

Differential Support of Lake Food Webs by Three Types of Terrestrial Organic Carbon

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Abstract

Organic carbon inputs from outside of ecosystem boundaries potentially subsidize recipient food webs. Four, whole-lake additions of dissolved inorganic ^{13}C were made to reveal the pathways of subsidies to lakes from terrestrial dissolved organic carbon (t-DOC), terrestrial particulate organic carbon (t-POC) and terrestrial prey items (t-prey). Terrestrial DOC, the largest input, was a major subsidy of pelagic bacterial respiration, but little of this bacterial C was passed up the food web. Zooplankton received < 2% of their C from the t-DOC to bacteria pathway. Terrestrial POC significantly subsidized the production of both zooplankton and benthic invertebrates, and was passed up the food web to *Chaoborus* and fishes. This route supplied 33% to 73% of carbon flow to zooplankton and 20 to 50% to fishes in non-fertilized lakes. Terrestrial prey, by far the smallest input, provided some fishes with >20% of their carbon. The results show that impacts of cross-ecosystem subsidies depend on characteristics of the imported material, the route of entry into the food web, the types of consumers present, and the productivity of the recipient system.