



## Summary of 2008 Southern California Bight Regional Monitoring Program (Bight '08)

### Offshore Water Quality Component

#### Significance

Globally, nutrient pollution has contributed to an increasing incidence of algal blooms and hypoxia in nearshore waters. However, the relative importance of human nutrient sources in the nearshore zone is difficult to distinguish from natural sources in regions like southern California where upwelling occurs. Upwelling is a natural phenomenon wherein nutrient-rich deep waters are transported to the surface, constituting a "natural source" to fuel algal blooms. As a result of complexities like these, a regional evaluation of nutrient sources and other factors associated with algal blooms in southern California has not been attempted in decades. Bight '08 utilized new technology to overcome some of these barriers and obtain a glimpse of interactions between nutrient inputs and algal blooms at regional and local scales.

#### Goals

Goals of this component were to (1) quantify four major nutrient sources to the Bight (natural coastal upwelling of nutrient-rich water, treated wastewater discharge, atmospheric deposition, and terrestrial coastal runoff) (2) characterize the spatial and temporal patterns of algal blooms; and (3) characterize the conditions associated with bloom events.

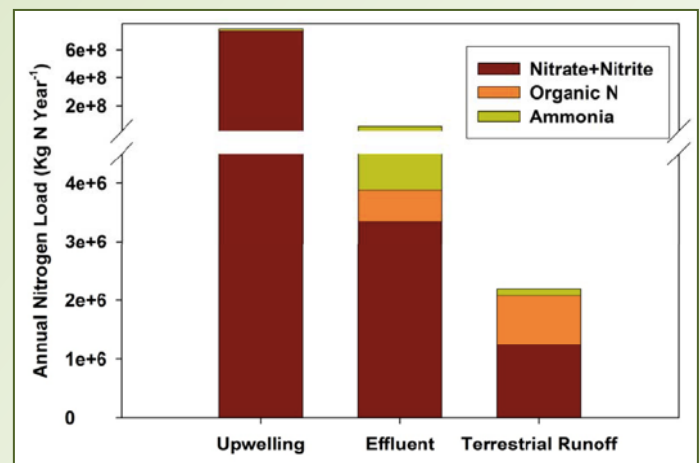
#### Approach

Satellite- and ground-based sensors, unmanned underwater "gliders", ship sampling platforms, and automated stormwater monitoring stations were used to collect remotely sensed data and water quality samples throughout the southern California nearshore zone. Parameters focused on ocean temperature and salinity, current speed and direction, chlorophyll and plankton, and nutrient concentrations (varying forms of nitrogen and phosphorus) in discharges, atmospheric deposition, and ocean water. Computer models were used to assess the transport and fate of nutrients from upwelling.

#### Findings

Across the Bight, natural upwelling sources of nutrients dominated human sources by orders of magnitude. At sub-regional spatial scales, however, the combination of human sources from treated wastewater effluent or land-based runoff sometimes rivaled natural sources.

Based on examination of historical data, the extent of algal blooms in the Bight has increased over the past 10 years. Regional algal blooms occurred consistently during the spring upwelling periods. Persistent algal blooms occurring year-round were located near the Santa Barbara Channel, San Pedro Shelf, Santa Monica Bay, and South San Diego. These upwelling hot spots were co-located with wastewater discharge outfalls, major river mouths, and reduced circulation. Additional work will be required to estimate the extent to which human sources of nutrients contribute to algal blooms.



*Regional-scale comparison of nutrient sources*

#### Final Report

Volume VII. [Water Quality](#). Technical Report 710.

