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Water Quality Monitoring Around Submerged Wastewater Outfalls in Southern California: From Compliance Assessment to Impact of Climate Change.

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Abstract

Routine monitoring near major submerged ocean outfalls in southern California is focused on the assessment of the effects of wastewater discharge on water-quality (WQ), including dissolved oxygen, pH, transmissivity, and phytoplankton biomass. The proposed WQ compliance assessment using DO as an indicator includes 1) identification of the area affected by effluent wastewater using Colored Dissolved Organic Matter (CDOM) as an effluent plume tracer, 2) selection of reference sampling sites representing 'natural' conditions, and 3) comparison between DO profiles in the reference and plume-affected zones. This strategy is implemented as an interactive web-based tool including convenient data visualization options. At the same time, the data of WQ monitoring (regular quarterly observations starting 1998-present) provides an excellent platform to analyze the spatial and temporal (seasonal and interannual) variations in near-shore ocean ecosystem. An illustrative example is the trends in the depths of the euphotic layer and subsurface chlorophyll maximum layer (SCML), abruptly deepening during the most recent four-year period (2011-2014). These dramatic changes are associated with declining intensity of the North Pacific gyre circulation (NPGO index), decreasing upwelling and increasing transport of warm water from equatorial Pacific (PDO and ENSO cycles).