

## **Development of a Proposed List of Endangered and Threatened Vertebrate Animals for Indiana**

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The first warnings of the overexploitation of our lands, our waters and our wildlife came many years ago—some in the previous century. In the 1850's and 1860's, Henry Thoreau and George Perkins Marsh authored cautionary essays on what we were doing to our lands and waters. Later in the 19th Century, John Muir castigated Congress for its failure to protect the incomparably beautiful lands of the west—our Yosemite, our Grand Canyons, our Sierra Peaks. In the first half of this century, Aldo Leopold, Stephen Mather, Robert Sterling Yard, and Robert Marshall issued admonitory blasts against our exploitive ways.

Not, however, until mid-century did these early warnings convince a significant portion of our population that these dangers were real. The conservationists' victory in the Echo Dam Battle of the 1950's convinced them to drive on to a formalized protection—the Wilderness Act of 1964. With our special lands supposedly inviolate, our special animals were the next to receive our protective attention. The Endangered Species Act of 1966 was passed. Clean air and clean water acts were also enacted. Later amendments to the Endangered Species Act extended protection to marine mammals, foreign mammals (prohibited importation), and endangered plants. Presently we are seeking help for non-game animals.

The enactment of a law is a simplistic precursor to the tougher task of implementing it. Each piece of restrictive legislation must necessarily result in lessening or eroding of some previously accepted or implied right or freedom. The man in the middle is the land manager who must see that the dictates of the law are being implemented. He must deal, on the one hand, with that public which feels that its previous freedoms have (unjustly, of course!) been taken from it. On the other side, he is being pushed to apply the advocates' interpretation of the legislation stringently—perhaps even beyond what appears to have been congressional intent.

The Endangered Species Act compounded the usual problems by applying to animals of extremely low populational densities. Indeed, this was the primary requisite for their selection—animals that were generally the least evident and often those animals about which we knew the least. These animals were so rare that even the most astute authorities could not tell the land manager whether or not the species of concern occurred on the lands or in the waters for which the manager was responsible.

On public lands, Congress had dictated that protective management be instituted. These management practices may, however, be expensive. The managers' quandary: To install protective management practices unquestioningly, or to wait until there are proven losses of these rare animals on

the lands under his responsibility. The first approach exposes the manager to possible embarrassment when later experience shows that his expensive protection of a species was installed on lands or waters where the species did not occur. The second approach subjects the manager to charges of insensitivity and dereliction of his responsibilities.

A compromise approach would involve an exhaustive compilation of all collections of these threatened animals, followed by biological surveys (i.e., actual field searches) for those species showing a high likelihood of being present. In 1976, the Indiana Chapter of the American Fisheries Society proposed to the Indiana Academy of Science that the Chapter compile these threatened species data. The AFS Chapter felt not only that the data were urgently needed, but also that the Chapter had within its ranks the expertise to do the job. The Academy agreed, and issued a grant of \$1400 for the production of a comprehensive document on the subject.

The Indiana Chapter of the AFS persuaded two of its members to take on this task. James Gammon analyzed the status of threatened fishes, and John O. Whitaker, Jr., took on the assignment of bringing together all the distributional data for mammals, birds, reptiles, and amphibians. The AFS Chapter would restrict its attention to these groups; no lower animals or plants were to be considered.

We assembled a working list of species to be considered from three primary sources. One of these was the 1972 Soil Conservation list of rare and endangered plants and animals. A second list (for amphibians and reptiles) was one prepared by the Society for the Study of Amphibians and Reptiles (SSAR) in 1972. The third source was a list of vertebrate animals received from the Department of Natural Resources in November, 1976. These three lists became our working roster, and species appearing on one or more of these three lists were reviewed in depth.

Most of this review entailed an intensive analysis of past distributional records of each species. In a few cases it appeared that the presumed rarity of the animal might be merely due to lack of spatial or temporal collecting effort. Further, previous collectors may have used less effective collection methods than those which were currently available. In these cases, actual field collections were made. (It should be noted, however, that field collection efforts were minimal.)

All previously published distributional data were compiled on the included species, and the results of any actual field collections were added to this data base. Other authorities on Indiana fauna were contacted, and their personal knowledge of unpublished occurrences of these animals was sought. Some were asked to review the first draft of the manuscript. They supplied a number of additions and corrections.

With these data assembled, Whitaker and Gammon made a critical judgment for each species. These judgments took one of three forms: 1) the status of the species (endangered or threatened) on the working list was most probably correct; 2) the species was moved from one category to another within the list (e.g., a species was listed as "Endangered" on the working list, but should

be lowered to "Threatened"); or 3) should be removed from the list entirely. On the basis of present distributional data, we would assign species on the *working list* to the categories indicated in Table I. Note, however, that we reluctantly abstained from a fourth category in these judgments, viz., *adding* species to the working list which were not originally on it.

The manuscript is now complete. It includes discussion of the distributional status for each species. We have included all records of which we are aware and we hope that we have eliminated much of the ambiguity concerning collecting localities of these animals. This does *not* mean, however, that the job is complete.

