Ecological Drainage Units of Missouri

The Grand River within the Central Plains/ Grand/ Chariton Ecological Drainage Unit.

The Gasconade River within the Ozark/ Gasconade Ecological Drainage Unit.

Objective
Stratify each of the Aquatic Subregions within Missouri into relatively distinct zoogeographic subunits that also fit the definition of an ecosystem.

General Description
Isolation is a key component of divergent evolutionary processes and is especially prevalent in freshwater ecosystems (Matthews 1998). For animals lacking a terrestrial life history phase, drainage boundaries serve as important isolating mechanisms, which is why each one tends to contain a relatively distinct fauna (Gilbert 1980; Pflieger 1989; Brown 1995). Embedded within Aquatic Subregions are geographic variations in taxonomic composition (species- and genetic-level) resulting from the geographically distinct evolutionary histories of the major drainages within each Subregion (Pflieger 1971; Mayden 1987; Mayden 1988; Crandall 1998; Matthews and Robison 1998). Ecological Drainage Units (EDUs) account for these differences in taxonomic composition. EDUs are analogous to "islands" when viewed within the context of the surrounding Aquatic Subregion, which is analogous to the "sea" in which the EDUs reside. Within a given Aquatic Subregion, all of the EDUs have assemblages with relatively similar ecological composition (e.g., physiological tolerances, reproductive and foraging strategies). However, the taxonomic composition (species and phylogenetic composition) of the assemblage within any given EDU is relatively distinct due to evolutionary processes such as adaptive radiation, genetic drift, differences in colonization history, random genetic mutation, etc.

Principle Investigators
Scott P. Sowa, Missouri Resource Assessment Partnership (MoRAP), UMC, Columbia, Missouri
Gust M. Annis, MoRAP, UMC, Columbia, Missouri
David D. Diamond, MoRAP, UMC, Columbia, Missouri
Michael E. Morey, MoRAP, UMC, Columbia, Missouri

References
Brown, J. H. 1995. *Macroecology*. University of Chicago Press. 269 pp.

Crandall, K.A. 1998. Conservation phylogenetics of Ozark crayfishes: Assigning priorities for aquatic habitat protection. Biological Conservation 84: 107-117.

Gilbert. 1980. The equilibrium theory of island biogeography: fact or fiction? Journal of Biogeography 7: 209.

Matthews, W. J. 1998. *Patterns in Freshwater Fish Ecology.* Chapman and Hall, New York, NY.

