



2009

WILDLIFE DIVERSITY REPORT



INDIANA RARE SPECIES CONSERVATION

State law charges the Wildlife Diversity Section of the Department of Natural Resources Division of Fish and Wildlife with management and conservation of nongame and endangered species, terms that can be confusing unless specifically defined. “Nongame” species are mammals, birds, reptiles, amphibians, fish, mollusks and crustaceans not normally pursued by people for sport or commercial purposes. Those that are pursued as game are managed using hunting and fishing license fees and federal funds. The Indiana Nongame and Endangered Species Conservation Act (IC14-22-34) defines “endangered species” of wildlife as those “whose prospects of survival or recruitment within Indiana are in jeopardy” or might soon be in jeopardy. Conservation of endangered and nongame species is funded by citizen donations and since 2000, federal matching funds.

These funds support the WDS, a modern scientific resource program, including survey and monitoring, research and habitat management, and protection.

This 2009 report includes a summary of these activities and the generous private funding that supports the program.

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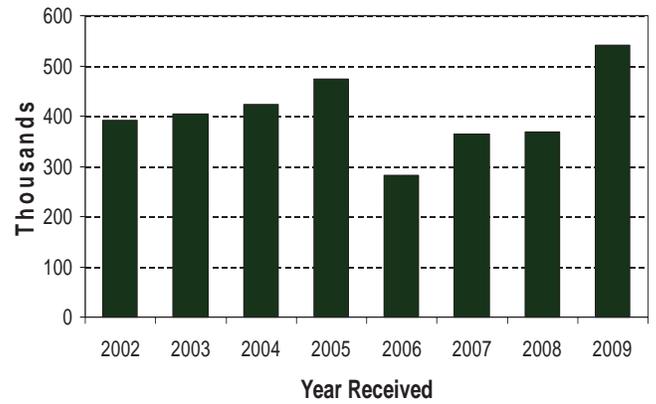


Figure 1. Last eight tax-years donations to the Nongame Fund in thousand dollar increments.

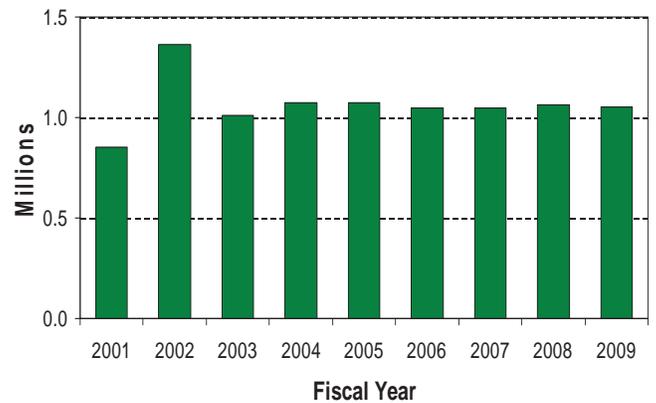


Figure 2. Last eight years federal matching funds for Indiana.

FUNDING

All activities reported herein are funded by the state Nongame Fund and federal State Wildlife Grant funds. The Nongame Fund receives no State tax dollars; it relies on direct donations and money donated using a state income tax check-off program. The fund is currently financially sound, thanks to all donors.

More money was contributed in tax year 2008 than in the previous two years (Figure 1), despite the depressed economic climate. Because Indiana must match the federal funds, one to one, with non-federal dollars, Nongame Fund donations must exceed \$400,000 annually, the level at which survey and monitoring can continue. To claim Indiana’s share of federal funds, several of Indiana’s colleges and universities (see the Research Section) also provide non-federal matching funds. These cooperative projects allow Indiana to identify and/or address specific threats to rare species or habitats and claim all of Indiana’s allotted federal funds (Figure 2).



HOW TO DONATE

The Indiana Wildlife Diversity Section invites you to play an active role in conserving Indiana's nongame and endangered wildlife. This program is funded through public donations to Indiana's Nongame Fund. The money you donate goes directly to the protection and management of more than 750 wildlife species in Indiana—from songbirds and chipmunks to state-endangered barn owls and spotted turtles. You can help Indiana's wildlife by looking for the eagle logo and the line provided on your Indiana state tax form to donate all or part of your refund. To donate directly, please write to:

Nongame Fund
402 W. Washington St. Rm. W273
Indianapolis, IN 46204

HABITAT PROTECTION

The WDS acquired no new land this year, but did develop new habitat for least terns. The nesting islands at Tern Bar Slough Wildlife Diversity Area in Gibson County attracted nesting least terns; however, the nests again suffered predation, just as in previous years. Soil erosion caused gullies to form under the facility's electric fence and provided access points for predators.

When weather permits, the islands are scheduled for additional rip-rap deposition to prevent further soil erosion.

The tern nesting island at Goose Pond Fish and Wildlife Area was also completed this year. The large pool is expected to be flooded in 2010, providing an additional protected nesting site for terns in Indiana.

SURVEY AND MONITORING

Inventory is the first step in the WDS planned management. Working with species that are rare or cryptic complicates identifying the starting point. The WDS conducts many survey efforts to determine a species' current status, (i.e., endangered, special concern or secure). Additionally, conservation requires that management activities and habitat alteration impacts be evaluated. Through monitoring, appropriate conservation actions can be determined and management refined. To achieve the goal of maintaining Indiana's biological diversity the status of species must be determined and conservation efforts prioritized.



Anne Fullenkamp sampling with dip net for banded pygmy sunfish (and other rare SW fishes) in wetland near Big Cypress Slough in Posey County in 2009



Banded pygmy sunfish collected from River Deshee in Knox County in 2006

AQUATIC

Survey for Rare SW Fishes

Several species of fish found in Indiana waters are restricted to the extreme southwestern portion of the state. Many are rare or possibly even extirpated. The purpose of this survey was to document the current status of three of these species; the state endangered bantam sunfish (*Lepomis symmetricus*), and two species of special concern, the cypress darter (*Etheostoma proeliare*) and banded pygmy sunfish (*Elassoma zonatum*). All three prefer the oxbows, sloughs, swamps, backwaters, and ditches of the region that are choked with aquatic vegetation and have soft mud or organic-debris bottoms. Because of their diminutive size and secretive nature, all three species can often go unnoticed in these unique habitats.

