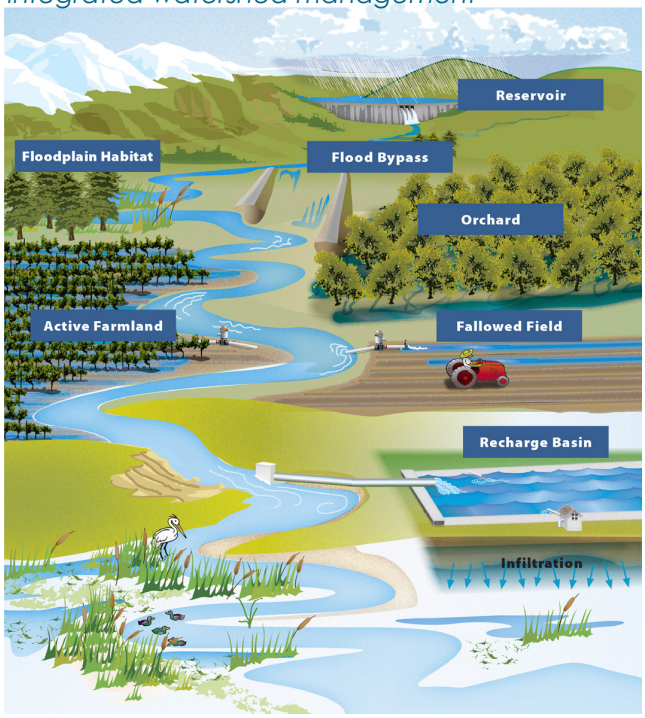
FLOOD-MAR: Advancing Integration for Water Management Sustainability

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, working landscapes, and managed natural 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. In 2018, DWR initiated a Flood-MAR Program and released a white paper that described Flood-MAR as an opportunity to modernize water management infrastructure and State policies to recognize the nexus between flood management, land use, groundwater management, and ecosystem enhancement.

The white paper and other Flood-MAR information are available online at www.water.ca.gov/Programs/All-Programs/Flood-MAR .

Flood-MAR supports headwaters to groundwater integrated watershed management



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. In this decade, California has experienced the driest four consecutive years of statewide precipitation in the historical record (2012-2015) followed by the 2nd wettest year on record (2017). These recurring periods of extreme dry and wet weather events, characteristic of California's Mediterranean climate intensified by climate change, are 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.

The most recent cycle of drought and flood, and the passage of the Sustainable Groundwater Management Act (SGMA), make Flood-MAR 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:

- **Climate Change Program:** https://water.ca.gov/Programs/All-Programs/Climate-Change-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

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

"...The potential benefits of this are significant: groundwater replenishment, peak flood flow attenuation, additional values and uses for agricultural land, a potential source of instream flows during drought or other periods of critical environmental need, and finally, increased efficiencies from reservoir reoperation."
- Karla Nemeth, Director, State of California Department of Water Resources

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 continue Flood-MAR program activities. Currently, a Research Advisory Committee is preparing a Flood-MAR Research and Data Development Plan to develop information and expertise needed to expand implementation of Flood-MAR projects (release of public draft in August 2019). DWR will continue to communicate and document Flood-MAR concepts and practices. Additionally, DWR will encourage practitioners to implement Flood-MAR projects with planning, technical, and facilitation assistance, while supporting 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, working with other State, federal, tribal, and local entities; academia; and landowners, will build on the knowledge and lessons from past and ongoing studies and programs; pursue expanded implementation of Flood-MAR; and make Flood-MAR an integral part of California's water portfolio for the 21st century.