

PHYSIOLOGICAL MODIFICATIONS OF SESTON IN RESPONSE TO
PHYSICOCHEMICAL GRADIENTS WITHIN LAKE SUPERIOR

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We show for the first time the importance of plankton producing non-phosphorus lipids as a strategy for reducing cellular P inventories in Lake Superior. In September 2011, we investigated the distribution of dissolved and particulate phosphorus (PP) pools throughout the lake. Average seston PP concentrations in the deep chlorophyll maximum (DCM; 85 nmol L⁻¹) were significantly greater than in the epilimnion (63 nmol L⁻¹), but particulate organic carbon: PP ratios showed the opposite trend. At the same time, mean seston nucleic acid P-concentrations were invariant between the epilimnetic and DCM layers. To explain this dichotomy we further examined total lipid concentrations and distributions. Intact polar membrane-derived phospholipids were greater in the DCM (6 nmol L⁻¹) relative to the epilimnion (4 nmol L⁻¹). However, phospholipids were only a minor proportion of PP (7-14%) and total membrane lipids (< 30%). Our results suggest that plankton substituted non-phosphorus lipids for phospholipids. Nitrogen- and sulfate-based betaine lipids and sulfolipids dominated the lipid pool (40-77%), and concentrations were significantly greater in epilimnetic seston. *This talk does not necessarily reflect EPA policy.*