How and Where Nature Uses Groundwater
Mapping Groundwater Dependent Ecosystems and Interconnected Surface Water in California

Groundwater is essential to support nature in California. Many tree species like willows and cottonwoods rely on groundwater to survive seasonal and annual dry spells. Fish and other aquatic life rely on groundwater to keep rivers flowing. Unsustainable management of groundwater causes the levels to drop so the trees die and the rivers stop flowing. This analysis presents a method to map groundwater dependent ecosystems and interconnected surface water to improve groundwater sustainability plans.

**Methods and Data Sources**

1. Download groundwater elevation data from DWR, [https://gis.water.ca.gov/app/gicima/](https://gis.water.ca.gov/app/gicima/)
2. Download land and water surface elevation data from the National Elevation Dataset ([https://nationalmap.gov/elevation.html](https://nationalmap.gov/elevation.html))
3. Subtract the two layers (land and water surface elevation from groundwater elevation) to get groundwater depth
5. Map major central valley rivers from 1990 to 2010
6. Intersect vegetation and river data with groundwater depth data
7. Classify
8. Intersect
9. Download

**Definitions**

Groundwater Dependent Ecosystems: Ecosystems that require access to groundwater or benefit from or otherwise rely on subsurface stores of water to function or persist. Groundwater Dependent Ecosystems are often supported by interconnected Surface Water.

Disconnected Surface Water: Surface waters, including streams, lakes, and ponds, that are not connected from groundwater. This includes losing streams and water bodies where surface water is leaking but is still connected to groundwater by a saturated zone. Interconnected Surface Water often supports Groundwater Dependent Ecosystems.

Interconnected Surface Water: Surface waters that feature a year-round, unconfined source of water from regional groundwater.

**Conclusions**

- Groundwater-dependent ecosystems and interconnected surface waters are found throughout the Central Valley.
- These natural ecosystems are highly dependent on sustainable groundwater levels.
- The methods presented here can be refined with more detailed regional information.
- Mapping these areas is the first step to ensure they are sustainably managed.

**Next Steps**

- Update the groundwater-dependent vegetation and wetland with higher-resolution and more-detailed vegetation maps.
- Expand the mapping effort statewide.