2010 WILDLIFE DIVERSITY REPORT

INDIANA RARE SPECIES CONSERVATION

State law charges the Wildlife Diversity Program (WDP) of the Department of Natural Resources with management and conservation of nongame and endangered species, terms that can be confusing unless explicitly defined. "Nongame" species are mammals, birds, reptiles, amphibians, fish, mollusks and crustaceans not normally pursued by people for sport or commercial purposes. The Indiana Nongame and Endangered Species Conservation Act (IC14-22-34) defines "endangered species" as those "whose prospects of survival or recruitment within Indiana are in jeopardy" or might soon be in jeopardy. Whereas wildlife that is pursued as game is managed using hunting and fishing license fees and federal funds, the conservation of nongame and endangered wildlife is funded by citizen donations (Nongame Fund), and since 2000, federal matching funds (State Wildlife Grants, Endangered Species Funds). These funds support the WDP, a modern scientific resource program, including survey and monitoring, research and habitat management, and protection. This 2010 report includes information on challenges facing the program's funding sources, the status of specific nongame and endangered species, new emerging threats, and updates of ongoing contracted research and studies.

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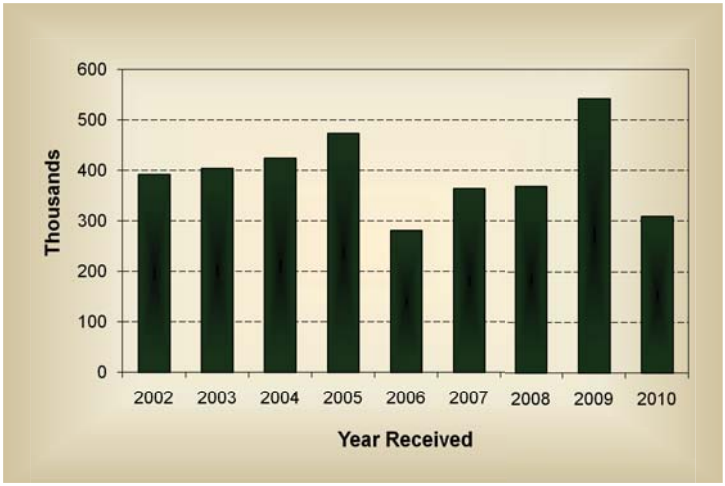


Figure 1. Last eight tax years of donations to the Nongame Fund in thousand-dollar increments.

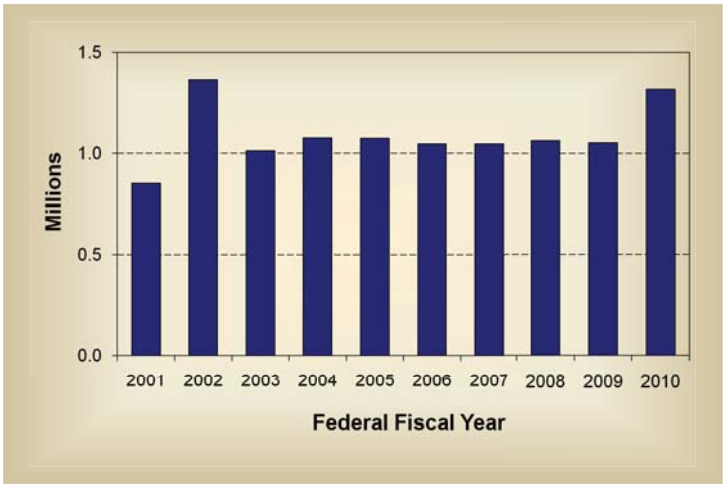


Figure 2. Last eight years of federal matching funds for Indiana.

FUNDING DURING UNCERTAIN TIMES

Like many other charities and membership-supported conservation organizations, the Nongame Fund experienced a downturn (43%) in donations in 2010, likely due to the continued economic recession (Figure 1). The final 2010 total of $304,551 was the lowest amount donated since 2006, and the second-worst year in the 22-year history of the fund.

Despite that, there is good news. With the help of conservation partners, the WDP was able to obligate all the federal State Wildlife Grant and Endangered Species funds apportioned to Indiana (Figure 2). Unfortunately, additional federal support is uncertain. Finalization of the current fiscal year federal budget has been postponed until March 2011, leaving the availability of future federal funds in doubt. However, as we endeavor to leave future generations a rich and diverse natural world, there is no shortage of conservation challenges and opportunities to be addressed.

We thank all Indiana citizens who have donated to this program over the years and ask for your continued support. We do our best to efficiently and economically

HOW TO DONATE

The Indiana Wildlife Diversity Program 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

or donate directly online at
www.IN.gov/ai/appfiles/dnr-inf/index.html

move Indiana's rarest wildlife to healthy, self-sustaining populations and to protect their habitats.

CITIZENS WANT TO HELP

People often ask "How can I help endangered species?" or "What can I do or what can my students do to help conserve endangered wildlife?" Regrettably, interested and well-meaning citizens often find the answer unsatisfactory. It is certainly true rare wildlife needs help, but the threats to these species are widespread, complex and often beyond the control of a single individual or small group. The ultimate causes for the declines of most wildlife populations are habitat loss and/or habitat fragmentation. These long-term factors, however, stress populations in a number of more immediate ways such as: reduced genetic diversity, limited access to food sources and suitable shelter, increased exposure to competitors or predators, greater exposure or susceptibility to new or existing diseases, or various combinations thereof. In some cases, but particularly for aquatic animals, there is just a general degradation in habitat quality that limits population health. Well-designed, specialized, and time-consuming research is often needed to tease out the reasons and develop effective management efforts.

