

Phytoplankton biomass and production in two Tuamotu atoll lagoons (French Polynesia)

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ABSTRACT: Nutrient concentrations, phytoplankton biomass (chlorophyll *a*, chl *a*) and primary production (^{14}C uptake) were measured over a 5 yr period (1990 to 1994) in the atoll lagoons of Takapoto (4 yr water residence time; with pearl oyster aquaculture) and Tikehau (0.5 yr residence time; without pearl oyster but with a fishery), French Polynesia. In both atolls, phosphate and silicate concentrations ($0.1 \mu\text{M PO}_4$ and $0.8 \mu\text{M SiO}_2$) were lower inside the lagoon than in surrounding oceanic surface waters. Picoplankton $<1 \mu\text{m}$ dominated phytoplankton biomass (61%) and productivity (55%) in both lagoons. Average assimilation numbers were high ($13 \text{ mg C mg}^{-1} \text{ chl } a \text{ h}^{-1}$) and average chl *a* doubling rates of the $<1 \mu\text{m}$ fraction were estimated to be 1.1 and 1.3 d^{-1} in Takapoto and Tikehau, respectively. Average daily primary production during the 1991 to 1994 period in Takapoto and Tikehau lagoons was estimated to be 0.8 and $0.7 \text{ g C m}^{-2} \text{ d}^{-1}$, respectively.

KEY WORDS: Nutrients · Phytoplankton · Production · Pearl oyster · Atoll lagoon · French Polynesia