Very little is known on the exact distribution of bantam sunfish, cypress darter, and banded pygmy sunfish in

Indiana; there are no historical collection localities. None were collected during a statewide survey of the fishes of Indiana in the 1940's, although all three were considered 'species of probable or possible occurrence.' They have all been documented from areas along the Illinois side of the lower Wabash River or further south in Illinois. For this reason, they have always been considered part of Indiana's historical fish fauna.

In October 2006, biologists from Illinois were taken to Knox County, Indiana, to collect some redspotted sunfish (*Lepomis miniatus*), another more common southwestern Indiana species. They were evaluating the possible augmentation of some redspotted sunfish populations in their state, and as part of that process were conducting a genetic's study of other populations to determine the feasibility of using them as source populations. Unexpectedly, banded pygmy sunfish were also collected during this work. This was the first time that banded pygmy sunfish had actually ever been collected from Indiana and provided the impetus for the current survey.

Since 2007, desired habitats of the bantam sunfish, cypress darter, and banded pygmy sunfish have been sampled in southwestern Indiana in order to determine their current distribution. Sampling in these unusual southwestern habitats can be challenging. Fish were collected using electrofishing techniques (used in open water areas and along edges of stands of aquatic vegetation) and small-meshed dip nets (used in shallow edge areas and pulled through areas of thick aquatic vegetation). To date, areas in southwestern Knox County and southern Posey County have been sampled. No bantam sunfish or cypress darter have been collected; large populations of banded pygmy sunfish have been found in the weedy ditches of southwestern Knox County and several different slough habitats in southern Posey County.

Statewide Freshwater Mussel Survey

Freshwater mussels are an important component of Indiana's aquatic habitats. They act as natural filters and can often comprise the largest proportion of animal biomass in a waterbody. They filter large quantities of suspended materials from the water column and can have a significant influence on nutrient cycling in aquatic ecosystems through excretion and biodeposition. They convert phytoplankton, zooplankton, other microorganisms, detritus, and bacteria that they filter into consumable energy for other organisms. Biodeposition of feces and pseudofeces, byproducts of their feeding, are consumed by other benthic organisms and plants. Adult freshwater mussels are readily eaten by fish, muskrats, raccoons, mink, turtles, ducks, herons, and otters. Live mussels help stabilize the substrate. As they burrow and move they also help mix the substrate, increasing oxygen and nutrient exchange between the substrate and water. Shell material left over from dead mussels provides a colonization surface and habitat for algae, sponges, insect larvae, crayfish, and fish.

Freshwater mussels are Indiana's most endangered group of animals. Of the 77 species historically found in the state, 19 are completely gone or no longer reproducing. Many others have seen a marked reduction in their



Rabbitsfoot collected from Tippecanoe River in Pulaski County in 2005.



Pile of shells (midden) left behind by hungry muskrat—East Fork White River in Martin County—mussels include mapleleaf, purple wartyback, pimpleback, pink heelsplitter, threehorn wartyback, fragile papershell.

distribution. The reasons for these declines are varied, but likely include a combination of the following factors: 1) water pollution—both non-point and point source, 2) habitat alteration/destruction, 3) exotic species' impacts, and 4) over-harvest for the button and cultured pearl industries. The relative immobility of the freshwater mussel and their complex life cycle has exacerbated these effects.

The Wildlife Diversity Section has funded freshwater mussel surveys of most of Indiana's major drainages since 1990. These surveys have provided valuable information on the current and historical freshwater mussel distribution of Indiana. However, many streams of Indiana have remained unsurveyed; no information is available on their current freshwater mussel community. A statewide survey of these previously unsurveyed streams was initiated in 2001.

Over 500 sites have been sampled to date. Several

important new species' locations have been documented during the survey. A previously unknown reproducing population of snuffbox (*Epioblasma triquetra*), a state endangered species, was found in the Salamonie River. An expanded region of the Eel River (upper Wabash River drainage) is now known to contain rabbitsfoot (*Quadrula cylindrica cylindrica*), a state endangered species, and just recently elevated federal candidate species. Reproducing round hickorynut (*Obovaria subrotunda*), a state species of special concern, were found in the West Fork White River drainage. Large, reproducing populations of ellipse (*Venustaconcha ellipsiformis*), also a state species of special concern, were located at several locations in the Kankakee and Lake Michigan drainages. Although no live individuals were found, fresh shells of fat pocketbook (*Potamilus capax*), a federal and state endangered species, were found at several locations in Big Creek, Posey County and the mainstem White River, Knox and Gibson counties. Several new populations of kidneyshell (*Ptychobranchus fasciolaris*), little spectaclecase (*Villosa lienosa*), and wavyrayed lampmussel (*Lampsilis fasciola*), state species of special concern, were discovered in multiple drainages. Diverse mussel communities were also documented in stretches of Big Pine Creek, Deer Creek, and Laughery Creek.

Lake Sturgeon

Lake sturgeon (*Acipenser fulvescens*) were once a common inhabitant of Indiana's largest rivers (Ohio, Wabash and White), as well as Lake Michigan. As the result of a variety of factors, including dam construction, water pollution, and over-harvest, populations have declined across their range. For the entire Ohio River drainage, all that remains is a relatively small population inhabiting the East Fork White River in Indiana.

In the summer of 1996, a study was initiated in the East Fork White River to learn more about this remnant lake sturgeon population. Annual trammel and gill net sampling has been attempted since 1996 and nearly 100



Sarah Bales with lake sturgeon collected from East Fork White River, Martin County—notice transmitter at base of dorsal fin—this fish was used in telemetry study.

individual lake sturgeon have been identified, many being captured several times over the course of the study. Captured lake sturgeon have ranged from four to over 100 pounds in weight, although most weigh around 30 pounds. Collection of several smaller individuals over the past couple of field seasons has provided evidence that at least some recent successful reproduction has been occurring.

Since 2002, transmitters have been placed on several different lake sturgeon. These fish have been tracked using radiotelemetry for varying periods of time. These tracked lake sturgeon have shown similar annual movement patterns since the telemetry study started. Most lake sturgeon spend the summer months in a primary, deeper stretch of the river. As water temperatures cool in the fall, the fish tend to disperse throughout the river, eventually selecting a secondary deeper stretch of water in which to spend the winter. Little movement occurs during the coldest winter months. When water temperatures approach 50 F, usually around the end of March, the lake sturgeon make an impulsive, mass migration upstream. Most reach Williams Dam in Lawrence County, which provides a barrier to further upstream movement. After spending several weeks in the Williams Dam area, the fish slowly redistribute downstream. Most return to their primary summer reach of the river.