So, what can a private citizen do to help?

1. If you own or manage land, try to keep the habitat contiguous. Consider a commitment to habitat preservation through a conservation easement or managing your land for wildlife. Even a small yard can provide habitat, and gardening for wildlife can be inexpensive, attractive and fun. Check out the Certified Wildlife Habitat Program of the National Wildlife Federation for more information about how to make your yard a wildlife haven: www.nwf.org/gardenforwildlife/certify.cfm.
2. If you are lucky enough to encounter a rare species, please leave the animal where you find it. Encourage your children to enjoy and respect wildlife in its natural habitat. Often people intend to provide a good (safe) home, but wild animals do not respond well to captivity and often die. Once in captivity, the animal does not contribute to the breeding population, just as if it had been killed, and the entire wild population continues to decline. Relocation of an animal decreases its chance of survival and can spread diseases. Moving aquatic organisms, including release of unused bait, can spread disease and cause ecological imbalances.
3. Report instances of wildlife that appears sick or is behaving oddly to the DNR Division of Fish and Wildlife. Do not approach or attempt to capture a sick animal. If possible, take picture(s) from a safe distance and include with your report. Reports should contain the date, time and a good description of the suspicious specimen, its behavior and location. Report to DFW@dnr.IN.gov. The DFW may not be able to respond to all reports but will be able to work with other health agencies to address potentially harmful or emerging diseases in a timely manner.
4. Be a responsible pet owner. Do not release exotic or captive species to the wild and contain small predators such as house cats. Do not support the trade in rare domestic or foreign wildlife.
5. Do reduce, reuse and recycle. Avoid or properly dispose of all household toxic substances and materials.
6. Train for and volunteer to conduct wildlife survey and monitoring activities such as the North American Amphibian Monitoring program. Check our website at endangeredwildlife.IN.gov frequently for information on this and other survey and monitoring opportunities.
7. Please support conservation programs like the Wildlife Diversity Program (through the Nongame Fund), one of Indiana's land trust organizations that preserve habitat and/or buy a Heritage Trust license plate for your vehicle.

Finally, these are uncertain times. There is already evidence of a lengthening growing season, dryer autumns and range shifts for some wildlife species. Healthy, productive, and diverse ecosystems are best equipped to deal with change. We depend on our environment to provide clean water, clean air and a healthy balance between pest and beneficial animal populations. We must work together to ensure maintenance of these essential ecological services for Hoosiers. We hope the public will stay engaged and prepare to be flexible and innovative as we strive to meet new conservation challenges.

HABITAT PROTECTION

The WDP acquired no new land this year. Problems due to soil erosion at Tern Bar Slough in Gibson County were addressed after this year's nesting season. An abandoned, damaged irrigation pipe was also removed from the bottom of the water feature surrounding the nesting islands. These improvements should improve prospects for terns to nest successfully on the islands next year.

Land acquisition can be a lengthy process. In the fall of 2010, acquisition activities were initiated for two properties in southern Indiana (Floyd County) in coordination with the Division of Nature Preserves and in partnership with the Nature Conservancy.

CONSERVATION DEVELOPMENT

This past summer, the Indiana Department of Transportation (INDOT) coordinated with the Department of Natural Resources to protect Eastern box turtle populations within the roadway alignment of Section 2 of the I-69 Corridor. INDOT's consulting firm, Bernardin, Lochmueller and Associates (BLA), and DNR staff conducted specialized searches to find box turtles residing within the construction zone. Once found, the turtles were captured, given a unique identification number and transported to a secure, semi-natural habitat close to their original home site. The animals will be cared for until they can be returned, likely within two years. Box turtles have a fairly well-developed homing instinct. When box turtles are displaced, they will attempt to return home and are often killed on roads as they pass through unfamiliar territory. Therefore, these turtles will be returned to safe areas near their original captures sites only after installation of

Naturalist aide Jason Mirtl weighs an Eastern box turtle.

An Eastern box turtle with its new identification number.

Nongame herpetologist Sarabeth Klueh measures an Eastern box turtle.

highway right-of-way fence. INDOT's efforts greatly advance the conservation of these gentle creatures. Once all of the turtles have been returned, follow-up demographic /movement investigations are planned by the DNR. The Eastern box turtle is a special-protected species in Indiana that is experiencing population declines throughout its range. INDOT's efforts in this very special project are greatly appreciated.

SURVEY AND MONITORING

Inventory is the critical first step in the WDP planned management. Working with species that are rare or secretive complicates identifying the starting point. Nongame personnel conduct numerous surveys to determine a species' current status, (i.e., endangered, special concern or secure). Additionally, adaptive wildlife management requires that management activities and habitat alteration impacts be evaluated for their effects on rare species. Through monitoring, appropriate conservation actions can be determined and management refined to minimize adverse activities. To achieve the goal of maintaining Indiana's biological diversity, the status of species and habitats must be determined and conservation efforts prioritized.

AQUATIC

Survey for Rare 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. A survey was initiated in 2007 to determine the current status of three of these species—the State-Endangered bantam sunfish and two Species of Special Concern, the cypress darter and banded pygmy sunfish.

All three species prefer the oxbows, sloughs, swamps, backwaters and ditches of southwestern Indiana that are choked with aquatic vegetation and have soft mud or

Cypress Slough, Posey County, southeast of Mount Vernon—very low water during 2010 summer—banded pygmy sunfish collection location.

Rail Marsh (at Hovey Lake Fish and Wildlife Area), Posey County—banded pygmy sunfish collection location in 2010.

Small, unnamed pond near Goose Pond and Halfmoon Pond along the lower Wabash River in southern Posey County—banded pygmy sunfish collection location in 2010.

