

A Regional Survey of the Extent and Magnitude of Eutrophication in Estuaries of Southern California

What is it?

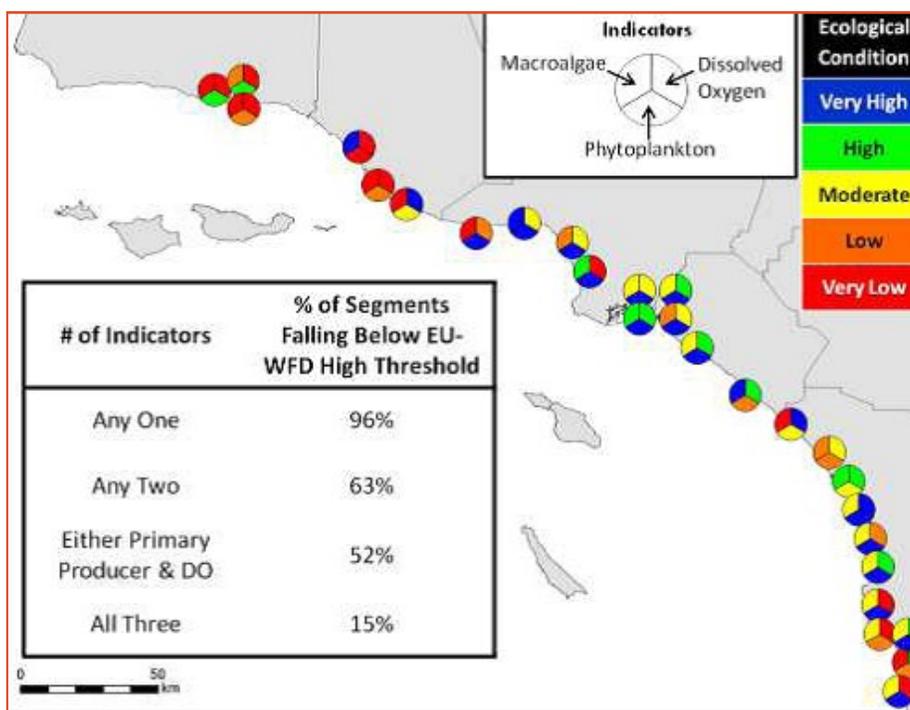
The San Diego Water Board participated in an assessment of the extent and magnitude of eutrophication in coastal estuaries in southern California that was completed in 2013. This study demonstrated that eutrophication is prevalent in coastal estuaries region-wide. Indicators of the extent and magnitude of eutrophication were measured at 27 areas in 23 estuaries in the Southern California Bight between October 2008 and October 2009. The areas represent a location within the estuary that is more likely to exhibit symptoms of eutrophication.

The following monitoring questions were addressed by this project:

- 1) What is the extent and magnitude of eutrophication in estuaries of the Southern California Bight?
- 2) Is there a difference in eutrophication between different classes of estuaries or by the degree of tidal flushing?
- 3) Is there a relationship between the symptoms of eutrophication and nutrient inputs?

This assessment was conducted as part of the Southern California Bight Regional Monitoring Program in 2008 (Bight '08). The study was a collaboration between the Southern California Coastal Water Research Project (SCCWRP), California State University Channel Islands, Tijuana River National Estuarine Research Reserve, Resource Conservation District of the Santa Monica Mountains, San Elijo Lagoon Conservancy, Santa Monica Bay Restoration Commission, Cheadle Center of Biodiversity and Ecological Restoration, and the San Diego Water Board with funding from the municipal stormwater copermittees (in exchange for reductions in other monitoring requirements) and from Cleanup and Abatement Account Funds awarded to the San Diego Water Board. Dr. Busse, the SWAMP coordinator for the San Diego Water Board, was one of the main principal investigators of this study.

Thresholds from the existing assessment frameworks of the European Union and the National Oceanographic and Atmospheric Administration and based on three ecological response indicators (macroalgae biomass and cover, phytoplankton biomass, and dissolved oxygen) were then used to classify the results. Using these thresholds, a large fraction of areas were classified as having moderate to bad eutrophic conditions – 78% based on macroalgae, 39% for phytoplankton, and 63% for dissolved oxygen. In many areas, the three indicators of ecological response did not correspond. However, all but one of the areas were classified as having an eutrophic condition class of moderate or bad based on at least one indicator.



Ecological condition category determined for each estuarine segment using three response indicators of eutrophication: macroalgae, phytoplankton and dissolved oxygen concentration. Summary table shows the percent of segments falling below the "high" threshold for one, two or three indicators (SCCWRP Technical Report 2012).

Why is it important?

Eutrophication of estuaries is a global environmental issue. Eutrophication is the increased production of organic matter from aquatic algae and plants due to nutrients. Nutrients are introduced into coastal wetlands through wet and dry weather runoff from developed watersheds, municipal and industrial wastewater treatment plants, atmospheric deposition, and

from the nearshore environment through tides. Estuaries are an important resource for biodiversity; they support commercial and recreational fisheries, migratory birds, endangered species, and ecotourism. Eutrophication from excess nutrients can negatively affect these ecosystem services.

Management of eutrophication and the development of appropriate nutrient water quality goals are often hampered by a lack of regional monitoring data characterizing the symptoms, extent, and magnitude of the problem. This study fills the gap of estuary monitoring in southern California, and the results will help decision-makers better address the problem of nutrient pollution in estuaries.

How will this information be used?

This assessment will be useful to the estuarine Nutrient Numeric Endpoint (NNE) project that is currently being conducted by the State Water Board. The NNE project is developing indicators of ecological response to nutrients, since measurements of actual nutrient concentrations typically are not indicative of ecological effects. For the NNE, assessment frameworks specific to the local ecology of southern Californian estuaries will need to be developed.

For more information:

- The Technical Report for this study can be found on the [SCCWRP](#) website.
- This study is now published:
 - McLaughlin, K., Sutula, M., Busse, L., Anderson, S., Crooks, J., Dagit, R., Gibson, D., Johnston K., Stratton, L. 2013: A Regional Survey of the Extent and Magnitude of Eutrophication in Mediterranean Estuaries of Southern California, USA. *Estuaries and Coast*, published online 5 July 2013.