



## Nutrient quality drives differential phytoplankton community composition on the southwest Florida shelf

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**ABSTRACT:** During May 2003, the dry season, the southwest Florida shelf was surveyed for nutrient concentrations and phytoplankton community composition concurrently with plankton nutritional and physiological status (tracer techniques, enzyme assay, and biomass response bioassays). Inorganic nitrogen concentrations were low throughout the region, while dissolved organic nitrogen (DON) was elevated ( $>30 \mu\text{mol N L}^{-1}$ ) nearshore. Conversely,  $\text{PO}_4^{3-}$  and dissolved organic phosphorus concentrations were high only in northern coastal areas adjacent to estuarine outflows. Nitrogen : phosphorus (N : P) ratios in the particulate material; gradients in  $\text{NO}_3^-$  and urea uptake rates; urease and alkaline phosphatase activities; and bioassay responses were indicative of a strong gradient from N to P limitation of plankton biomass from north to south. Nitrogen limitation was apparent in the northern region ( $\text{N} : \text{P}_{\text{particulate}} < 8$ , Tampa to Sanibel), where  $\text{PO}_4^{3-}$  and DON inputs dominated; balanced nutrient conditions were evident in the mid-region ( $\text{N} : \text{P}_{\text{particulate}} = 8-24$ , Sanibel to Shark River); and P limitation was evident south of the Shark River ( $\text{N} : \text{P}_{\text{particulate}} > 24$ ), where inorganic N input was greatest. Phytoplankton community composition varied along the same gradient, from a cyanobacteria and dinoflagellate community in the north, to a cyanobacteria-dominated community in the mid-region, and to a diatom community in the southern region. Percentages of  $\text{NO}_3^-$  uptake and diatoms in the total phytoplankton community were positively related, as were percentages of urea uptake and cyanobacteria. Inorganic and organic N and P fractions in the nearshore shelf region reflect longitudinal gradients in regional watershed characteristics, and their relative availability thus appeared to control both phytoplankton community composition and its physiological status.

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