Whipple Ditch (part of Pitcher Lake watershed), west of Mount Vernon along the lower Wabash River in southern Posey County—looked like prime banded pygmy sunfish location, but none collected in 2010.

organic-debris bottoms. Because of their diminutive size and secretive nature, all three species often go unnoticed in these unique habitats.

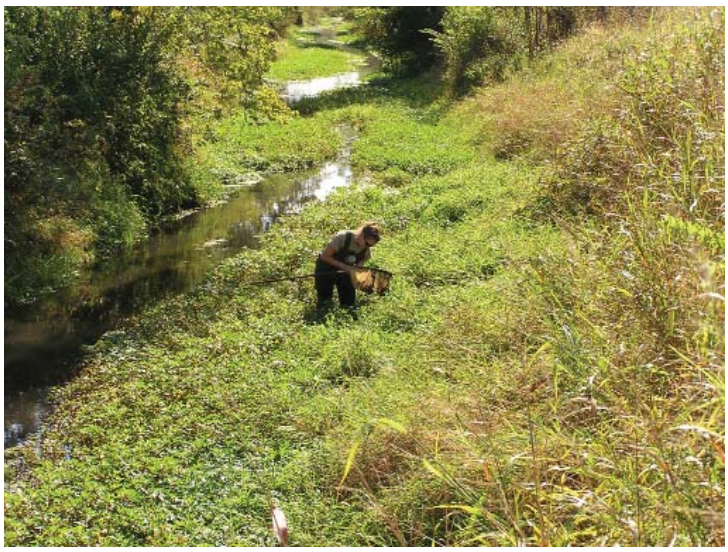
Sampling in these habitats can be challenging. Fish were collected using electro-fishing techniques (used in open-water areas and along edges of stands of aquatic vegetation) and small-meshed dip nets (used in shallow edge areas and pulled through areas of thick aquatic vegetation).

To date, areas in southwestern Knox County and southern Posey County have been sampled. No bantam sunfish or cypress darters 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.

Flier—another southwestern Indiana fish species commonly found in locations with banded pygmy sunfish.

River Deshee, southern Knox County—typical banded pygmy sunfish ditch habitat in Knox County—banded pygmy sunfish collection location in 2008.

Banded pygmy sunfish—typical size of adult



Mantle Ditch, southern Knox County—sampling with dip net in thick aquatic vegetation for banded pygmy sunfish—banded pygmy sunfish collection location in 2008.

Statewide Freshwater Mussel Survey

Freshwater mussels are an important component of Indiana's aquatic habitats. They act as natural filters, converting microscopic plants and animals into food for other organisms such as 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 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,

Salamonie River, Huntington County—location of snuffbox

All freshwater mussels located at a site on the Salamonie River, Huntington County—live snuffbox lower middle of picture.

Eel River, Miami County—location of rabbitsfoot

Rabbitsfoot from Eel River, Miami County

Tippecanoe River, Kosciusko County—location of clubshell

and 4) over-harvest for the button and cultured-pearl industries.

A statewide freshwater mussel survey of Indiana's rivers and streams was initiated in 2001. More than 750 sites have been sampled to date. Drainages where previous freshwater mussel surveys had never been attempted were targeted. The current statewide distribution for all of our species is now fairly well understood. New locations

for several of Indiana's rarer species were also uncovered.

A previously unknown reproducing population of snuffbox, 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, a State-Endangered Species, and just recently elevated Federal Candidate Species. Reproducing round hickorynut, a state Species of Special Concern, was found in the West Fork White River drainage. Large, reproducing populations of ellipse, also a state Species of Special Concern, were located at several sites in the Kankakee and Lake Michigan drainages. Although no live individuals were found, fresh shells of fat pocketbook, a Federal- and State-Endangered Species, were found at several locations in Big Creek, Posey County and the mainstem White River in Knox and Gibson counties.

Clubshell located in Tippecanoe River, Kosciusko County.

Round hickorynut located in Tippecanoe River, Fulton County.

Lake sturgeon spawning—April 2010.

Lake sturgeon spawning location downstream of Williams Dam, East Fork White River.

Lake Sturgeon

Lake sturgeon were once a common inhabitant of Indiana's largest rivers (Ohio, Wabash and White) and Lake Michigan but 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.

Annual sampling (using trammel and gill nets) has been attempted since 1996 to learn more about the population dynamics of this remnant lake sturgeon population.

More than 100 individual lake sturgeon have been captured, ranging from four to more than 100 pounds in weight.

Transmitters have been placed on several lake sturgeon to better understand their movements in the East Fork White River. Successful reproduction was first documented in 2005, when spawning lake sturgeon were tracked to below Williams Dam. The spawning run has been monitored annually since.

Tracked lake sturgeon have shown similar annual

Deposited lake sturgeon egg from April 2010 spawn

Newly hatched lake sturgeon (about a week after spawning occurred)

movement patterns since the telemetry study began. Lake sturgeon spend summer in a primary, deeper stretch of the river. As water temperatures cool in fall, the fish tend to disperse throughout the river, eventually selecting a secondary deeper stretch of water in which to spend winter. Little movement occurs during the coldest winter months. When water temperatures approach 50 F, they 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.

Northern Brook Lamprey Survey

Seven species of lamprey inhabit Indiana waters, including the exotic sea lamprey and the State-Endangered Northern brook lamprey. Four of Indiana's seven lamprey species are parasitic, attaching to other fish species in medium and large rivers. The Northern brook lamprey is one

Nine pound lake sturgeon collected in 2010 (JoAnne Davis holding fish).