In 2005, lake sturgeon spawning (fish congregating to reproduce) was documented in the river for the first time. Several fish were observed actively spawning along a rocky shoreline just downstream from Williams Dam. Several deposited eggs were collected and taken to Cikana State Fish Hatchery to determine their viability. More than a dozen larval (newly hatched) lake sturgeon were produced from these eggs. Larval lake sturgeon were also collected from the river using larval drift nets set below the spawning area. Lake sturgeon spawning has been documented at this location every year since, through 2009.

A study through Purdue University was completed in 2006 to determine if the genetic structure of the East Fork White River lake sturgeon population is unique. Results showed these fish to be sufficiently different enough from other Great Lake populations to warrant conservation of the population. Any type of augmentation to the East Fork White River population or reintroductions in other parts of the Ohio River drainage should only be attempted using East Fork White River lake sturgeon.

Northern Brook Lamprey Survey

When the word 'lamprey' is heard, most might think of a snake-like or eel-like exotic species that attacks and attaches to lake trout and other fish in Lake Michigan. This is one, the sea lamprey (*Petromyzon marinus*), of seven species of lamprey that inhabit Indiana waters. The sea lamprey is actually an introduced species that invaded Lake Michigan in the 1930's; the other six species of lamprey are native to Indiana.

Lampreys have a unique life cycle in comparison to other fish species in Indiana. After hatching they spend several years of their lives in a larval form (ammocoete) buried in the mud or sand of smaller streams, where they filter-feed on microscopic animals and organic material. They eventually transform into adults and then diverge



Newly transformed lamprey collected from Mill Creek, Pulaski County, in 2008.



Least tern chick

to two very different lifestyles. Some species, after transforming, migrate to bigger rivers and attach to other fish. These ‘parasitic’ lampreys feed on their hosts, while attached to their bodies. After a year or two of parasitizing other fishes in larger rivers, they congregate in smaller streams to spawn, after which they die.

Other species of lamprey in Indiana aren’t parasitic as adults. These ‘non-parasitic’ species simply spawn in the spring after transforming the previous fall, never feeding as adults. The northern brook lamprey (*Ichthyomyzon fossor*) is one of Indiana’s non-parasitic lamprey species. It was added to Indiana’s endangered fish list in 2004; mainly because little was known of its actual distribution in the state and concern over the effects of lampricides on their populations. Lampricides, lethal to all lamprey species, are used in many of the tributaries of Lake Michigan to kill/control sea lamprey populations.

A survey was initiated in 2007 to determine the current distribution of northern brook lamprey in Indiana. Sampling has been attempted mainly in the late summer and fall, using electrofishing techniques. Sampling is conducted during this time of the year to specifically target newly transforming adults, as ammocoetes can be hard to distinguish from other species. To date, the northern brook lamprey seems to be limited to northern Indiana, encompassing portions of the Ohio River drainage (upper Tippecanoe River watershed), Kankakee River drainage (Yellow River watershed), and the Lake Michigan drainage (St. Joseph River watershed).

NONGAME BIRDS IN INDIANA

Least tern

This petite and active waterbird is the only federally endangered bird that nests in Indiana. Since the discovery of one pair in Gibson County in 1986, the nesting colony has grown tremendously and additional sites have been found in southwestern Indiana. Least terns feed on small fish and invertebrates and nest on the ground in

sparsely vegetated areas near water. As a result, they are vulnerable to predators, flooding, and other disturbances. Working closely with power companies and the U.S. Fish and Wildlife Service, colonies at two locations were closely monitored and steps taken to ensure successful nesting this year. The original and largest colony is found in Gibson County with birds present on properties owned and managed by Duke Energy, the U.S. Fish and Wildlife Service (Cane Ridge Wildlife Management Area), the Indiana Department of Natural Resources (Tern Bar Slough), and some private agricultural land. There locations had record numbers of least tern adults present (220) in 2009 and produced an estimated 115 fledglings from 170 nesting attempts (90 early nests; 80 re-nests or later nests). Although relative productivity has been higher in other years, the values for 2009 are above minimum levels believed to be needed to maintain populations. Successful nesting occurred at three distinct sites: Duke Energy’s power plant ash disposal flats (40 chicks fledged), nesting islands of the Cane Ridge Wildlife Management Area (35), and the splitter dike of Gibson Lake (30). Least terns were observed feeding and roosting at Tern Bar Slough and three nests in an agricultural field near the Wabash River were inadvertently destroyed. At the American Electric Power Plant in Spencer County, 10 chicks were fledged from 25 nesting attempts. Indiana’s population of least terns have been doing well in recent years and a survey of the lower Wabash River in late July turned up 16 adults and at least one nest on an island in Posey County. Management of least terns is challenging and consists of maintaining nesting sites free of dense vegetation, using fencing and manipulating water levels to deter ground predators, and employing least tern decoys to attract birds to suitable sites.

Barn owl

The “monkey-faced” barn owl feeds at night on voles, mice, other small mammals, and some birds, preferring permanent grasslands such as pastures, hayfields, prairie plantings, and the margins of wetlands. Its nesting sites



Barn owls in nest box

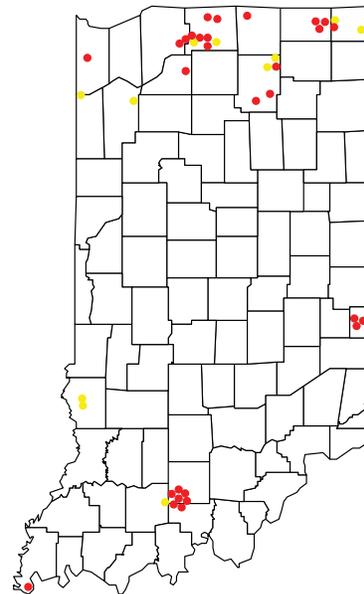


Osprey adult and chicks at Patoka Lake nest platform.

