

EPA EPSCoR Progress Report

Title: Developmental Stability in Amphibians as a Biological Indicator of Chemical Contamination and Other Environmental Stressors

Investigators: Whiteman, Howard H., Loganathan, Bommana G.

Institution: Murray State University

EPA Project Officer: ??? David fill in here??

Project Period: October 1, 2001 through September 30, 2003

Project Amount: \$165,775 (this is the EPA total)

Research Category: ?? Biological Indicators Research

Description:

Objective: We proposed to evaluate the potential of using developmental stability as a biological indicator of anthropogenic and natural stress in amphibians. Amphibians are ideal biological indicators, because their semi-permeable epidermis and complex life cycle expose them to multiple stressors in both aquatic and terrestrial environments. Because of this, amphibians should be among the first vertebrates affected by anthropogenic stressors in either of these environments. Furthermore, some of the same stressors affecting amphibians are known to have negative effects on other species, including humans. Although we proposed to evaluate a wide range of possible stressors, a major thrust of this project is to correlate amphibian developmental stability with contaminant levels accumulated in their tissues. We hypothesized that amphibian developmental stability would decrease with increased levels of anthropogenic (contaminants, land use practices) and natural (population size and density) stressors. Our specific goals are to: (1) correlate the effects of environmental stressors with amphibian developmental stability; (2) evaluate the effect of species, life history stage, trophic level, and habitat type on measures of developmental stability; and (3) develop methods for separating the effects of anthropogenic and natural stressors.

Progress Summary: In Year 1 of this grant, we began our developmental stability research, honed our methodologies, and attracted the personnel needed to complete the project. Specifically, we processed animals from two species/life stages: adult eastern newts and larval bullfrogs. Statistical analysis of these specimens is nearing completion, and we are currently collecting tissue samples for contaminant processing. Because of the start date of the grant (October), we did not attract graduate students to the project immediately, but rather used the time to advertise and attract a quality graduate student (Beth Kobylarz), while utilizing current graduate and undergraduate students to complete some of the necessary work. Instead of a second new graduate student, we have hired a part-time postdoc to assist with the contaminant analyses. In addition, two other graduate students have become involved in this project: Christy Meredith has conducted experiments on the effects of nitrate on amphibian development, and will be completing her M.S. this fall. Jessica Boynton has recently joined our group, and with funding from the Kentucky Space Grant Consortium will be analyzing our developmental stability results from a GIS perspective.

Preliminary Results: We are still in the process of analyzing the results of our initial developmental stability work, and should have these completed this fall. As part of quality assurance of our chemical analysis in amphibians, we participated in the 2002 National Institutes of Standards and Technology (NIST) Intercomparison Exercise Program and analyzed 25 PCB congeners and 24 chlorinated pesticides in fish (Fish Homogenate V: QA02FSH5) and sediments (Marine Sediment XI (QA02SED11)). Our laboratory results are published in 2002 NIST QA Report. (Schantz, M.M., Kucklick, J.R., Parris, R.M., Poster, D.L. and Wise, S.A., *Description and Results of 2002 Organic Intercomparison Exercises*, National Institute of Standards and Technology, Gaithersburg, MD). Because of the longer time horizon present with contaminant analysis, amphibian results will not be available until next year.

Future Activities: We will continue work toward all three goals during the coming year. With the addition of a graduate student the research should progress quickly, and another new graduate student will allow us to put our results into a GIS perspective.

Publications and Presentations: Total Count: ??

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Type

Presentation

Meredith, C. A. Effects of nitrate on the Mexican axolotl, *Ambystoma mexicanum*. Sigma Xi Poster Competition, Murray State University, April 2003.

Supplemental Keywords: amphibians, bioindicators, contaminants???

Scientific Discipline: conservation biology, toxicology, ???