Lake sturgeon weighing 78 pounds collected in 2010—transmitter attached to base of dorsal fin (JoAnne Davis holding fish).

Catch of lake sturgeon during 2010 sampling—JoAnne scanning base of dorsal fin for pit tag to determine if the lake sturgeon is a recapture.

Mill Creek, Pulaski County, is a typical Northern brook lamprey stream in Tippecanoe River watershed.

Yellow River, Marshall County, is a typical Northern brook lamprey stream in Kankakee River watershed.

Newly transformed Northern brook lamprey from Mill Creek, Pulaski County

Newly transformed Northern brook lamprey from Yellow River, Marshall County

of Indiana's three non-parasitic lamprey species, living most of its life buried in the stream bottom, not feeding as an adult.

The Northern brook lamprey was added to Indiana's endangered fish list in 2004, mainly because little was known of its actual distribution in the state and because of concern over the effects of lampricides (chemical used in Lake Michigan tributaries to control sea lamprey populations) on their populations. A survey was initiated in 2007 to determine the current distribution of Northern brook lamprey in Indiana.

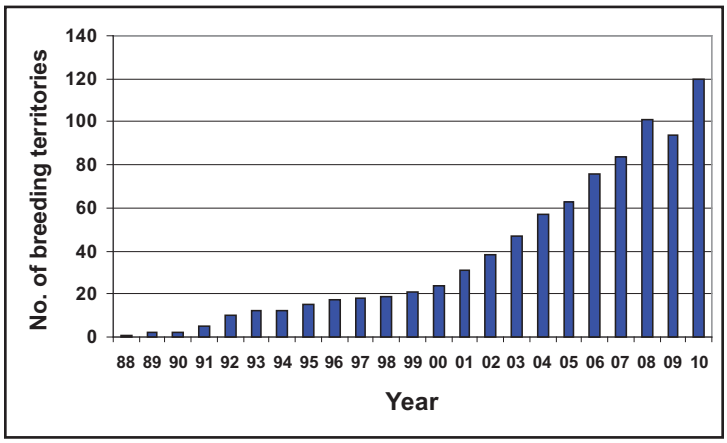
Sampling has been attempted mainly in the late summer and fall, using electro-fishing techniques. To date, the Northern brook lamprey seems to be limited to northern

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).

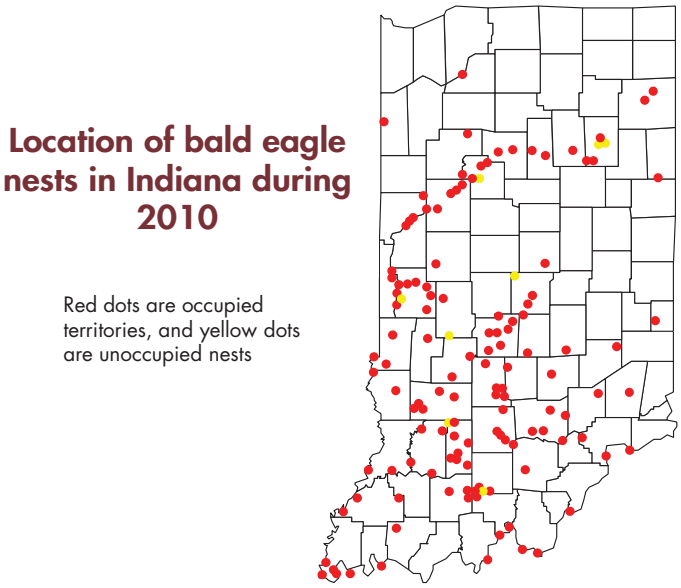
NONGAME BIRDS IN INDIANA

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 reaching a goal of 50 nesting pairs, 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 these bald eagles first began nesting in Indiana in 1989, nests have been monitored to document population changes. Nests are generally checked from a helicopter during 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.



Annual number of bald eagle territories in Indiana.



Adult bald eagle perched near its nest with one large eaglet in south-central Indiana.

From March 31 to April 12, six days were spent checking nests from the air. Combined with a few reports of nesting eagles later in the year, 120 nesting territories were known in Indiana during 2010. This represents an increase from 94 in 2009 and 101 in 2008. At least 98 of the nests in 2010 had eggs, chicks, or an incubating or brooding adult present on the nest. In 2008 and 2009, 90 active nests were counted. Twenty-three nests had not been known of before 2010 and are considered new. With nests found for the first time in Allen, Shelby, and Washington counties, the number of counties in Indiana with bald eagle pairs stood at 50 in 2010.

Eagles generally nest in large trees along the shorelines of larger rivers and lakes, but in 2010, for the first time in Indiana, an eagle pair built a nest and raised young on a large utility pole. Another memorable event during 2010 was the recovery of eagle #C-29, a bird taken from a nest in Alaska in 1987 and raised at Lake Monroe. Found injured in late February near the Brown/Jackson county line, she later died. At nearly 23 years of age, she was the longest known surviving member of the 73 birds released as part of Indiana's successful restoration program.

Another way to keep tabs on long-term 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 Indiana since 1979. For many years, these were conducted by helicopter, but were discontinued in 2009. In January 2010, eight locations, mainly fish-and-wildlife properties or public lakes, were surveyed for eagles from the ground. Sixty-one bald eagles and one golden eagle were tallied this year: at the West Union bridge along Sugar Creek in Parke County (33 bald eagles), Lake Monroe (13, plus 1 golden eagle), Brookville Lake (5), Patoka Lake (3), Muscatatuck National Wildlife Refuge (3), Willow Slough Fish and Wildlife Area (2), Eagle Creek Reservoir (2), and Hovey Lake Fish and Wildlife Area (0). The 2010 count of 61 bald eagles was much less than the 116 bald eagles (plus 1 golden eagle) tallied at the same sites in 2009. Winter eagle counts can

vary dramatically depending on the severity of the winter and the availability of prey (fish and waterfowl) and open water. Indiana attracts more eagles during cold winters when more northern birds are forced to venture south for food.

