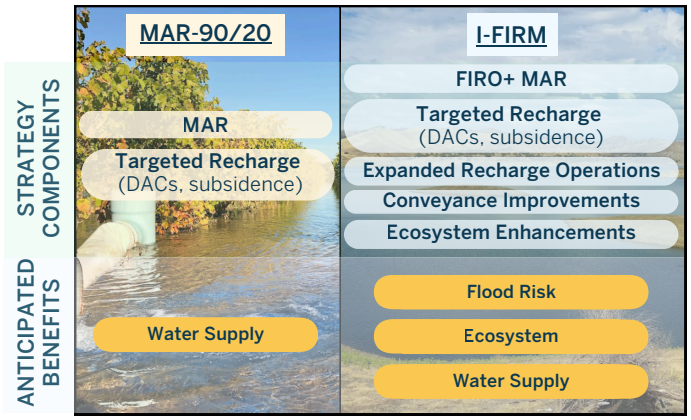
MERCED WATERSHED - AT A GLANCE

Sustainable Conservation

A CHANGING CLIMATE: By 2050, rising temperatures are expected to create more intense winter storms and limit snowpack in the Merced watershed, reducing runoff in the dry season when farms, communities, and ecosystems need it most. Warming will also increase evaporative demand and shrink surface water supplies, increasing reliance on groundwater. Without action, groundwater levels will fall, flood risks will intensify, and ecosystems will suffer.

FLOODWATER AS A RESOURCE: The San Joaquin Basin Flood-MAR Watershed Studies evaluated the opportunity for Flood-Managed Aquifer Recharge (Flood-MAR) and Forecast-Informed Reservoir Operations (FIRO) to mitigate the impacts of climate change. Working with growers, Flood-MAR can be scaled to capture more wet season flows in recharge basins and on farmland, thereby reducing flood risk and rebuilding groundwater stores for the dry season.



What is Impacted by Climate Change?

Groundwater Supply

BBy 2050, average annual groundwater overdraft is expected to increase by 26% to 120,000 acre-feet per year. Groundwater levels will fall by an average of 19 feet, and groundwater levels beneath Disadvantaged Communities (DACs) will fall by 2 feet.

What can Recharge Accomplish?

Compared to the baseline future scenario, MAR-90/20 would reduce annual groundwater overdraft by 12% and increase groundwater levels by 42%. With I-FIRM, groundwater supplies increase annually, average groundwater levels rise to 15 feet above current levels, and groundwater levels below DACs rise to 11 feet above current levels.

Flood Risk

By 2050, maximum peak flow of the Merced River is expected to increase from 6,100 cubic feet per second (cfs) to 33,000 cfs, greatly exceeding the 7,300 cfs channel operational capacity. The number of years in which flows exceed channel operational capacity increases from 0 to 4 years per 100.

What can Recharge Accomplish?

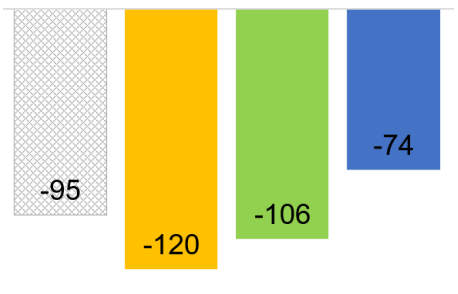
Compared to baseline future, MAR-90/20 would have limited impacts on flood risks, though it would reduce the maximum duration of flood events exceeding operational capacity. Under I-FIRM, the intensity, frequency and duration of flood events are each reduced by half, yet all remain greater than current conditions.

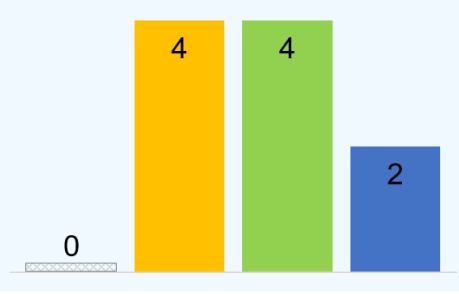
Ecosystems

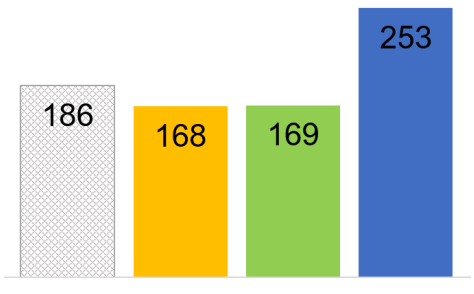
By 2050, increased winter river flows will decrease instream salmonid habitat, where salmon need low flows to lay eggs and raise juveniles. However, higher peak flows could improve off-channel floodplain habitat, where salmon feed before outmigration to the sea. Groundwater-dependent ecosystems (GDEs) see a 3% reduction in suitable habitat.

What can Recharge Accomplish?

MAR-90/20 has a limited impact on these shifts. Managed ecosystem flows under I-FIRM would increase instream salmonid spawning habitat by 36%, while off-channel habitat is reduced 22% as high-flow events are shaved off for MAR. I-FIRM offsets the 3% loss in GDE habitat, and creates new shorebird and flow-through basin habitat in the watershed.







Baseline Current | Baseline 2050 | MAR-90/20 | I-FIRM

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SCENARIO OUTCOMES

In a Baseline Future

- GW overdraft increases greatly
- Flood risk increases greatly
- Ecosystems see mixed outcomes

With MAR-90/20

- Increase in GW overdraft is lessened
- Flood risk remains high
- Ecosystems see mixed outcomes

With I-FIRM

- Increase in GW overdraft is offset
- Increase in flood risk is lessened
- Ecosystems see mixed outcomes

PLANNING FOR THE FUTURE

Strategic Flood-MAR implementation in the near-term can reduce groundwater overdraft in the region while providing additional benefits, such as supporting groundwater levels near DACs, and addressing the cone of depression. FIRO-MAR will take longer to implement, but it can mitigate some of the most severe climate change impacts expected in the Merced watershed.

To achieve multi-benefit watershed-scale outcomes, collaboration will be essential. Growers, water districts, Groundwater Sustainability Agencies, reservoir operators, flood control agencies, community groups, and environmental organizations must coordinate to develop and pilot management strategies and build system resilience.

Scaled MAR will depend on greatly expanded on-farm recharge in the Merced watershed, so grower involvement in project planning and implementation will be essential.

These studies help us envision how Flood-MAR can help shape California's water future. However, they rely on one set of assumptions and focus specifically on what is possible with recharge. Additional management actions such as land repurposing are not discussed in these studies but will be necessary to meet long-term groundwater sustainability goals.

Ultimately, local water and land managers, large- and small-scale growers, and residents of the Merced watershed will shape real-world outcomes for the region.

Whether you are a grower, water manager, community member, environmental advocate, or another interested party, you can play a role in building resilience to a changing water future in the Merced watershed. Sustainable Conservation has resources to help you learn more about Flood-MAR, and can connect you with partners to promote MAR in your area. Water managers can use a locally developed Groundwater Recharge Assessment Tool (GRAT) developed as part of the Watershed Studies toolset to plan recharge efforts that target benefits based on local priorities. Visit suscon.org and groundwaterrecharge.org for more information.

SCAN FOR MORE RESOURCES

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Runoff to Recharge .....