Spatiotemporal Variation In Prairie Stream Fish Assemblages

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Fisheries biologists must be certain that their samples represent true parameters to make sound management decisions. Thus, assessing the spatiotemporal variation of fish assemblages in Montana prairie streams will allow for a better understanding of these ecosystems and their management. We used stratified random sampling to select five tributaries of the Yellowstone River that represent a gradient of stream sizes. To assess spatial variation, fish were sampled at sites arrayed from the confluence to the headwaters of each stream during June and July 2005 and 2006. To assess temporal variation, downstream, middle, and headwater sites, i.e., drainage position, were sampled on each stream in spring 2005 and summer and fall 2005 and 2006. In general, species richness increased with increasing watershed size from 16 to 26 species. Species richness varied spatially and decreased from downstream to upstream sites. Species richness in the smallest stream varied spatially from 12 to 0 (CV = 86.73) species; likewise, species richness varied from 16 to 2 (CV = 41.63) in the largest stream. The downstream site of the largest stream exhibited the greatest temporal variation in species richness—from 16 to 9 species (CV = 1.03). Overall, species richness did not vary consistently among seasons. Canonical correspondence analysis showed that drainage position and proportion of fine substrate were significant in explaining the most variation in fish assemblage structure. Given logistic and monetary constraints, we suggest that biologists design their surveys to maximize spatial coverage to adequately characterize fish assemblages of prairie streams.