

Iowa Stream Fish Species of Greatest Conservation Need: Using IAGAP Products to Refine Prioritization and Guide Assessment

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Goals and Objectives:

- Refine Iowa's prioritization of stream fish species of greatest conservation need (SGCN).
- Test the potential of Iowa Aquatic Gap Analysis Program (IAGAP) models for predicting the occurrence of fish SGCN in Wadeable Iowa streams.
- Better understanding of the occurrence and distribution of high-priority fish SGCN in Wadeable Iowa streams.

Progress:

During FY2012 all project objectives were completed, final reports were submitted, and manuscripts were prepared for submission to select scientific journals.

Conclusions and Recommendations:

Freshwater systems are among the most endangered ecosystems in the world, and many freshwater species are consequently highly threatened and vulnerable to extinction. In Iowa, 68 fish species have been identified as species of greatest conservation need (SGCN). Before locations in streams and watersheds can be identified as potential conservation sites, the distribution, status, and habitat requirements of fish SGCN must be better understood. Fish species distribution models developed as a component of the Iowa Aquatic Gap Analysis Project (IAGAP) are a potential conservation tool, but the effectiveness of these models needs to be evaluated before they are relied on for conservation planning. Thus, the objectives of this study were to 1) evaluate the status of fish SGCN by comparing historical and contemporary fish assemblage surveys, 2) test the effectiveness of IAGAP models for predicting the occurrence of fish SGCN in Wadeable Iowa streams with an independent dataset, and 3) identify large-scale (i.e., GIS-measured) and small-scale (i.e., instream) habitat features that influence fish SGCN occurrence. During spring and summer 2009 and 2010 fish assemblages and instream habitat were sampled from 86 Wadeable stream segments in the Mississippi River drainage of Iowa. Frequencies of occurrence in stream segments where species were historically documented were used to assess the status of ten species and frequencies of occurrence in stream segments where species were predicted present and absent by IAGAP models were used to evaluate the performance of twelve species distribution models. Furthermore, multiple-logistic regression analyses were used to evaluate the associations of large-scale and small-scale habitat variables with the occurrences of seven fish SGCN.

Results showed that the status of ten Iowa fish SGCN was highly variable. The frequency of occurrence in stream segments where historically documented varied from 0.0% for redbfin shiner *Lythrurus umbratilis* to 100.0% for American brook lamprey *Lampetra appendix*. Frequencies of occurrence greater than 80.0% suggest that the current distributions of banded darter *Etheostoma zonale*, American brook lamprey, and southern redbelly dace *Phoxinus erythrogaster* are similar to historical distributions. In contrast, redbfin shiner, slender madtom *Noturus exilis*, tadpole madtom *Noturus gyrinus*, blackside darter *Percina maculate*, and slenderhead darter *Percina phoxocephala* were collected in 40.0% or fewer of the stream segments where previously documented, suggesting declines in their distributions. Twelve IAGAP models were evaluated by comparing model-predicted presences and absences to surveyed species presences and absence. Overall correct classification rates varied from 0.34 for the tadpole madtom model to 0.84 for the longnose dace *Rhinichthys cataractae* model. The IAGAP models for banded darter, southern redbelly dace, and longnose dace were the only models that performed better than would be expected by random chance. Thus, a majority of the IAGAP models failed to accurately predict the occurrences of fish SGCN with an independent dataset. Results for the third objective revealed that both large-scale and small-scale habitat variables can explain occurrences of fish SGCN, but combinations of small-scale and large-scale variables predicted the occurrences of most species with the greatest accuracy. Thus, conservation of fish biodiversity will require managing for habitat complexity across a broad spectrum of landscapes and environmental gradients.