

# Water Quality Report Card

<b>Regional Water Board:</b>	San Diego, Region 9
<b>Beneficial Uses Affected:</b>	AGR, REC-1, REC-2, IND, WARM, WILD
<b>Implemented Through:</b>	Water Board Site Cleanup Program
<b>Effective Date:</b>	April 2015
<b>Attainment Date:</b>	To Be Determined

## Nutrients in Lake San Marcos (Phosphorus and Ammonia as Nitrogen)

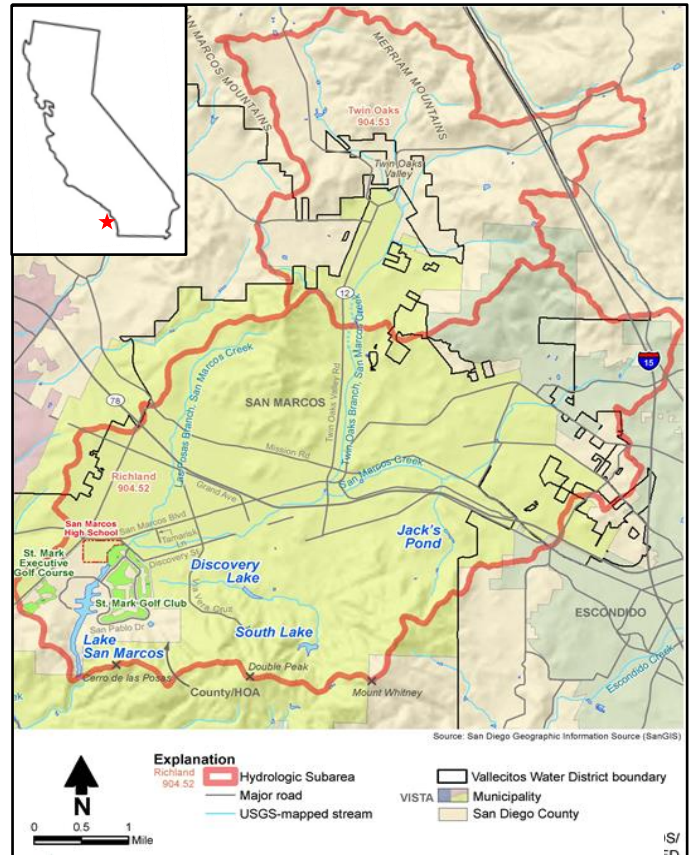
<b>STATUS</b>	<input checked="" type="checkbox"/> <b>Conditions Improving</b>	
	<input type="checkbox"/> Data Inconclusive	
	<input type="checkbox"/> Improvement Needed	
		<input type="checkbox"/> Targets Achieved/Water Body Delisted
<b>Pollutant Type:</b>	<input checked="" type="checkbox"/> Point Source <input checked="" type="checkbox"/> Nonpoint Source <input checked="" type="checkbox"/> Legacy	
<b>Pollutant Source:</b>	Erosion/Siltation	Urban Storm Water Runoff
	Irrigated Crop Production	Confined Animal Facilities

### Water Quality Improvement Strategy

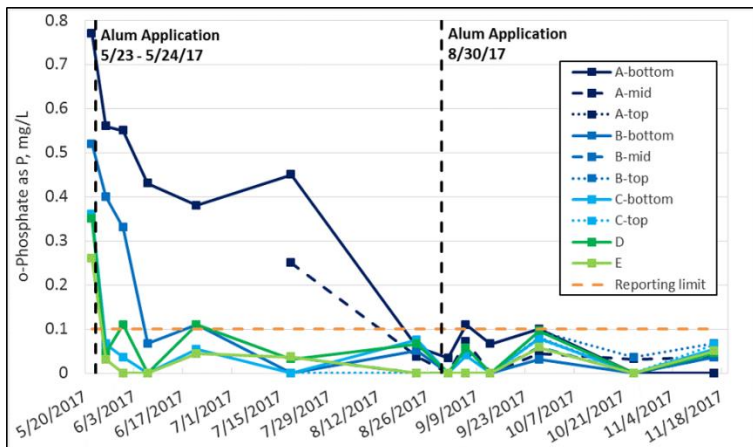
Lake San Marcos, a reservoir in north San Diego County, was created in 1946 by damming San Marcos Creek (SMC) to create an irrigation water supply. SMC, its tributaries, and the lake are within the Upper SMC watershed, and SMC is the primary surface water stream entering the lake from the north. The lake is seasonally stratified and impaired by high nutrients, excess algae, and low dissolved oxygen. Lake San Marcos is included on the USEPA Clean Water Act 303(d) list due to impairment by nutrients and ammonia as nitrogen. The primary pollutant sources are storm water runoff from surrounding agricultural, commercial, and residential areas, as well as legacy sources from historical crop production and ranching operations. This has resulted in nutrient-rich sediments that contribute to elevated nutrient levels in the lake under anoxic conditions.

The lake restoration process, which includes addressing sources within the Upper SMC watershed, has been managed by the San Diego Regional Water Board's [Site Cleanup Program](#) since 2015. Work is being performed by the lake owner and a group of four public agencies who are also Municipal Separate Storm Sewer System (MS4) co-permittees. The parties have agreed to adopt an alternative to a TMDL approach to remediate water quality. A [Remedial Investigation/Feasibility Study \(RI/FS\)](#) in 2016 recommended phosphorus inactivation using alum, selective withdrawal, and aeration for the lake, as well as nutrient reduction remedies for Upper SMC. Pilot testing of remedies proposed in the RI/FS is currently ongoing. Results of pilot tests will be used to develop full-scale remedies for implementation in the next 3 to 5 years.

### Watershed Map



### Phosphorus Concentrations in Lake San Marcos



Stations A through E are sampling stations located in the lake. Station A is at the south end, near the dam, and Station E is at the north end, near where the creek enters the lake.

### Water Quality Outcomes

- Significant reductions in phosphorus concentrations in the water column and from lake sediment fluxing have been realized because of alum applications.
- A Lake Management Plan to provide a framework for long-term lake management and restoration and maintenance of beneficial uses is in development.
- Pilot testing has been seasonal with lake remedies most effective in the spring and summer, prior to the onset of stratification, and watershed remedies most effective in the winter when storm water flow is occurring.
- Pilot testing is ongoing and will continue through 2019 with Corrective Action Plans planned for 2019-2020. Remedy implementation will follow.