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Spatial variability of stable isotopes and fossil pigments in surface sediments of Alaskan coastal lakes: Constraints on quantitative estimates of past salmon abundance

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ABSTRACT: We quantified spatial patterns of stable isotopes of N and C (δ^{19} N, δ^{13} C) and fossil pigment concentrations in the uppermost 10 mm of sediment (,10 yr) from 74 profundal locations and three spawning-stream discharge areas in Lake Nerka, southwest Alaska. Sediment δ^{19} N (4.3% \pm 0.7%) and δ^{13} C (-26.3% \pm 1.2%) varied directly (δ^{19} N) or inversely (δ^{13} C) with water column depth, whereas concentrations of most fossil pigments from algae were negatively correlated with depth. Sediment δ^{19} N and δ^{13} C were poorly correlated with either fossil pigment abundance or the local densities of spawning salmon. Instead, coastal nursery lakes appeared to integrate marine-derived nutrients rapidly into lakewide nutrient pools, suggesting that while individual cores may be used to reconstruct whole-lake salmon densities, habitat-specific variations of past fish populations cannot be quantified reliably from sedimentary analyses.

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