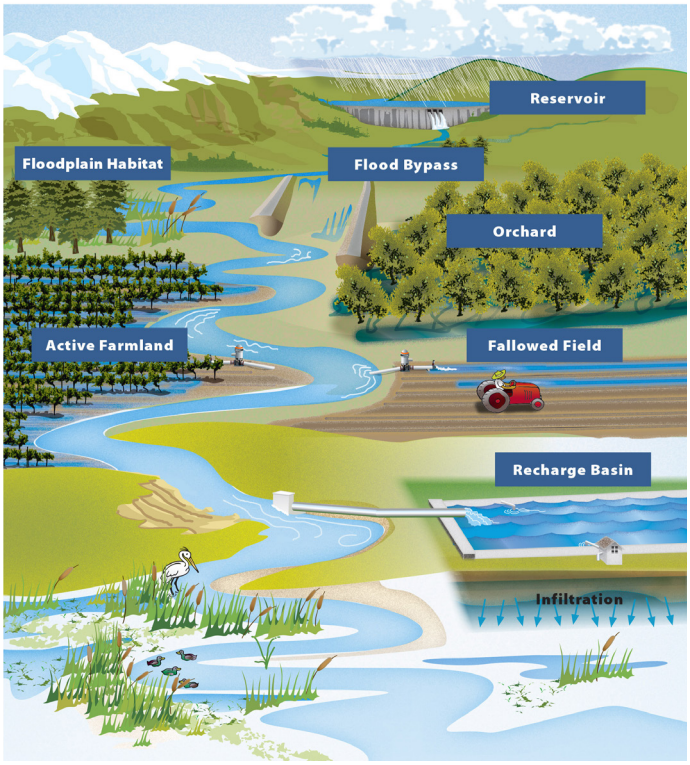
FLOOD-MAR: Advancing Integration for Water Management Sustainability

What is Flood-MAR?

"Flood-MAR" is an integrated and voluntary resource management strategy that uses flood water resulting from, or in anticipation of, rainfall or snowmelt for managed aquifer recharge (MAR) on agricultural lands and working landscapes, including but not limited to refuges, floodplains, and flood bypasses. Flood-MAR can be implemented at multiple scales, from individual landowners diverting flood water with existing infrastructure, to using extensive detention/recharge areas and modernizing flood management infrastructure/operations. As part of the System Reoperation Study, the California Department of Water Resources (DWR) developed a white paper to describe and promote Flood-MAR implementation (https://www.water.ca.gov/Programs/All-Programs/System-Reoperation-Program).

Example areas of managed aquifer recharge (MAR)



Why is Flood-MAR Necessary?

The effects of climate change necessitate wholesale changes in how water is managed in California. In response, rehabilitating and modernizing water and flood infrastructure in California is imperative. California is now amid one of the driest winter seasons on record, which is on the heels of the 2nd wettest year on record. And before that, the driest four consecutive years of statewide precipitation in the historical record were 2012 through 2015. These recurring periods of extreme dry and wet weather events, which are being intensified by climate change, are significantly stressing the state's water resources.

With less water storage from snowpack, California needs to leverage both the current water system and new opportunities to provide sustainable alternatives that can simultaneously accommodate longer and deeper droughts, and more severe and frequent episodic and seasonal flooding.

Flood-MAR will become an important part of California's portfolio of water resource management strategies, now and in the future, to significantly improve water resources sustainability and climate resiliency.

For more information on related DWR programs, please refer to:

- **System Reoperation Program:** https://www.water.ca.gov/Programs/All-Programs/System-Reoperation-Program
- **Groundwater Management Program:** https://www.water.ca.gov/Programs/Groundwater-Management/SGMA-Groundwater-Management
- **Flood Planning and Studies:** https://www.water.ca.gov/Programs/Flood-Management/Flood-Planning-and-Studies

FloodMAR will bring many key benefits to Californians

What are the Benefits of Flood-MAR?

Flood-MAR projects can provide broad benefits for Californians and the ecosystems of the state, and there is a clear State interest to participate in and encourage Flood-MAR projects. Potential public benefits include:

- **Flood Risk Reduction.**
- **Drought Preparedness.**
- **Aquifer Replenishment.**
- **Ecosystem Enhancement.**
- **Subsidence Mitigation.**
- **Water Quality Improvement.**
- **Working Landscape Preservation and Stewardship.**
- **Climate Change Adaptation.**
- **Recreation and Aesthetics.**

Private, or non-public, benefits include improved water supply reliability for urban and agricultural water uses through direct supply or improved system flexibility.

What is Needed to Expand Flood-MAR Implementation?

Complex technical, legal, and institutional barriers and challenges affect the planning and implementation of Flood-MAR projects. Barriers and challenges can be organized by the following themes:

- **Cooperation and Governance.**
- **Policy.**
- **Legal, including water rights and regulatory.**
- **Implementation, including land use, recharge, recovery, conveyance, reservoir operations, economics, environmental considerations, and data and capacity building.**

Overcoming these barriers and challenges requires open dialogue, strong leadership, robust partnerships, and innovative research and pilot projects. Partnerships, among DWR; other State, federal, tribal, regional, and local entities; and university and private researchers, are actively exploring ways to overcome these barriers and challenges, and to determine how flood and groundwater management can be co-managed to their mutual benefit.

Contingent on available funding, DWR will initiate a Flood-MAR program and, in partnership, implement a Research and Data Development Framework (R&D Framework, discussion draft to be released in March 2018) to develop information and expertise needed to expand Flood-MAR implementation. DWR is developing a communication strategy to exchange Flood-MAR ideas, practices, and lessons learned. Additionally, DWR will encourage practitioners to design Flood-MAR projects by providing planning, technical, and facilitation assistance, while supporting robust implementation of pilot projects in the near-term.

There is strong, and growing, interest across the state in understanding the benefits, limitations, concerns, costs, and funding opportunities for Flood-MAR projects. DWR plans to work with other State, federal, tribal, and local entities; academia; and landowners to build on the knowledge and lessons from past and on-going studies and programs; pursue expanded implementation of Flood-MAR; and make Flood-MAR an integral part of California's water portfolio.