Research Needed to Assess Management Strategies for Amphibians and Reptiles in the Midwest

Midwest Partners in Amphibian and Reptile Conservation – Research Working Group

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The Research Working Group identified assessment of management strategies for their impacts on amphibians and reptiles as the greatest research need in amphibian and reptile conservation. Such management strategies might be intended to benefit amphibians and reptiles directly or to benefit other species of conservation, economic, or recreational value and have secondary effects on amphibians and reptiles. Research approaches should include both manipulative experiments with appropriate replication and control treatments and long-term monitoring of populations in managed and unmanaged habitats. Such monitoring can provide valuable information on trends over time even in the absence of preplanned control treatments. Information dissemination, regardless of the success of the management strategy, is an integral part of management strategy assessment.

Habitat Restoration (Terrestrial and Aquatic): Restoration often proceeds with the goal of creating habitat that approximates its condition prior to European settlement and subsequent development. For most species and habitat types, it is not known whether restored habitat increases population viability locally or makes a positive contribution to meta-population dynamics.

Prescribed Burn: Fire is a management technique that is used to discourage spread of non-native vegetation and prevent succession within certain native habitats. While prescribed burn is expected to benefit resident animals indirectly, the burns can have detrimental direct effects. Variables associated with prescribed burn that require further investigation are: 1) its timing with respect to annual periods of amphibian and reptile activity (emergence, breeding aggregation, thermal regime), 2) spatial distribution of the burn (one large vs. several small), and 3) burn intensity under different fire loads.

Eradication of Exotic Species: Removal of exotic plant species is an aspect of restoration that involves a range of techniques which may be harmful to amphibians and reptiles. Manual removal of vegetation alters habitat structure. Application of herbicides and pesticides increases the risk of direct and indirect exposure to non-target organisms. Better knowledge of both the effect of removing the exotic species on natives and also the potential impacts of different removal techniques is needed.

Establishment of Habitat Corridors: Habitat corridors are intended to increase the linkage between habitat patches to maximize the potential for species to persist regionally in the face of environmental stochasticity on the local level. Little is known about the use of corridors by different species and how they should be configured to be most beneficial. Also, there needs to be further development of research on the best methods

for crossing different types of barriers (roads, agricultural fields, urban/suburban development)

Reintroduction of Historically Present Species (including Translocation and Headstarting): Reintroduction of species is a technique that is being increasingly considered for endangered amphibians and reptiles. Assuming that there is a historical record of the species' distribution, research to understand the original cause of population decline and an assessment of the suitability of the proposed site of reintroduction is necessary to enhance the chances of success. Additional considerations include: 1) the number of individuals and frequency of release, 2) the fidelity of the introduced individuals to the relesase site, 3) the life stage, sex, body size, and genetic diversity of the release population, and 4) monitoring the survival and reproduction of released individuals.

The source of reintroduced individuals may be from a wild population (translocation) or from individuals bred in captivity (headstarting). Investigation of the effect of translocation on the source population and monitoring of the establishment of residency of introduced individuals is needed. Meanwhile, study of headstarting requires assessment of the risk of unintended introduction of disease and study of the effect of the rearing environment on neonate sex, size, and subsequent growth.

Silviculture: Practices associated with the establishment, growth, and harvest of forest are expected to impact resident amphibians and reptiles. In addition to study of the distribution and abundance of resident species, additional research is needed on the mechanisms that drive population change. Such mechanisms might include alteration of the biophysical environment, change in food resources, and establishment of novel predators and/or competitors.

Grazing: Open habitats can be maintained by livestock grazing. Study of the relationship between grazing intensity, and the abundance and distribution of amphibians and reptiles is needed. Similar to siliviculture, the mechanisms of population change require further investigation.

Fish Stocking: The introduction of fish to aquatic habitats used by amphibians and reptiles is a concern. Fish can act as potent predators on amphibian larvae and be vectors of aquatic diseases. They may also influence resource availability to amphibians and reptiles and sometimes represent alternative prey to native species (e.g., for semi-aquatic snakes and turtles). The effects of certain species of stocked fish on the range of species making up a herpetofaunal assemblage are needed. With respect to disease, there is little information on which diseases carried by stocked fish are a risk for native amphibians and reptiles.

Wildlife Management in Existing Habitat: Activities aimed at managing populations of a single species may have direct and indirect effects on co-occurring amphibian and reptile populations. In particular, potential habitat change resulting from wildlife management is likely to be most important in this context. As described for silviculture and grazing (see above), the mechanisms associated with the effect of habitat change require investigation.

Population Viability Analysis (PVA): PVA is a modeling technique that can be used to evaluate the effectiveness of differing management approaches for enhancing the chances of persistence of a species of interest. By varying parameters of the model, it may be possible to identify the stages of life history that are most sensitive to a particular management practice. Furthermore, PVA can be used to determine critical variables that require the greatest attention in the monitoring of the population.