have historically consisted of cavities in large trees, but it has taken readily to using human structures in small towns and agricultural areas including haylofts, steeples, silos, and other buildings. In an effort to provide nesting sites more secure from raccoons and other predators, the Indiana Department of Natural Resources has built over 300 nest boxes and erected them in barns and other structures in suitable grasslands statewide during the past three decades. Although many of these structures have been destroyed, existing boxes are checked periodically and new ones erected for this secretive and rare owl. During 2009, 121 barn owl sites in 27 counties were checked for evidence of use, primarily in April. Sites were nest boxes in barns or other buildings (114), tree cavities (5), silos (1), and a warehouse I-beam (1). Adult barn owls, eggs, or chicks were observed at 16 sites (15 in boxes, 1 in a silo), all in southern Indiana (Dubois, Greene, Jackson, Jennings, Lawrence, Orange, Owen, Perry, Scott, and Warrick counties). Reliable reports of active barn owl nests were also received from Gibson, Lake, Orange, and Pike counties for a total of 20 known nests in 2009. In addition, barn owl pellets, the regurgitated and undigestible hair and bones, were found at 13 sites including some in Clark, Crawford, Pike, Spencer and Vigo counties. Thirteen boxes were being used by American Kestrels, while 11 boxes were deemed unusable due to barn collapse or removal (8), squirrels or raccoons chewing holes in the box (2), or the box weathering and falling apart (1). Four new boxes were installed. Barn owl populations in Indiana remain relatively rare but stable in Indiana, primarily being found in southern counties. Their numbers are restricted by the availability of small mammal populations in grasslands, suitable nest sites, winter severity, and predation by great horned owls and raccoons.

Osprey

This large, eagle-like bird is an active fisherman and generally seen during spring and fall migrations hovering, diving, and catching fish in the open waters of Indiana's lakes, ponds, and rivers. Historically a few remained to



2009 Osprey nests

Red – active (eggs present) nests
Yellow – inactive nests

nest, building large stick nests in dead trees near the shoreline or on islands in lakes, rivers, or wetlands. In recent times, nests are most often found on man-made structures including utility poles, buoys, duck blinds, and especially, nesting platforms built specifically for osprey. A restoration effort was undertaken from 2003-2006 with 96 young ospreys taken from nests in coastal areas of Virginia and raised and released at four locations in Indiana. As a result of this effort and the erection of nesting platforms in a partnership between the Indiana Department of Natural Resources and private groups and individuals, Indiana's osprey population has shown steady growth. During 2009, 35 pairs of osprey were known in Indiana with 30 pairs believed to have laid eggs. These figures compare to 2 pairs and 1 active nest in 1999, 6 pairs and 5 active nests in 2003, and 32 pairs and 24 active nests in 2008. The distribution of ospreys is clustered in Indiana with the largest number of nests in St. Joseph and adjacent counties (11 nests or pairs), Pigeon River Fish and Wildlife Area (7), Patoka Lake (7), Kosciusko Co. (5), and

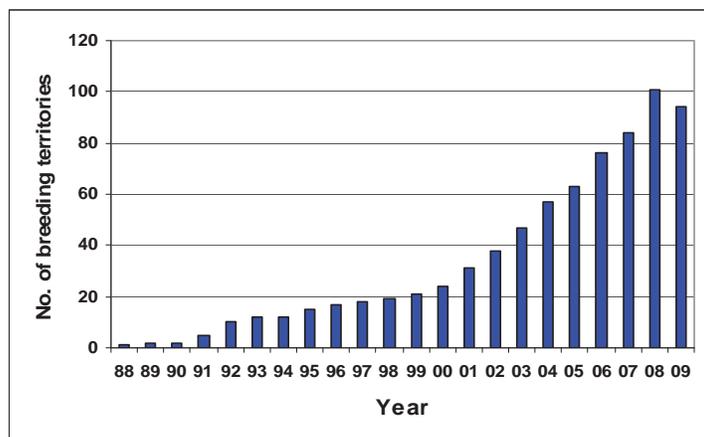
Brookville Lake (3). Nests in 2009 were built on nesting platforms (19), cell towers (7), dead trees (4), metal utility towers (3), and wooden utility poles (2). Nesting success has been good and with ongoing efforts to maintain clean water, healthy fish populations, and suitable nest sites, the population of ospreys in Indiana should continue to grow.

Bald eagle

After showing dramatic population declines after World War II primarily from the devastating effects of DDT and other pesticides, our national symbol was declared recovered in 2007 and removed from the federal endangered species list. Indiana followed suit in 2008 after a goal of 50 nesting pairs was reached, a remarkable achievement considering that no eagles were known to have nested in the state from about 1900-1988. Restoration efforts from 1985-1989 when 73 eaglets from Wisconsin and Alaska were raised and released at Lake Monroe contributed greatly to the statewide recovery. Since bald eagles first began nesting in Indiana in 1989, nests have been monitored to document population changes. Nests are generally checked from a helicopter in the spring when pairs would typically be incubating eggs or have chicks. Later surveys to determine the success of those nests and to count the number of chicks raised were discontinued after 2007. In 2009, weather and scheduling problems delayed normal timing of flights and likely resulted in undercounts of nesting efforts. Some nests may have already failed and been abandoned by the time we were able to check them and heavy leaf cover resulted in not being able to find some nests. Eagle nest checks were completed by 5 May and 90 nests were considered active (eggs, chicks, or an incubating/brooding adult was present), the same number tallied in 2008. However, the number of occupied territories fell from 101 to 94. Again, this decline may not be real but due to late sampling. There appears to be suitable nesting habitat (large trees near lakes and rivers) for continued expansion of the bald eagle population in Indiana for the foreseeable future.

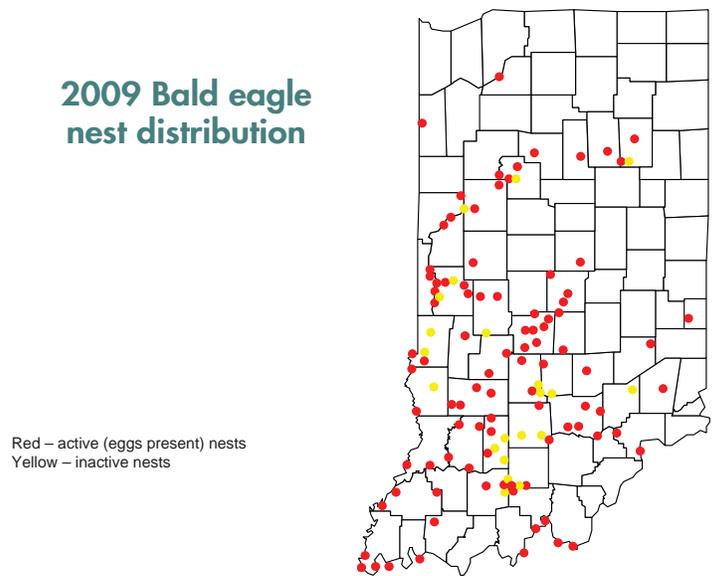
Another way to keep tabs on eagle population trends in the region has been to conduct winter surveys. Nationwide midwinter bald eagle surveys, now coordinated by the Army Corps of Engineers, have been conducted in

