Streams and their biota are inherently linked to riparian vegetation in forested systems: when we alter streamside vegetation we are altering streams. In the Pacific Northwest (PNW) of the United States, riparian forests have undergone a drastic shift in the past half century. Decades of heavy harvesting have given way to our current state of dense second-growth vegetation as a result of contemporary forest management practices. With dense vegetation comes a reduction in light availability to streams on the forest floor and subsequent light limitation of benthic primary production. Because higher trophic levels are disproportionately supported by algae, a shift in this basal resource can have a substantial effect on biota. Earlier research has shown that relieving light limitation by clear-cutting riparian forests can result in an increase in stream primary and secondary productivity, as well as increases in stream temperature, but clear cutting along streams is no longer a common practice in the Pacific Northwest. Now forests are in the early stages of stand regeneration with dense homogenous canopy cover. As forest succession continues natural disturbances and tree mortality will increase canopy heterogeneity through the introduction of gaps. To understand how aquatic food webs respond to an increase in light associated with canopy gaps, we investigate the response of macroinvertebrates and fish feeding to canopy-opening manipulations.

Stream light availability is an important driver of aquatic food webs. In the PNW, stream algal production is highly light-limited, and an increase in light often enhances benthic algal growth, which in turn increases food availability for secondary consumers in the stream such as macroinvertebrates. Macroinvertebrates play an important role in assimilating and transducing energy to higher trophic levels such as insectivorous fish and other vertebrate predators. Because macroinvertebrates play such a crucial role in mediating food web interactions, understanding their community dynamics can provide insight into broader ecosystem functioning.

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Clear cutting has been shown to have a definite impact on streams, but local changes in light availability (on the meter scale) are much more variable.

Understanding the impacts of small canopy gaps, rather than large clear cuts, will be important for dictating future management practices.

What, if any, is the impact of gaps on stream invertebrate communities?

Does changing light conditions cascade through the food web?