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## **Evaluation of uptake kinetics during a wastewater diversion into nearshore coastal waters in southern California**

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### **ABSTRACT**

The global eutrophication of coastal ecosystems from anthropogenic nutrients is one of the most significant issues affecting changes to coastal oceans today. A three-week diversion of wastewater effluent from the normal offshore discharge pipe (7 km offshore, 56 m depth) to a shorter outfall located in 16 m water (2.2 km offshore) as part of the 2012 Orange County Sanitation District Diversion provided an opportunity to evaluate the impacts of anthropogenic nitrogen on phytoplankton community response. Nitrogen uptake kinetic parameters were used to evaluate the short-term physiological response of the phytoplankton community to the diverted wastewater and to determine if potential ammonium suppression of nitrate uptake was observed. Despite expectations, there was a muted response to the diversion in terms of biomass accumulation and ambient nutrients remained low. At ambient nitrogen concentrations, calculated uptake rates strongly favored ammonium. During the diversion based on the kinetic parameters determined during short-term experiments, the phytoplankton community was using all three N substrates at low concentrations, and had the capacity to use urea, then ammonium, and then nitrate at high concentrations. Ammonium suppression of nitrate uptake was evident throughout the experiment, with increasing suppression through time. Despite this interaction, there was evidence for simultaneous utilization of nitrate, ammonium, and urea during the experiment. The general lack of phytoplankton response as evidenced by low biomass during the diversion was therefore not obviously linked to changes in uptake rates, physiological capacity, or ammonium suppression of nitrate uptake.

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