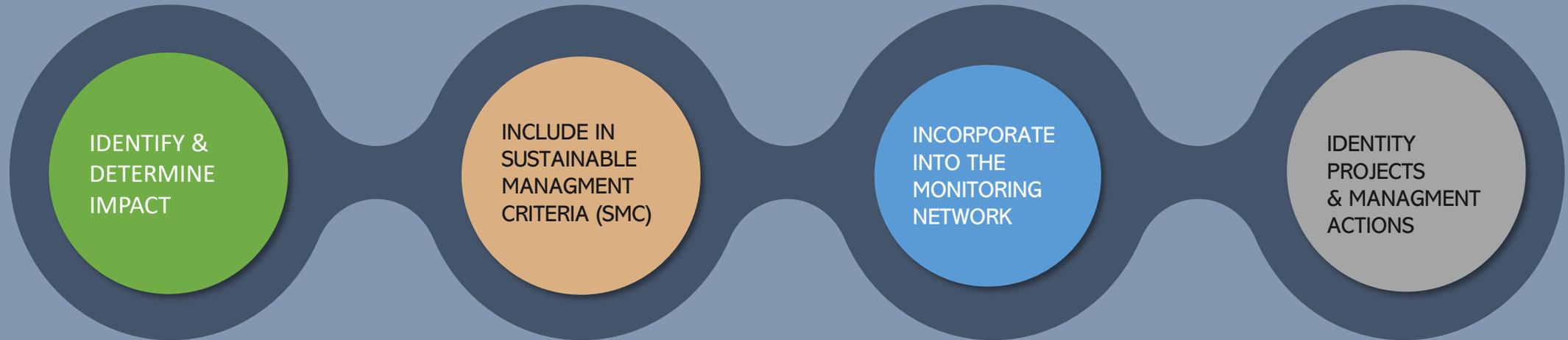


# Tour of the Groundwater Resource Hub

*Environmental Resources for Groundwater Sustainability Plans*



## Identify GDEs

**Map** and **Characterize** GDEs in the basin. The results from this step will be used to consider GDEs in other parts of the GSP, including establishing sustainable management criteria and assessing the monitoring network.

## Determine Potential Impacts on the environment

Use hydrologic data to observe changes in groundwater conditions to help define whether potential effects on the environment are occurring or may occur.

## Consider the environment when establishing the SMC

Consider GDEs when establishing sustainable management criteria for the basin. The objective in setting sustainable management criteria is to protect GDEs from adverse groundwater impacts while providing a reasonable margin of operational flexibility based on levels of uncertainty.

## Incorporate the environment into the Monitoring Network

Assess and improve the hydrologic monitoring network to ensure groundwater conditions and sustainability indicators are sufficient to detect impacts to the environment.

Incorporate relevant biological data collection into the monitoring network to monitor GDE responses to changing groundwater conditions.

## Identify Projects & Management Actions

Select projects and management actions that may help to maintain or improve GDEs to achieve the basin sustainability goal.

## STEPS TO IDENTIFY PROJECTS & MGMT ACTIONS TO MAINTAIN OR IMPROVE GDEs

- [Supply Management Strategies](#)
- [Demand Management Strategies](#)

### DEMAND-SIDE PROJECTS & MGMT ACTIONS

While supply-side management may be generally preferred, GDEs that are experiencing adverse impacts may require proximate pumping reductions to achieve the sustainability goal, objectives, and thresholds for the basin.

- Domestic/farm/industrial conservation technologies or process changes
- Specified minimum distance for pumping to buffer GDEs
  - Specified maximum pumping rates for pumping around GDEs
- Restricted pumping during certain times of the year
  - Restricted pumping at certain depths
  - Well permitting and well density rules, including preclusion of new wells
- Where groundwater markets are developed, protective trading rules to ensure GDEs are not adversely impacted
  - Offset requirements for impacts



View of oak woodlands and riparian habitat along the Michigan Bar in the Cosumnes River watershed, CA. © Karen Gregg Elliott/The Nature Conservancy

### SUPPLY-SIDE PROJECTS & MGMT ACTIONS

Potential approaches for augmenting groundwater and interconnected surface water to maintain or improve GDEs while providing other benefits for the basin. Multi-benefit projects, are highlighted below as they are conducive to facilitating partnerships and financial opportunities (e.g., matched funds, grants, general bond obligations, water markets).

- **Groundwater Recharge** (i.e., managed aquifer recharge) projects can offer a wide range [of multi-benefit opportunities](#) for improving groundwater conditions.
- **Habitat Restoration** can reduce consumptive water demand. In GDEs dominated by non-native plant species, invasive plant removal may help improve groundwater conditions by reducing water demand and creating an opportunity to restore native plants, both of which can improve the health of a GDE.
- **Floodplain Restoration:** In some areas, GDEs may occur on floodplains that have become separated from stream and river channels. Reconnecting rivers and streams to their flood-plains reestablishes natural floodplain dynamics, including recharge that occurs when floodwaters spread over riverbanks.
- **Open Space Preservation:** In many cases, open space lands are important locations where natural recharge can occur. By preserving these land uses, either through easements or land designations, natural recharge areas can be maintained, and consumptive use related to more intensive uses of the land are avoided.

## RESOURCES TO IDENTIFY PROJECTS & MGMT ACTIONS TO MAINTAIN OR IMPROVE GDEs

### CASE STUDIES

- [Colusa County Managed Aquifer Recharge](#)
- [Hamilton City Flood Damage Reduction & Ecosystem Restoration](#)
- [Sacramento County Cosumnes Levee Removal & Floodplain Restoration](#)
- [Ventura County Arundo Removal](#)
- [Ventura County Treated Wastewater as a Resource](#)

### GUIDANCE DOCUMENTS

- [Groundwater Markets](#)
- [Additional Resources for Managing GDEs](#)
- [GDE Guidance Document for GSPs](#)