

Respiration partitioning across the Yakima River Basin

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Respiration in terrestrial freshwater systems is an important process by which organic matter is converted to CO₂ and released to the atmosphere. River corridors are also highly sensitive to changing climate conditions. Understanding the factors that control the location and timing of organic matter processing in river corridor systems is critical to predicting their role in climate feedback. We undertook a large regional study measuring river corridor ecosystem respiration and partitioning it between water-column respiration and sediment-associated respiration in the Yakima River basin in central Washington State, USA in the summer of 2022. In addition to respiration rates, we measured a large number of physical and chemical parameters across the basin, both of the river and of the surrounding landscape. Our results indicate that in this basin, water-column respiration makes up less than 2% of total river corridor ecosystem respiration at all 48 of our study sites. Total ecosystem respiration and sediment-associated respiration varied between 0 and -20 gO₂/m²*day. We also find differing spatial patterns between river corridor ecosystem respiration and other measurements of benthic and hyporheic microbial processes, suggesting complex interactions between local biogeochemical processing rates, hyporheic exchange, and carbon and nutrient fluxes.

