SCCWRP Annual Report 2010

Assessing water quality conditions in southern California's areas of special biological significance

Kenneth Schiff, Brenda Luk, Dominic Gregorio and Steve Gruber

ABSTRACT

Over 280 km of shoreline have been designated as marine water quality protected areas, termed Areas of Special Biological Significance (ASBS), in southern California, USA. While the standard for water quality protection in an ASBS is "natural water quality", there are at least 271 documented coastal discharges that potentially threaten this important ecological resource. The goal of this study was to assess the water quality status of ASBS by answering two questions: 1) What is the range of natural water quality near reference drainage locations? and 2) How does water quality near ASBS discharges compare to the natural water quality near reference drainage locations? The sample design focused exclusively on receiving water (not effluents) and wet weather, which are the locations and times where natural and anthropogenic contributions can mix making pollutants difficult to identify and control. Sixteen locations encompassing 35 site-events were sampled immediately prior to (<48 hours), then immediately following (<24 hours) storm events ranging from 0.1 to 9.8 cm rainfall. Concentrations of total suspended solids (TSS), nutrients (ammonia, nitrate, nitrite, total nitrogen, total phosphorus), total and dissolved trace metals (arsenic, cadmium, chromium, copper, nickel, lead, silver, and zinc), and polycyclic aromatic hydrocarbons (PAH) from poststorm samples were similar at reference drainage and ASBS discharge sites. The average concentration difference between post-storm geometric mean concentrations at reference drainage vs. ASBS discharge sites across all parameters (except chlorinated hydrocarbons) was 3%. Concentrations of chlorinated hydrocarbons were almost entirely nondetectable and no post-storm sample exhibited significant toxicity to the purple sea urchin *Strongylocentrotus purpuratus*. In addition, there was no consistent increase from pre- to post-storm concentrations at either reference drainage or ASBS discharge locations. Most poststorm concentrations did not correlate well with storm parameters (i.e., rainfall quantity, antecedent dry period) or stormwater tracers (i.e., salinity, dissolved organic carbon), decreasing the utility of these tools for predicting impacts. A reference-based threshold was used as a proxy for distinguishing differences from natural water quality. The reference based threshold included a two-step process that was used to determine if water quality near ASBS discharges differed from natural water quality: 1) was the individual chemical post-storm discharge concentration greater than the 85th percentile of the reference drainage site post-storm concentrations; and then 2) was the individual post-storm discharge concentration greater than the pre-storm concentration for the same storm event. While the concentrations near ASBS discharges were on average similar to reference site concentrations, there were some individual ASBS discharge sites that were greater than the reference site based threshold. Cumulatively across all ASBS, the constituents that were most frequently greater than the reference site-based threshold were nutrients and general constituents, followed by dissolved or total trace metals.

Full Text

ftp://ftp.sccwrp.org/pub/download/DOCUMENTS/AnnualReports/2010AnnualReport/ar10_251_260.pdf