There should be a continuing review of the status of decimated and/or rare species. For example, Gammon and McReynolds wonder why such species as *Fundulus catenatus*, *Phoxinus erythrogaster*, and a few others were *not* on the list for which this review was made. Authorities such as the Indiana DNR and the Academy's Biological Survey Committee should constantly—or at least periodically—review the status of existing or potential candidates for the protected list. Only by a continuing monitoring of these animals will we be able to rescue those on the brink.

TABLE I *Base list of species of mammals, birds, reptiles, amphibians, and fishes of Indiana proposed for consideration for endangered or threatened status, and our recommended proposed status.*

Animals	Our Proposed Status
<i>Mammals</i>	
<i>Sorex longirostris</i> , Southeastern shrew	Omit from list
<i>Condylura cristata</i> , Star-nosed mole	Omit from list
<i>Myotis austroriparius</i> , Southeastern bat	Threatened
<i>Myotis grisescens</i> , Gray bat	Endangered
<i>Myotis sodalis</i> , Indiana bat	Endangered
<i>Plecotus rafinesquii</i> , Big-eared bat	Endangered
<i>Spermophilus franklinii</i> , Franklin's ground squirrel	Omit from list
<i>Geomys bursarius</i> , Pocket gopher	Omit from list
<i>Neotoma floridana</i> , Eastern wood rat	Threatened
<i>Reithrodontomys megalotis</i> , Western harvest mouse	Omit from list
<i>Sylvilagus aquaticus</i> , Swamp rabbit	Threatened
<i>Lynx rufus</i> , Bobcat	Endangered
<i>Taxidea taxus</i> , Badger	Threatened
<i>Birds</i>	
<i>Haliaeetus leucocephalus</i> , Bald eagle	Endangered

Animals	Our Proposed Status
<i>Falco peregrinus anatum</i> , Peregrine falcon	Endangered
<i>Dendroica kirtlandi</i> , Kirtland's warbler	Endangered
<i>Tympanuchas cupido</i> , Prairie chicken	Endangered (and possibly extirpated in last 5 years)
<i>Grus canadensis</i> , Greater sandhill crane	Threatened
<i>Pandion haliaeetus</i> , American osprey	Threatened
<i>Reptiles</i>	
<i>Kinosternon subrubrum</i> , Eastern mud turtle	Endangered
<i>Clemmys guttata</i> , Spotted turtle	Threatened
<i>Pseudemys concinna</i> , Hieroglyphic turtle	Endangered
<i>Natrix erythrogaster</i> , Northern copperbelly	Threatened
<i>Thamnophis butleri</i> , Butler's garter snake	Endangered
<i>Opheodrys vernalis</i> , Western smooth green snake	Threatened
<i>Cemophora coccinea</i> , Scarlet snake	Threatened
<i>Tantilla coronata</i> , Crowned snake	Threatened
<i>Sistrurus catenatus</i> , Eastern massasauga	Threatened
<i>Amphibians</i>	
<i>Cryptobranchus alleganiensis</i> , Hellbender	Endangered
<i>Ambystoma platineum</i> , Silvery salamander	Threatened
<i>Ambystoma tremblayi</i> , Tremblay's salamander	Threatened
<i>Hemidactylium scutatum</i> , Four-toed salamander	Threatened
<i>Pseudotriton r. ruber</i> , Northern red salamander	Endangered
<i>Fishes</i>	
<i>Acipenser fulvescens</i> , Lake sturgeon	Endangered
<i>Coregonus artedii</i> , Cisco	Threatened
<i>Esox masquinongy ohioensis</i> , Ohio muskellunge	Endangered
<i>Esox m. masquinongy</i> , Great Lakes muskellunge	Endangered
<i>Clinostomus elongatus</i> , Redside dace	Endangered
<i>Notropis ardens</i> , Rosefin shiner	Threatened
<i>Notropis ariommus</i> , Popeye shiner	Endangered

Animals	Our Proposed Status
<i>Notropis fumeus</i> , Ribbon shiner	Omit from list
<i>Notropis shumardi</i> , Silverband shiner	Omit from list
<i>Cycleptus elongatus</i> , Blue sucker	Threatened
<i>Amblyopsis spelaea</i> , Northern cavefish	Endangered
<i>Chologaster agassizi</i> , Spring cavefish	Omit from list
<i>Typhlichthys subterraneus</i> , Southern cavefish	Endangered
<i>Ammocrypta asprella</i> , Crystal darter	Endangered
<i>Ammocrypta pellucida</i> , Eastern sand darter	Threatened
<i>Etheostoma camurum</i> , Bluebreast darter	Endangered
<i>Etheostoma swaini</i> , Swamp darter	Omit from list
<i>Etheostoma histrio</i> , Harlequin darter	Endangered
<i>Etheostoma maculatum</i> , Spotted darter	Endangered
<i>Etheostoma squamiceps</i> , Spottail darter	Endangered
<i>Etheostoma tippecanoe</i> , Tippecanoe darter	Endangered
<i>Etheostoma variatum</i> , Variegate darter	Endangered
<i>Percina evides</i> , Gilt darter	Endangered
<i>Percina uranidea</i> , Stargazing darter	Omit from list