Colonial Waterbirds

The term "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 tens of thousands. Great blue herons are the most frequently encountered colonial waterbird in Indiana, with more than 100 known nesting colonies. Heron colonies are surveyed every five years. The most recent census was in 2008. 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. Biologists are concerned that cormorants may crowd out the rarer herons and egrets, forcing them to move elsewhere. Guano from cormorants can also kill trees used for nesting.

Double-crested cormorant chicks near nests at Gibson Lake

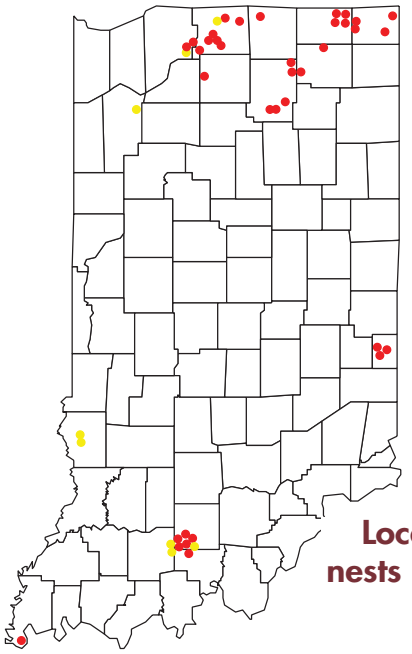
An adult black-crowned night heron rests on its nest at Mittal Steel East in Lake County.

Biologists searching for least tern nests at Cane Ridge Wildlife Management Area, Gibson Co., Indiana.

Counts at the Mittal Steel colonies were conducted on May 18. At Mittal Steel West, nesting cormorants are absent and great egrets and black-crowned night herons nest in small trees along the Indiana Harbor. Numbers detected in 2010 were similar to counts in 2009 for the herons (48 versus 58 nests in 2009) and egrets (6 versus 5). Black-crowned night herons nested here in the 1990s but disappeared after beavers cut down nest trees. They were first noted again in 2008 after trees and shrubs became reestablished. Great egret nesting was first observed in 2009.

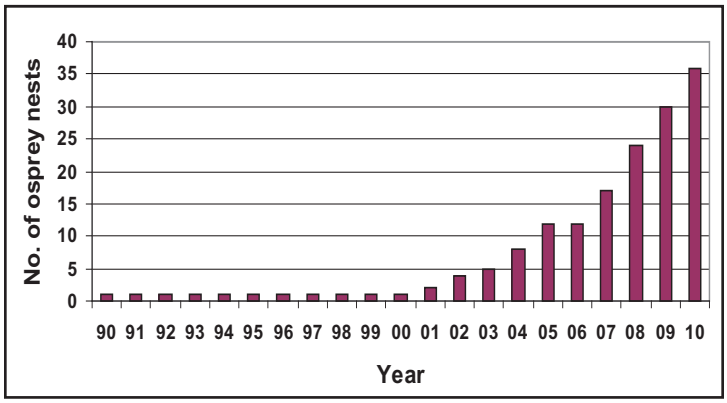
At Mittal Steel East, double-crested cormorants showed another large increase with 2,429 nests compared to 1,799 in 2009, and 1,075 in 2008. The number of black-crowned night heron nests declined from 180 nests in 2009 to 79 nests in 2010. Surprisingly, great egrets doubled, with 132 nests tallied in 2010 compared to 66 in 2009. Trees and shrubs available to nesting are becoming scarce, forcing all species to increasingly nest on the ground where eggs and chicks are more vulnerable to predation. In 2007, tree nesting occurred at a rate of 17% for double-crested cormorants, 64% for black-crowned night herons, and 98% for great egrets. The rate of tree nesting in 2010 was 2% for cormorants, 3% for night herons, and 68% for egrets. Damage to trees by beavers has also contributed to this decline.

Black-crowned night herons were discovered nesting at Goose Pond Fish and Wildlife Area (Greene County) in 2010, the only Indiana location away from the Lake County sites. A few double-crested cormorants continue to nest on the ground at Gibson Lake in southwestern

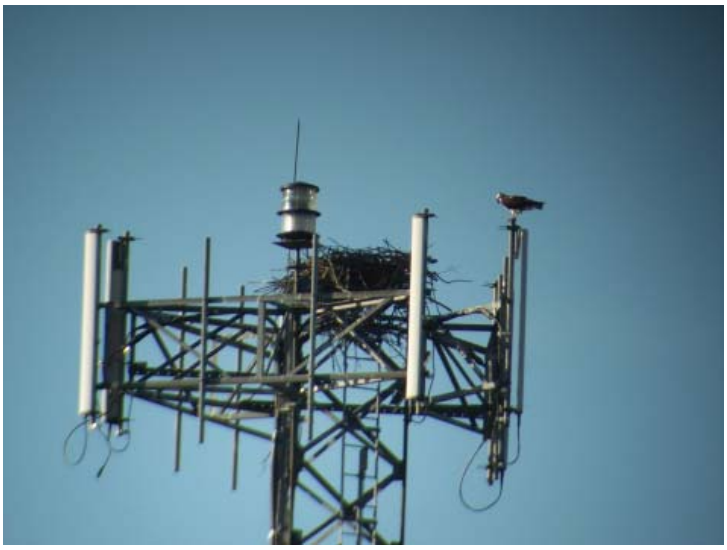


Red dots are active nests, yellow are non-nesting pairs

Location of osprey nests in Indiana during 2010



Annual number of osprey nests in Indiana



An adult osprey perched near its nest on a cell tower in Steuben County.

