Highlights

* We developed a dynamic mass balance model for organic carbon in lake ecosystems
* Allochthonous loads dominated in four of five lakes
* The ratio of respiration to burial increased as water temperatures increased during summer
* Organic carbon fates were mediated by carbon source (allochthonous vs. autochthonous)
* Future research should address dissolved organic carbon concentrations in tributaries and groundwater, budgets of particulate organic carbon, and measurement of burial