Light-Driven Changes in Aquatic Macroinvertebrate Community are not Reflected in the Diets of Coastal Cutthroat Trout

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Forests in the Pacific Northwest are continuing to undergo stand regeneration after more than a century of heavy harvesting, and best practices of the half century preceding the Northwest Forest Plan have left forested headwater streams with dense second growth riparian vegetation. In these aquatic ecosystems, light availability is mediated almost entirely by the canopy structure of stream-side vegetation. So, in a young second growth forest with a dense canopy structure, we would expect that primary production is light limited. We manipulated stream-side canopy cover of several streams in the western Cascades of Oregon by creating small (≈ 40-meter diameter) gaps in order to increase light availability and investigate the role that the macroinvertebrate community plays in transducing changes in light availability to higher trophic levels. We hypothesized that increases in light availability would have a positive response on grazing macroinvertebrates due to elevated algal production, and that this change in community structure would be reflected in the diets of trout. The study was designed with paired control and treatment reaches at five different sites. Pretreatment benthic invertebrate samples were collected during summer of 2017, then gaps were cut over the winter. Sites were resampled during summer of 2018 and trout diets were collected as well. The relative abundance of invertebrate taxa in trout diets were compared to the relative abundances in the benthic community as well as to the change in abundances in the treatment reach before and after cutting gaps relative to the control reach. The presence of a gap proved to be a moderate driver of changes in the benthic invertebrate community, but this change was not reflected in the diets of trout. The lack of response in trout diets and the marginal response in the benthic invertebrate community suggest that a non-uniform riparian buffer may not be detrimental at the small, reach-scale level.