Bald eagle territories in Indiana



Eagles at nest in Johnson Co., IN

2009 Bald eagle nest distribution



Indiana since 1979. For many years, these were conducted by helicopter, but austerity measures have forced us to cut back on the extent of coverage and survey wintering eagles by boat or ground counts. In January 2009, staff at seven fish and wildlife properties or public lakes made counts of eagles on a single day. Fifty-four bald eagles were tabulated at Lake Monroe (38 eagles), Patoka Lake (5), Brookville Lake (4), Muscatatuck National Wildlife Refuge (5), Willow Slough Fish and Wildlife Area (2), Hovey Lake Fish and Wildlife Area (0), and Eagle Creek Reservoir (0). A new ground count was established in Parke County to tabulate bald eagles as they leave their night roost along Sugar Creek and fly to foraging areas along the Wabash River. Sixty-two eagles were counted from this spot, an amazing number of eagles seen over the course of a couple of hours.

Peregrine falcon

The recovery of the peregrine falcon, the world's fastest animal, has been quite remarkable. As many as 500 pairs were thought to have nested on cliffs and river bluffs in the eastern United States and southern Canada, but after 1963 none were known to breed successfully in the



Falcon Kinney at his Indianapolis nest box.

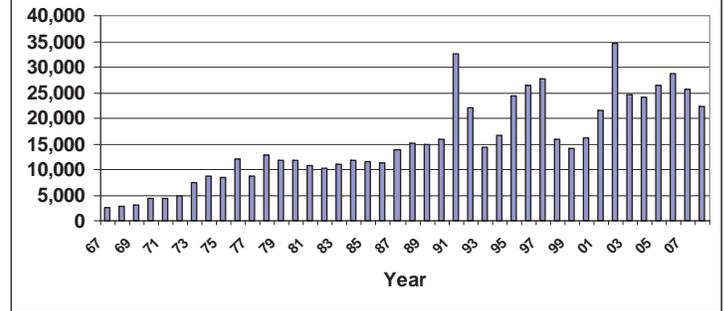
wild. An effort to restore peregrines in the Midwest began in 1981, when young chicks hatched in captivity were released in Minnesota. In subsequent years, this program expanded with releases in all Midwestern states, many in urban areas, including 60 falcon chicks released in four Indiana cities during 1991-1994. This adaptable, but highly territorial species, has found urban and industrial areas to its liking with high densities of local birds providing abundant food and suitable nest sites on ledges of tall buildings, smokestacks, and under bridges. Providing nest boxes have attracted and benefited peregrines and resulted in high nesting success. In 1999, the peregrine falcon was considered recovered and was taken off the federal endangered species list.

Since Indiana's first nesting pair in recent times was discovered in 1989, the state's peregrine falcon population initially grew steadily but has grown more slowly in recent years. During 2009, 16 territorial pairs were known, one more than in 2008. Two sites had not had peregrines present previously, while one site active in 2008 was vacant this year. Twelve pairs laid eggs, the same as in 2007 and 2008. Ten nests were successful and 26 chicks fledged, the lowest number since 2001 but still a healthy number. Nineteen of the chicks were banded. Of the 32 adults, 14 were identified by their leg bands, 8 were banded, but the birds could not be identified, 3 were unbanded, and 7 birds were not seen well enough to determine if they were banded. Kinney, the 16 year-old male in downtown Indianapolis has now raised 54 chicks, the most by any male in the Midwest. Freedom, a 15 year-old female released in Evansville, is still paired and on territory in downtown Fort Wayne, but she has not laid eggs the past two years, most likely due to her advanced age.

Sandhill crane

The sandhill crane is a long-legged, long-necked waterbird that can be confused with the somewhat similar-appearing but totally unrelated great blue heron, sometimes inappropriately referred to as the blue crane. Sandhills fly with their necks outstretched and are seldom seen alone, but an individual is almost always in company with its

Peak fall counts of Sandhill Cranes at Jasper-Pulaski FWA



mate, family group, or flocks numbering from a couple of dozen to the hundreds. During fall and spring migratory periods, groups of 50-100 are most commonly encountered flying in a loose V-formation or circling as they catch updrafts or descending to a field to feed or roost for the night. During migration, their bugling calls are most often heard before the flock is sighted. The eastern population nests in marshes in the upper Great Lake states and southern Canada and the population has been expanding. Nesting has been noted in Indiana since the early 1980s and now occurs in the northern quarter of the state. Sandhill cranes feed on a variety of aquatic plants, invertebrates, and small vertebrates, as well as waste grains in agricultural fields. At night, they normally roost in shallow water of marshes or fields.

Each year, the U.S. Fish and Wildlife Service coordinates a fall survey of the eastern population of sandhill cranes in order to monitor changes in population size. Much of the population makes a stop at Jasper-Pulaski Fish and Wildlife Area in northwestern Indiana before venturing south to wintering areas in Tennessee, Georgia, and Florida. Of nine Indiana areas surveyed in late October 2008, only two reported sandhill cranes. Jasper-Pulaski Fish and Wildlife Area had 8,444 sandhill cranes present while 30 birds were reported at Pigeon River Fish and Wildlife. Many sandhill cranes had not yet moved south into Indiana from Wisconsin, Michigan, and other northern locales. The peak population of cranes at Jasper-Pulaski occurred on 25 November when 22,405 birds were counted and many birds remained until the last week of December. In recent years, greater numbers winter in the state and northern movements are noted in February.