Two osprey chicks in a nest

Indiana, and nesting was discovered at Eagle Creek Park in Marion County in 2010.

Osprey

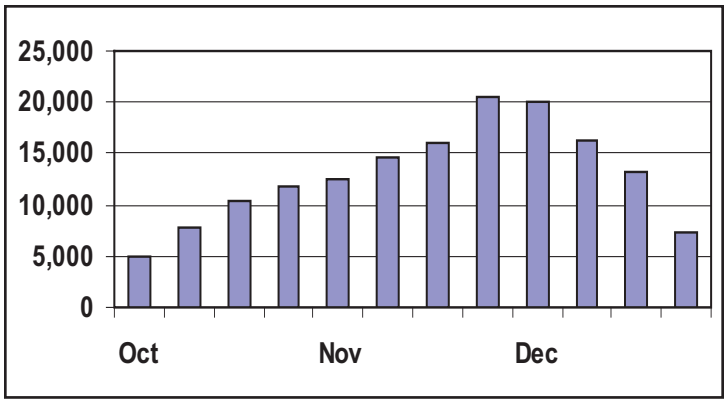
This large, eagle-like bird is an active fisherman and is generally seen during spring and fall migrations hovering, diving, and catching fish in the open waters of Indiana's lakes, ponds and rivers. Historically, a few remained to nest, building large stick nests in dead trees near the shoreline or on islands in lakes, rivers or wetlands. In recent times, nests are most often found on manmade 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 through a partnership between the Department of Natural Resources and private groups and individuals, Indiana's osprey population has shown steady growth.

During 2010, 45 pairs of osprey were known in Indiana, with 37 pairs believed to have laid eggs. These figures compare to two pairs and one active nest in 1999, six pairs and five active nests in 2003, and 35 pairs and 30 active nests in 2009. The distribution of ospreys is clustered in Indiana with the largest number of nests in St. Joseph and adjacent counties (12 nests or pairs), Patoka Lake (8), Pigeon River Fish and Wildlife Area (6), Kosciusko County (6), and Brookville Lake (3). Nests in 2010 were built on nesting platforms (24), cell towers (9), dead trees (4), metal utility towers (4), and wooden utility poles (4). 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.

Sandhill Crane

The sandhill crane is a long-legged, long-necked waterbird that people sometimes confuse with the somewhat similar-appearing but unrelated great blue heron, which is sometimes inappropriately referred to as the blue crane.

Sandhills fly with their necks outstretched and are seldom seen alone. An individual is almost always in compa-



Average number of sandhill cranes counted weekly during the fall at Jasper-Pulaski Fish and Wildlife Area, 2003-2009.

ny with its mate, family group, or flocks numbering from around two dozen to the hundreds. During fall and spring migratory periods, groups of 50 to 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 on 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 to monitor changes in population size. Much of the population stops at Jasper-Pulaski Fish and Wildlife Area in northwestern Indiana before venturing south to wintering areas in Tennessee, Georgia and Florida. Of the 10 Indiana areas surveyed in late October 2009, five reported sandhill cranes. Jasper-Pulaski had 10,420 sandhill cranes present. Lesser numbers were present at Kingsbury FWA (178), Pigeon River FWA (175), Brookville Reservoir (21), and Pisgah Marsh Wildlife Diversity Area (17). Many sandhill cranes had not yet moved south into Indiana from Wisconsin, Michigan, and other northern locales. Numbers on weekly counts were greatest at Jasper-Pulaski from mid-November to early December when at least 13,000 cranes were present. The peak count occurred on Nov. 24, when 14,500 were estimated, and 1,500 birds remained to the end of December. In recent years, greater numbers winter in the state, and northern movements are noted in February with large concentrations at Goose Pond FWA.

The Mississippi Flyway Council completed a management plan for the Eastern population of sandhill cranes. Provisions in this plan allow for flyway states to conduct limited hunts with a maximum of 2,500 cranes harvested annually in the entire flyway. Recent fall surveys indicate a population exceeding 60,000 sandhill cranes in this region.

Least Tern

This petite and active waterbird is the only federally en-

Least tern chick at Gibson Lake

Decoys used to entice least terns to nest at Tern Bar Slough, Gibson County

The dike between two settling ponds where least terns nest at an American Electric power plant in Spencer County

dangered 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 disturbance from people.

Working closely with power companies and the U.S. Fish and Wildlife Service, least tern colonies at two locations are closely monitored and steps are taken to ensure successful nesting. The original and largest colony is in Gibson County, where birds are present on properties owned and managed by Duke Energy, the U.S. Fish and Wildlife Service (Cane Ridge Wildlife Management Area), and the Indiana Department of Natural Resources (Tern Bar Slough). A record 220 least tern adults were present in 2009 but somewhat fewer terns (150) showed up in 2010, beginning on May 7. However, the number of least tern chicks raised was an all-time high of approximately 165 young produced, compared to the previous record of 115 in 2009. This year eggs were laid in 110 nests with a higher number of first nests (75) and fewer later attempts indicating less predation and other causes of nest failure.

