

Amphibian Research and Monitoring Initiative – Midwest Region

Background

As part of the Amphibian Research and Monitoring Initiative (ARMI; <http://armi.usgs.gov/>), scientists from the U.S. Geological Survey have been working to provide critical information on the extent and causes of amphibian declines since 2000. The goals of ARMI are to assess the statuses of amphibian populations, describe the scale, severity, and causes of declines, and provide essential scientific information to enable effective conservation actions. We began conducting ARMI research in ARMI's Midwest Region (ARMI-MR) in 2002. Our offices and laboratories are at the Upper Midwest Environmental Sciences Center in La Crosse, Wisconsin (Fig. 1; <http://www.umesc.usgs.gov/>).



Fig. 1. The Midwest Region of the U.S. Geological Survey's Amphibian Research and Monitoring Initiative. The red star indicates the location of La Crosse, Wisconsin.

Amphibian populations are reduced in size or lost because individuals are sensitive to environmental stressors. These sensitivities largely are due to complex life cycles that make most amphibians vulnerable to impacts in both aquatic and terrestrial habitats; relatively moist skins that can harbor pathogens and allow the uptake of contaminants from air, soil, and water; and requirements for unusual combinations of temperature and water to survive and reproduce. Such traits not only render amphibians susceptible to impacts from stressors, but also make them potentially important indicators of environmental changes that could reduce a range of crucial ecosystem services and affect human health.

Primary threats to amphibians in the ARMI-MR include effects from habitat loss, exposure to agricultural chemicals, emergent diseases, and climate change. These factors are principal threats in this region because: 1) conversions of aquatic and terrestrial habitats to agricultural production and urban expansion continue to reduce places where amphibian populations can persist in the highly altered ARMI-MR; 2) widespread exposures to agricultural chemicals that can be toxic directly or indirectly add further to the complex and likely interacting stressors acting on amphibian populations; 3) emergent diseases have reduced amphibian populations dramatically around the world and might have impacted regional populations in past decades; and 4) the exceptional temperature and moisture regimes amphibians require make climate change a possible pervasive driver of significant impacts on amphibian populations.

Efforts and Outcomes

We have conducted initial assessments of the statuses of amphibian populations relative to the above stressors, as well as to the occurrence of gross physical deformities, in Minnesota, Wisconsin, Illinois, and Iowa. We found all the amphibian species we surveyed generally where we expected them, except for the northern cricket frog (*Acris crepitans*), which already was known to have declined. We also detected atrazine and a potentially deadly amphibian chytrid fungus in many breeding sites, but a very low incidence of deformities. These were the first assessments of this type and scope conducted in this portion of the country. We now are building upon our initial work by leveraging resources with multiple partners to implement innovative, cost-effective monitoring. This highly integrated approach is necessary to provide stakeholders the additional information they need on long-term population statuses relative to environmental stressors across meaningful spatial scales. For more information, please visit <http://armi.usgs.gov/> and <http://www.umesc.usgs.gov/armi.html> or contact Walt Sadinski (wsadinski@usgs.gov).