Colonial waterbirds

Colonial waterbirds refers to a number of different bird groups that nest in close proximity to each other. In Indiana, these include cormorants, herons, egrets, terns, and gulls. Colonies consist of fewer than 10 nests up to the tens of thousands. Great blue herons are the most frequently encountered colonial waterbird in Indiana with over 100 known sites and are surveyed every five years in recent times. Other species are counted more often. One species, the double-crested cormorant has been viewed with concern in the Midwest because increasing populations pose a potential threat to local fisheries and they can compete for nest sites with less common heron and egret species. Since cormorants were discovered nesting

at a Lake County site in 2004, annual counts of cormorants and associated heron nests have been made at two steel mills in Lake County. On the counts conducted in May 2009, double-crested cormorants showed another large increase at Mittal Steel East with 1,799 nests tallied compared to 1,075 in 2008. Surprisingly, numbers of great egrets and black-crowned night-herons rebounded from low numbers in 2008 when many of the nest trees had been felled by beaver. In 2009, 66 great egret nests and 180 black-crowned night-heron nests were counted. All egret nests were in trees or shrubs, while 93% of the night-heron nests were on the ground. At nearby Mittal Steel West, regrowth of trees and shrubs after beaver felling in the 1990s have again provided nest sites for herons and egrets. Five great egret nests and 58 black-crowned night-heron nests were tallied at this site, while double-crested cormorants were absent. Black-crowned night-herons are not known to nest at any other locations in Indiana, while great egrets were only known to have nested at one other site in Indiana (Marion County) during 2009. For the first time since nesting attempts were noted at Gibson Lake, double-crested cormorants successfully raised five young from ground nests.

Breeding Bird Atlas

The Indiana Breeding Bird Atlas is a mammoth undertaking that utilizes the skills and efforts of hundreds of birders in Indiana. The objective of the project is to determine the current distribution of breeding birds in the state that will result in a map for each species. This is accomplished by making observations in 647 priority blocks, each consisting of 1/6th (approx. 10 mi² in area) of a standard 7.5' topographic map. Observers record breeding evidence for each bird species encountered during its presumed breeding period. The first atlas of breeding birds in Indiana was conducted from 1985-1990 and the current atlas was planned as an update 20 years later. Besides documenting changes in distribution, the updated atlas should provide indirect evidence for changes in abundance for some species. This is the fifth of six planned field seasons for collecting atlas data. Approximately 75% of atlas blocks in all but ten counties now have some observations. There have been over 30,000 bird records with evidence of breeding, which is about 70% of the number recorded during the earlier atlas. So far, 185 bird species have been recorded with 155 showing confirmed evidence of breeding. During the 1985-1990 atlas, 158 bird species were confirmed breeding.

MAMMALS

Bobcats in Indiana

As recent as just 25 years ago, catching a fleeting glimpse of a bobcat springing across an open field or country road was a rare sight in Indiana. They are elusive, active mostly at night, and travel widely in search of food and cover. They don't spend much time in one place and go to great lengths to avoid contact with humans. Nonetheless, biologists have accumulated enough information over the past two decades to indicate the resilient bobcat



Map of bobcat movements



Bobcat with radio collar



Wildlife Diversity staff work on an anesthetized adult male bobcat in Martin County

has bounced back from near extirpation and is even thriving in some parts of Indiana.

Bobcats have a vast North American distribution—about the only areas in which their populations suffered any appreciable declines from pre-settlement levels are densely-populated regions of the mid-Atlantic coast and the agricultural Midwest. They once ranged throughout Indiana and were commonly listed in fur/hide shipments from the early 1800s. However, the combined effects of unregulated take, human persecution of predators, and habitat loss as Indiana’s forests were converted to agriculture eventually took their toll on this medium-sized carnivore. Some writers claimed bobcats vanished from the state in the first half of the 1900s, but scattered reports always persisted—typically in unglaciated southern Indiana where most forest cover remained. Yet sightings were often found to be a misidentified domestic cat or coyote and there were surprisingly few physical specimens to prove bobcats truly existed.

Fast forward to 1990. Bobcats are still considered rare in Indiana and have been listed as state-endangered for over 20 years. In late September, a vehicle strikes an adult female on Interstate 64 in rural Warrick County, only the fourth mortality of an Indiana bobcat reported in 20 years. Two more are struck in 1993, three are accidentally killed 2 years later, while the last two years of the decade produce nine cats. This escalating trend continues into the new millennium, and by 2008, a record 43 bobcats were reported accidentally killed statewide. Most originate from the southern half—especially southwest Indiana where second growth forests and reclaimed strip mine lands provide the dense, brushy undergrowth sought by bobcats for food and cover. Others are widely scattered throughout the undulating terrain of west central Indiana and the natural lakes region in the northeast corner.

Meanwhile, similar increases were noted in Illinois, Iowa, and other Midwestern states, and in 1998, WDS personnel initiated a multiyear study to obtain basic ecological information from an established population in southcentral Indiana. Over a 7-year span, biologists captured 43 bobcats and attached radiocollars to 38 individuals in hopes of gaining insight into factors that have contributed to their recent resurgence.

Although field work has concluded and analyses are ongoing, much has been learned about this hardy survivor. Bobcats are an adaptable sort, requiring a dependable prey base and nearly any undeveloped habitats that provide reasonable cover and denning opportunities. They are an opportunistic hunter taking whatever those habitats provide—rabbits, squirrels, and mice comprise the bulk of their diet. Resident adults have predictable movement patterns and traverse areas ranging from 8 to 250 square miles in size depending on their sex and reproductive status. Dispersing juveniles, however, may also travel great distances to seek out and establish their own territories. Young cats radioed in Indiana were eventually recovered in all 4 adjacent states including a 2-year-old male that was struck by a vehicle in Michigan, nearly 300 miles from his capture site. Survival is high compared to many populations elsewhere; human-related factors such as collisions with vehicles and shootings accounted for

10 of the 13 mortalities during the study. Only one death was attributed to natural causes.

The development of conservation and management strategies for wide-ranging carnivores like bobcats is a lengthy process that requires a variety of information accumulated over multiple years. Using this approach, WDS biologists have shown that bobcats are indeed doing well in Indiana. Unlike other native predators such as wolves and bears that have long since disappeared, the versatile bobcat seems well equipped to persevere in the current Indiana landscape. The culmination of these efforts was realized in 2005 when the bobcat was removed from the state’s endangered species list after a 36-year stay and reclassified as a species of special concern.