Successful nesting occurred at three distinct sites at Gibson Lake. The narrow center dike in the middle of Gibson Lake produced 100-105 chicks to flight age with terns nesting at several small colonies along this 2.5-mile crushed-limestone roadway. Another 60-65 tern chicks were raised on one of the two 3-acre nesting islands in the tern pool at Cane Ridge. Efforts were made to discourage least tern use at a Duke Energy ash disposal area at which terns have nested in previous years. Duke is required to cover the ash with soil, but in spite of high disturbance by heavy machinery in this area, 10 nests were observed and one chick was raised. Two additional islands surrounded by a narrow moat were also available for nesting by least terns at Tern Bar Slough. A few terns were observed feeding and roosting there but nesting did not take place. Keeping water levels high around nesting islands at Tern Bar Slough and Cane Ridge was a problem in 2010. Rainfall was adequate in May and early June, but dry conditions prevailed the rest of the summer, and problems occurred with a pump that provides water from the Wabash River. As a result, the moat at Tern Bar Slough was bone dry most of the season, as efforts were directed toward keeping enough water around the Cane Ridge islands to thwart predators. Managers at Tern Bar Slough took advantage of the dry conditions to place additional riprap outside of the protective fence and remove a pipe that was hindering water retention.

Nearly 50 miles southeast of the Gibson Lake colony, a smaller population has been nesting at the American Electric Power Plant near the Ohio River in Spencer County for six years. The nesting site is a short, narrow dike separating some retention ponds. As many as 72 adult terns were counted in 2010, and 30 nests were discovered, 14 of which were considered re-nests or later nests. Fifteen chicks were estimated to have survived. On a nearby dredge island in the Ohio River, evidence of nesting was noted but no chicks were produced because of rising water levels.

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. These efforts have resulted in adequate production most years and a steadily increasing number of least terns in Indiana.

Peregrine Falcon

The recovery of the peregrine falcon, the world's fastest animal, has been remarkable. Once, 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 wild.

An effort to restore peregrines in the Midwest began in 1981, when young chicks hatched in captivity were released in Minnesota. In later years, this program expanded with releases in all Midwestern states, many in

A "dirty" adult peregrine falcon perches near its nest at US Steel in Lake County.

Peregrine falcon pairs and vacant nest boxes in Indiana and adjacent areas

urban areas, including 60 falcon chicks released in four Indiana cities from 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 ledges of tall buildings, smokestacks and areas under bridges making for suitable nest sites. The providing of nest boxes also has attracted and benefited peregrines and resulted in high nesting success. In 1999, the peregrine falcon was considered recovered and taken off the federal endangered species list.

Starting in 1989, when Indiana's first nesting pair in recent times was discovered, the state's peregrine falcon population grew steadily but growth has slowed in recent years. During 2010, 19 territorial pairs were known, three more than in 2009. Four sites had no peregrines present previously. Four sites with falcons present in 2009 were vacant this year. One of these, the Cline Avenue bridge site in East Chicago, where Indiana's first pair was reported in 1989, has had a pair present for 21 consecutive years. Eleven peregrine pairs laid eggs, one fewer than in 2009. Nine nests were successful, and 27 chicks reached flight age, one more than last year. Twenty-two of the chicks could be reached safely for banding, allowing their fates to be assessed in the future.

Four newly banded peregrine falcon chicks rest in their nest at a NIPSCO power plant in Porter County.

An adult female peregrine falcon defending its nest of four eggs at US Steel, Lake County, Indiana.

Of the 38 adult peregrines at the 19 sites, 11 were identified by their leg bands, 10 had bands but could not be positively identified, four lacked bands, and 13 birds could not be seen well enough to determine if they were banded. Kinney, Indiana's oldest male peregrine at 17 years of age, lives in downtown Indianapolis and has now raised 58 chicks, adding to his record as the most productive male in the Midwest. Freedom, Indiana's oldest female (16 years) that was originally released in Evansville, is still paired and on territory in downtown Fort Wayne, but she has not laid eggs the past three years, most likely due to her advanced age. Bailly, a male falcon hatched in captivity in 1993 and placed in a nest at US Steel in Gary, was found dead a few weeks after raising four chicks at NIPSCO's Bailly power plant near Porter. He has nested annually since 1996, raising 34 chicks at four different nest sites in Porter County.

The 19 nest sites in Indiana are unevenly distributed around the state. Ten are located along Lake Michigan, three along the Ohio River and one near the Kankakee River. The remaining nest sites are in urban Indianapolis, Fort Wayne, South Bend and Terre Haute. Five of the pairs were found associated with city skyscrapers, six at power plants and six at steel mills. Others were found at an oil refinery and a grain storage facility. All but two pairs laid eggs in nest boxes specifically designed for peregrine falcons.

The Midwestern population of peregrine falcons continues to grow. More than 250 pairs are now present. This number far exceeds the 60-80 pairs estimated to have been present historically. This is primarily due to peregrines now using manmade structures. As long as prey populations (other birds) remain abundant and free of harmful chemicals, and nesting pairs have secure nesting sites, this species should do well.

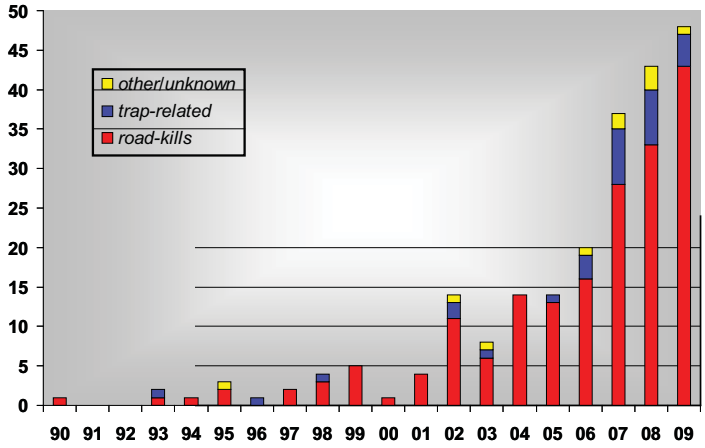
The people who follow peregrines are dedicated. Cameras set up at selected nests are viewed thousands of times on the Internet during the breeding season. "Falcon-cams" at nests in Indianapolis, Fort Wayne and South Bend provide such access.