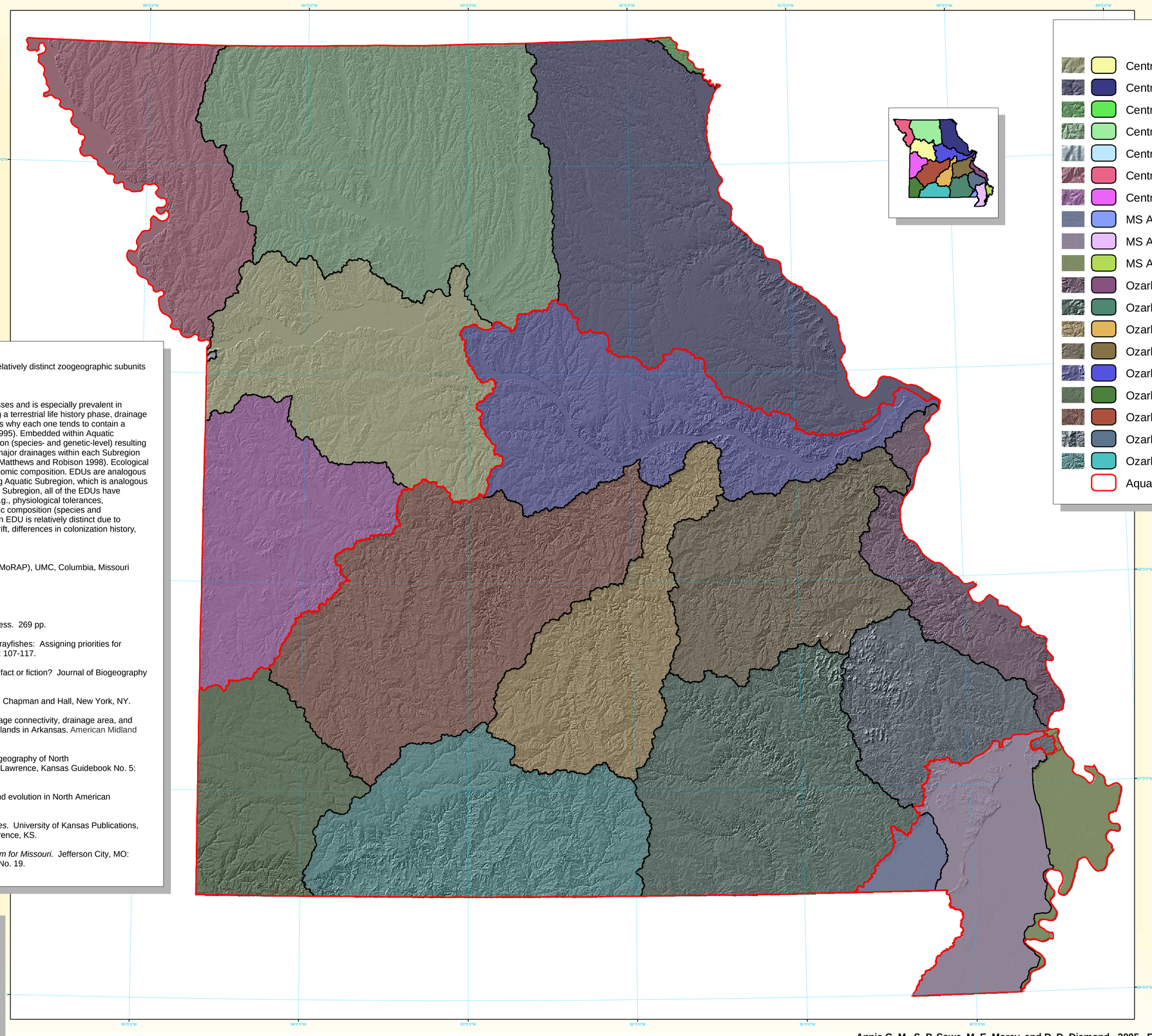
Matthews, W. J. and H. W. Robison. 1998. Influence of drainage connectivity, drainage area, and regional species richness on fishes of the Interior Highlands in Arkansas. American Midland Naturalist. 139:1-19.

Mayden, R. L. 1987. Pleistocene glaciation and historical biogeography of North American highland fishes. Kansas Geological Survey, Lawrence, Kansas Guidebook No. 5: 141-152.

Mayden, R. L. 1988. Vicariance biogeography, parsimony, and evolution in North American freshwater fishes. Systematic Zoology 37(4):331-357.

Pflieger, W. L. 1971. *A Distributional Study of Missouri Fishes.* University of Kansas Publications, Museum of Natural History Volume 20: 225-570. Lawrence, KS.

Pflieger, W. L. 1989. *Aquatic community classification system for Missouri.* Jefferson City, MO: Missouri Department of Conservation, Aquatic Series No. 19.



Legend

- Central Plains/Blackwater/Lamine
- Central Plains/Cuivre/Salt
- Central Plains/Des Moines
- Central Plains/Grand/Chariton
- Central Plains/Kansas
- Central Plains/Nishnabotna/Platte
- Central Plains/Osage/South Grand
- MS Alluvial Basin/Black/Cache
- MS Alluvial Basin/St. Francis/Little
- MS Alluvial Basin/St. Johns Bayou
- Ozark/Apple/Joachim
- Ozark/Black/Current
- Ozark/Gasconade
- Ozark/Meramec
- Ozark/Moreau/Loutre
- Ozark/Neosho
- Ozark/Osage
- Ozark/Upper St. Francis/Castor
- Ozark/White
- Aquatic Subregion Boundary

N

0 20 40 80 120 160 Miles

Large ditches are typical within the Mississippi Alluvial Basin/ St. Francis/ Little Ecological Drainage Unit.

Missouri Resource Assessment Partnership (MoRAP), University of Missouri, 4200 New Haven Road, Columbia, MO 65201

Annis G. M., S. P. Sowa, M. E. Morey, and D. D. Diamond. 2005. Ecological Drainage Units of Missouri. MoRAP Map Series MS-2005-006.

Cartographer: Gust M. Annis

Photos compliment of the Missouri Department of Conservation: Copyright © Missouri Conservation Commission