United States Department of the Interior

U.S. GEOLOGICAL SURVEY

Grand Canyon Monitoring and Research Center

Jeffrey D. Muehlbauer, Research Ecologist, Ph.D.

2255 North Gemini Drive, Flagstaff, Arizona 86001

[jmuehlbauer@usgs.gov](mailto:jmuehlbauer@usgs.gov) (928) 556-7328

### 3 February 2016

Dr. Aimeé Classen, *Ecological Monographs* Editor-in-Chief



Dear Dr. Classen,

My co-authors and I submit this manuscript entitled “Landscape controls on stream signatures: the forest edge as the boundary for terrestrial food webs” for your consideration. We believe this manuscript makes several important contributions that will be of interest to the broader field of ecology. Notably for the specific scope of *Ecological Monographs*, we also believe it tells a comprehensive, nuanced empirical story that should add substantially to the theory of ecological subsidies,thus warranting its publication in this journal specifically.

This manuscript represents the culmination of three years of my dissertation field work throughout central Europe and Appalachian North America, and as such is broad in geographic scope. The central question of the manuscript is how landscape features, including geography, geomorphology, vegetation, and hydrology, affect the spatial distribution of aquatic subsidies throughout the terrestrial landscape: what we define as “stream signatures” in a 2014 paper and meta-analysis in *Ecology*. A key component of this question is how the transmission of these subsidies varies across ecosystems that are vastly different in scale—from the smallest mountain streams to the Danube River, one of the largest river systems in the world. Few studies have investigated the extent to which ecological subsidies travel through adjacent food webs, even fewer have considered the environmental conditions affecting this transmission, and no other studies have come close to approaching the size and extent of our dataset. Having conducted the meta-analysis cited above, I say this without hubris and as a statement of fact. I think it is reasonable to hope that this manuscript, if published, should become the standard reference for such questions.

The comprehensive nature of the dataset included in this manuscript also provided us with an ability to explore nuance in the transmission of subsidies from rivers and streams to terrestrial ecosystems, which yielded some notable ecological surprises. Principal among these is that these subsidies can travel great distances, half a kilometer or more in many cases, even though the majority remains very near the water. Additionally, we quite unexpectedly observed a very consistent concentration of these subsidies at the edge of the forested zone where riparian vegetation gives way to upland forest. In essence, we consistently found a food web that was exceptionally “aquatic,” even at distances several hundred meters away from the edge of the stream. From the perspective of food web energy, our results show that this riparian-upland zone actually functions as much as a stream or river as the waterway that it runs parallel to. This result fundamentally challenges our human construct of stream and other ecological boundaries, with broad implications for ecologists studying food webs, for managers restoring streams, and for conservationists interested in the ecosystem services riparian zones provide.

We suggest Dr. Claudio Gratton as associate editor for this manuscript, based on his expertise in aquatic-terrestrial subsidies. Secondarily, we suggest Drs. David Lytle, Julian Olden, or Ryan King as associate editor based on their expertise in aquatic invertebrates and the movement of aquatic organisms and energy onto land. As reviewers, we suggest Drs. Daniel Allen, Colden Baxter, David Strayer, John Sabo, John Richardson, or Mary Power (contact info provided elsewhere on the online submission form), all of whom have published foundational literature in the field of stream-to-land subsidies and the boundaries between these ecosystems.

Thank you for your consideration.

Sincerely,

### Jeffrey D. Muehlbauer