

Examples of Ecosystem-level River Concepts Applied to Alaskan Rivers

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The hydrologic transfer of physical, chemical, and biological components characterizes rivers over time through three physical dimensions: longitudinal (upstream - downstream), lateral (lateral circulation of river water onto flood plain), and vertical (surface - subsurface water exchange within bed sediments and the flood plain). This paper describes how a strong conceptual foundation of key physical and biological processes operating on each river dimension can be used to develop successful conservation strategies for Alaska's rivers. At the foundation of ecosystem-level concepts is the recognition that flow variability determines levels of hydrologic connectivity throughout each river dimension, and subsequent levels of biodiversity. These concepts include an understanding of the extent in which a river's flow regime promotes hydrologic connectivity in space to produce shifting mosaics of riparian wetlands where hydrologic connectivity is high on each river dimension. Supporting empiricism for predictions of the river continuum (longitudinal dimension), flood pulse (lateral dimension), and hyporheic corridor (vertical dimension) concepts is presented in the context of northern rivers. Since few rivers in Alaska have been altered by flow modifications and floodplain development, water resource managers and researchers have the unique opportunity to integrate current river concepts into management strategies and expand upon them through research.

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