Factors affecting the fate of Pacific lamprey carcasses and resource transport to riparian and stream macrohabitats

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Abstract
1. Anadromous fish transport marine-derived nutrients to freshwaters during spawning migrations with potential implications for stream food webs. While many studies have explored the role of marine-derived nutrients instream ecosystems (particularly via Pacific salmonids [Oncorhynchus spp.]), relatively few have examined the spatial distribution and patchiness of non-salmonid fish carcasses or rates of transport to the riparian zone.

2. We radio-tagged and released 144 mature Pacific lamprey (Entosphenus tridentatus) prior to spawning and tracked the fate of post-spawn carcasses in two inland Columbia River basin streams to characterise spatial distribution of carcasses and marine-derived nutrient deposition. We found that 27 and 40% of lamprey that could be assigned a fate were moved into the riparian zone adjacent to stream segments exhibiting higher velocity conditions with larger substrates. Conversely, lamprey with instream fates were associated with depositional microhabitats and woody debris dams. Estimated carcass loading rates varied by more than an order of magnitude among habitats. These patterns probably reflect a combination of processes influencing the likelihood of carcass removal (e.g. by predators or scavengers, or stranding) and factors affecting the distribution of carcasses remaining within the stream.

3. Our results demonstrate substantial transport of lamprey carcasses across the stream-riparian ecotone and a non-random distribution of carcasses within streams, patterns which probably influence how resources enter stream and riparian food webs. More broadly, the results suggest local and landscape-scale hydrogeomorphic factors, along with species-specific traits and phenology, affect the distribution and potential roles of fish carrion in stream food webs.

KEYWORDS
anadromous fishes, resource subsidies, streams, trophic dynamics