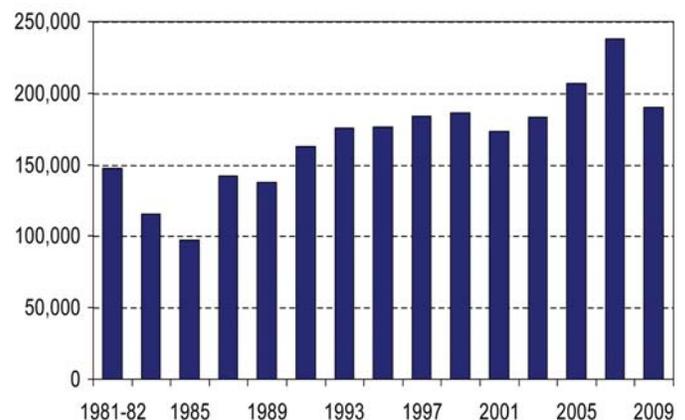
Indiana Bat Hibernacula Surveys

One of the most essential pieces of information needed to effectively manage wildlife is the number of individuals that comprise a population. For various reasons, however, this is a very difficult, if not impossible, number to obtain. In many cases, biologists must use other measures, such as harvest levels, track counts, or the number of animals struck by vehicles, which may not be directly related to the actual population size. For other species, estimates



Biologist uses a tape measure to determine the dimensions of a large cluster of hibernating Indiana bats.

Statewide Indiana bat populations



derived from small plots or along transects are extrapolated to a larger geographic area.

Such is not the case for the Indiana bat, one of 2 federally endangered migratory bat species found in the state. During the summer reproductive season, Indiana bats form small colonies distributed widely throughout much of the eastern half of the country. In winter, however, they congregate in underground caves and mines (called hibernacula) that provide the stable temperatures and humidity levels needed for hibernation. Relatively few sites, most of which have already been identified, provide such conditions. Additionally, hibernating Indiana bats often form dense, compact clusters ranging from 300 to nearly 500 bats per square foot. Because so few caves are suitable and the bats cluster, it is possible for biologists to obtain a rather complete count of the species' wintering population.

In January and February 2009, a team of bat biologists and volunteer cavers again participated in the biennial Indiana bat winter hibernacula survey. The survey is usually conducted every 2nd winter to provide information to evaluate cave-specific management efforts and assess progress toward the species' recovery. The 2009 survey was the 15th one conducted in Indiana in the last 28 years, one of the WDS's longest running data sets.

Nearly 190,000 Indiana bats were counted in 24 of the 27 caves visited during the survey. This figure was a 20% decrease (about 48,000 bats) from the 2007 statewide total, the first appreciable decline in the population in over 20 years (a slight decrease of 7% occurred in 2001). Typical for this species, nearly 97% of all Indiana bats counted were found in just 7 caves. This information will now be tallied with similar surveys from other states to provide a fairly accurate assessment of the total size of the Indiana bat population throughout its winter range—a feat rarely achieved in modern-day wildlife management programs.

River Otter Restoration

When the French explorer La Salle first ventured into the Ohio valley in the late 1600s, the river otter was a common inhabitant of the rivers, streams, and wetlands in the land area that would eventually become the state of Indiana. These swift, powerful, streamlined aquatic



River otters

predators, however, began to disappear from vast portions of the landscape due to unregulated take, habitat loss, and other adverse impacts associated with human settlement. Otters were first protected in Indiana in 1921, but chances of recovery were unlikely and they were essentially gone from the Hoosier state by 1942. In the 1970s, advances in furbearer management and sweeping environmental initiatives to improve water quality and protect and restore wetlands created an ideal setting for the return of river otter—all they needed was a little help.

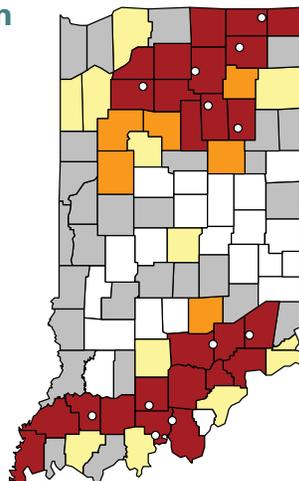
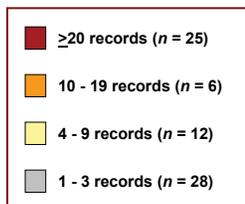
Efforts to restore river otters to Indiana's waterways began in 1995 through the release of 25 otters obtained from the marshes of coastal Louisiana. In the 5 years that followed, over 300 Louisiana otters were released into high quality riverine and wetland habitats at 12 sites in southern and northern Indiana. From these modest beginnings, the program has been a tremendous success and long-term prospects for maintaining viable, healthy otter populations in the Hoosier state are encouraging.

River otters are highly mobile and wide-ranging, use habitats that are difficult to get to or work in, and exist at low densities—all factors that make evaluating the status of their populations difficult. To meet this challenge, biologists use a combination of methods such as winter bridge surveys for otter activity (tracks, slides, droppings) along frozen, snow-covered streams, reports of otter sightings, and biological data obtained from otters accidentally killed in the state.

Analysis of information collected over the last 10 years clearly demonstrate that otters are reproducing at high rates and core populations in areas surrounding release sites are self-sustaining and secure. Otters have also colonized other portions of the state that were not initially targeted for restoration such as the Kankakee and Whitewater rivers as well as the Wabash and White River systems. Through 2008, there were confirmed records of otters from 71 of 92 Indiana counties although most occurred in 31 counties with or near release sites. Hoosier sportsmen and recreationists are reporting otter activity over an ever expanding area, and a record 43 otters were accidentally taken in traps legally set for other furbearers during the 2008-09 fur harvest season. Last winter, otter sign was found at nearly 14% of the more than 500

Cumulative distribution of river otters in Indiana, 1995-2008

1855 records in 71 counties
(circles denote release sites)



bridges visited statewide, the highest level ever recorded.

The ultimate sign of the program's success occurred in 2005 when river otters were removed from Indiana's endangered species list and reclassified as a species of special concern. Success, however, often brings new, but not totally unexpected, conflicts. Recently, opportunistic otters have found small recreational fishing ponds, a habitat not found in presettlement days, to their liking. While some pond owners may enjoy viewing otters, others are concerned about their potential impact to such small, stocked fish communities. Biologists have been following the frequency of these nuisance reports with interest, most of which have occurred near release sites where otter densities are probably highest. Should current trends continue, however, otter management in Indiana may require a more comprehensive approach that includes components not only to protect but to maintain and regulate restored populations. And that too is a sign of success.

