Angradi, T.R. Development of an index of ecological condition based on macroinvertebrate assemblages. *Upper Mississippi River Basin Association Workshop, Dubuque, IA, May 5-6, 2009*.

**Abstract.** We developed a set of great river macroinvertebrate indices of condition (GRMICs) for the mid-continent great rivers (Missouri, Upper Mississippi, and Ohio). We used a multiscale (site, reach, landscape) multimetric abiotic stressor gradient to select macroinvertebrate assemblage metrics sensitive to human disturbance. We used the same stressor gradient to derive reference expectations by empirical modeling. We developed GRMICs for each of 5 reaches, the Upper Missouri River, the Lower Missouri River, the unimpounded Upper Mississippi River, the impounded Upper Mississippi River, and the Ohio River. For each reach, we developed indices for the littoral benthos. We created 2 versions of each index: a version including all types of metrics (e.g., autecology, diversity, composition, tolerance to pollution) and based on the absolute value (AV) of the correlation between invertebrate metrics and the stressor gradient, and a version that included no tolerance-value-based metrics (NTV). With the exception of the unimpounded Upper Mississippi River, we concluded that the indices were reliable for general assessment of great-river aquatic conditions. The AV and NTV versions of the GRMIC were highly correlated ($r = 0.94$). The indices revealed longitudinal variation in condition on great river reaches and among-river variation in relative condition among reaches (the proportion of the river in a condition similar to the least-disturbed sites for that reach). No sites near or within 100 km downriver of Kansas City, Missouri on the Missouri River or Minneapolis-St. Paul, Minnesota on the Upper Mississippi River were in least-disturbed condition. Condition estimates based in GRMIC allow comparisons among rivers or reaches in the proportion of the reach in most- or least-disturbed condition as defined for that reach using the stressor gradient. About $46\pm8\%$ ($\pm95\%$ CI) of the Ohio was in least-disturbed condition based on the littoral benthos; $25\pm8\%$ of the Missouri River and $8\pm4\%$ of the Upper Mississippi River were in least-disturbed condition.