REPTILES & AMPHIBIANS

The North American Amphibian Monitoring Program (NAAMP) is administered in cooperation with the United States Geological Survey. This program incorporates public volunteers to collect data on Indiana's 17 frog and toad species. The NAAMP program was initiated because of increasing concerns about global amphibian declines. In Indiana, the crawfish frog is considered a state-endangered species. The northern leopard frog, plains leopard frog, spadefoot toad, and northern cricket frog are species of special concern.

Each year, the WDS recruits more than 40 volunteers to recognize the mating calls of Indiana's frogs and toads while conducting survey routes throughout the state. Herpetologist Sarabeth Klueh and naturalist aide Angela Garcia conducted training sessions in three regions of the state to teach new and potential volunteers how to identify frog and toad calls, and gave updates on new survey procedures. Volunteers must follow strict protocols for data collection and pass a frog and toad call identification test.

Each driving survey route has a total of ten stops near suitable amphibian habitat. Observers listen for exactly five minutes and record what species are present at each stop. Volunteers need to collect data a minimum of three times between February and June each year. In 2009, 40 volunteers submitted data for 35 routes statewide. We are grateful to all our dedicated volunteers for their invaluable assistance in monitoring this important group of animals statewide. We could not do it without them. If you are interested in becoming a NAAMP volunteer, please check out www.pwrc.usgs.gov/naamp, or email naamp@dnr.in.gov to learn more.

If you would like to learn more about the frogs and toads of Indiana, but aren't interested in becoming a volunteer, check out the information on our WDS webpage <http://www.in.gov/dnr/fishwild/3325.htm>.

Green Salamanders

In 1993, the green salamander was first discovered in Indiana. As one of the rarest reptile and amphibian species in Indiana, the salamander is restricted to only a few



Green salamander

known sites in Crawford and Perry counties. Known habitat for this species consists of forested bluffs with abundant moist sandstone and limestone outcroppings. The green salamander uses deep crevices in these outcrops and the bark of surrounding trees for cover and foraging sites. In 2004, WDS herpetologists began conducting surveys for the green salamander to locate new populations and monitor existing ones. All surveys have been conducted in Crawford, Perry, and Harrison counties. Initially, Wildlife Diversity biologists had documented only one population from the initial 1993 discovery site. In 2007, however, another population was discovered in Perry and Crawford Counties. In 2009, both the initial discovery site, and the Perry/Crawford County site were surveyed, with two individuals being found at the latter location. Other suitable places were surveyed in Perry and Crawford counties, but no new populations were observed.

Spadefoot Toad

Since 2006, WDS personnel have been surveying for the Spadefoot Toad, a species of special concern in Indi-



Spadefoot toad

ana. These elusive members of the toad family are hard to locate due to their short, explosive breeding patterns, subterranean lifestyle, and specific habitat requirements. Spadefoot toads call for a day or two after heavy rainfall and then use the spade (a horny, sharp-edged, sickle-shaped callus) located on their hind feet to burrow back into the ground. They will bury themselves anywhere from two inches to two feet underground. Other than during the breeding season it is thought that they only occasionally come to the surface at night to feed on insects. If they aren't surveyed for during that small window of opportunity while they are performing their breeding chorus, they could be missed. The call of the Spadefoot Toad is a low-pitched 'whar' sound, that some say resembles the call of a young crow. Surveys are conducted where appropriate habitat exists, and they are now known from 16 counties. In 2009, the Spadefoot toad was documented from Sullivan County for the first time. Continued surveys and monitoring is necessary to determine the full range of this species and to track any trends in the population.

Streamside Salamander

Unlike the other members of its family that breed in ponds, the Streamside salamander breeds in small, rocky streams. It is identical in appearance to the Small-mouthed Salamander and was only recognized as a separate species in 1989. The Streamside Salamander has a very limited range, occurring only in southeastern Indiana, southwestern Ohio, and northern Kentucky. In Indiana, it is being considered for inclusion as a Species of Special Concern. They can be found under rocks or logs along the bank in late fall or winter as they make their way to the stream to breed. Streamside salamanders prefer streams that are relatively fish free, and will lay their eggs on the undersides of rocks within the stream. In 2007, WDS herpetologists began surveying for this salamander and found individuals at a location in Switzerland county. Surveys were conducted again in 2009 in Switzerland, Perry, and Crawford counties, but only one individual was found. Surveys will continue and biologists hope that more populations can be located.



Streamside salamander



Red efts discovered as part of the Patoka Survey.



Worm snake discovered as part of the Patoka Survey.

Patoka

WDS biologists have been conducting a refuge-wide reptile and amphibian survey at Patoka River National Wildlife Refuge. This two year survey will help refuge personnel know what species occur on their property so that they will have a better idea of how to manage or improve populations on the refuge. There have been ten new county records for the refuge, which occurs in both Gibson and Pike counties. The record for the Two-lined salamander, in Pike County, represents the first time this species has been found within the Wabash lowlands of southwestern Indiana. Biologists are checking coverboards (wood squares that mimic logs and rocks), placing turtle or minnow traps, and performing surveys in areas with good reptile and amphibian habitat.

RESEARCH

Stretching the conservation dollar

Extinction or extirpation can be caused by single or complex and interconnected factors. The road to recovery from either begins with discovering the factors that limit the species' population and development of practical management options to overcome such barriers.

WDS personnel's discovery of such barriers and the development of methods to overcome them are accomplished through partnerships with Indiana's institutions of higher education. Through these partnerships, donated funds not only are spent efficiently, but enhance the education of those who work while being supported by them. As part of their normal business, colleges and universities pay their faculty, provide some student scholarships and maintain facilities, support staff and equipment (overhead). By accounting for those expenses relative to a partnership project, these normal expenditures can be claimed as non-federal match, securing Indiana's share of federal State Wildlife Funds.

It's a win-win. Without increasing normal State spending, matching federal funds are brought to the projects and Indiana reaps the following benefits.

1. Biologists get the needed information to identify population-limiting factors and ways to overcome those barriers.
2. Projects instrumental in the training of graduate students are funded and conducted. These students will be the next generation of scientists.
3. Student (mostly undergraduate) technician jobs are created. This support makes a college education affordable for some students, who also gain a valuable learning experience while working.
4. Funds for acquisition of modern equipment, which enhances the student's educational experience and stimulates the economy, are available.
5. The reputation and prestige of Indiana's colleges and universities are enhanced as they develop new ways to address research questions and develop scholarly publications and principles.

Click on the links below to view status reports on current projects. These reports were written by the students and staff conducting the studies.