Breeding Bird Atlas

The Indiana Breeding Bird Atlas is a mammoth undertaking that uses 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 and use those results to map each species. This is accomplished by making observations in 647 priority blocks, each consisting of one-sixth (approx. 10 mi² in area) of a standard 7.5-foot 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 current atlas should provide indirect evidence for changes in abundance for some species.

The year 2010 was planned as the last of six field seasons for collecting atlas data; however, complete coverage was not achieved but should be attained with one more year of field work. Approximately 92% of atlas blocks in all 92 Indiana counties now have some observations, although there has been minimal coverage in two counties. The number of records in priority blocks is nearly 39,000 with evidence of breeding, which is about 90% of the number recorded during the earlier atlas. So far, 188 bird species have been recorded with 159 showing confirmed evidence of breeding. During the 1985-1990 atlas, a similar number of species was confirmed breeding, although the lists are somewhat different. Species confirmed breeding during the earlier survey period, but not during the current atlas are Northern shoveler, green-winged teal, redhead, red-breasted merganser, least bittern, little blue heron, black tern, long-eared owl, short-eared owl, whip-poor-will, chestnut-sided warbler, Canada warbler, and pine siskin. Confirmed breeders in the 2005-2010 atlas that were not found in the 1985-1990 atlas included: ruddy duck, double-crested cormorant, great egret, black-crowned night heron, Mississippi kite, black-necked stilt, Wilson's phalarope, Caspian tern, Eurasian collared dove, monk parakeet, Western kingbird, red-breasted nuthatch, and Brewer's blackbird.

Bobcat Mortalities in Indiana, 1990 - 2009



MAMMALS

Otters, Cats, and Badgers

Three mammalian carnivores that were on the state's endangered species list when it was first developed more than 40 years ago continued their remarkable return to the Indiana landscape in 2010. River otters, bobcats and badgers were considered rare in the Hoosier state in the early 1970s; however, due to long-term management and research programs initiated by the WDP, these fascinating members of the state's native fauna appear to be established once again in Indiana. The end result of these efforts was achieved in 2005, when all three were removed from the state's endangered species list and reclassified as Species of Special Concern.

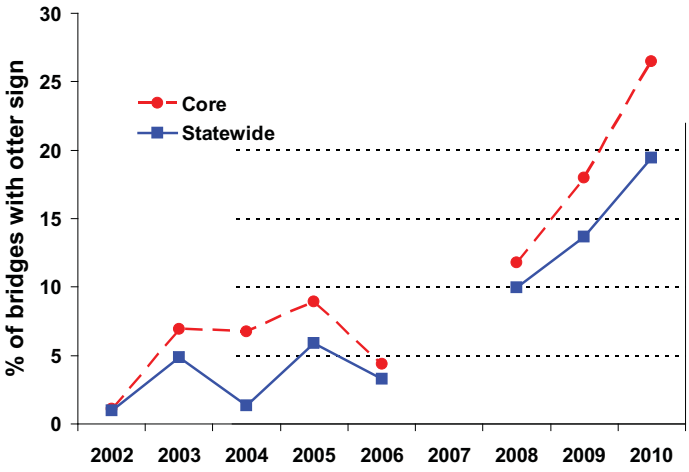
Distinctive otter sign detected in the snow in Miami County during the winter survey.

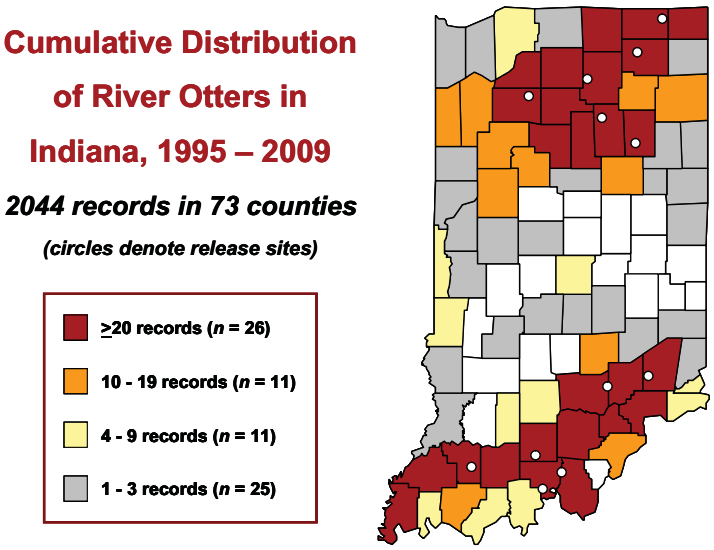
Collared, male bobcat recaptured in Southern Greene County.

River otters had benefitted from an ambitious restoration program during the latter half of the 1990s, during which 300 otters were released into high-quality habitats in northern and southern Indiana. The program has been a remarkable success. Otters are reproducing at high rates and populations surrounding release sites remain healthy and secure. They have also expanded to other portions of the state and now occupy 73 Indiana counties. A record 51 otters were accidentally taken in traps legally set for other furbearers during the 2009-10 fur harvest season. Last winter, otter sign was found at nearly 20% of the 480 bridges surveyed statewide, the highest level ever recorded.

Bobcats and badgers are both terrestrial carnivores that are difficult to monitor because they travel widely and typically exist at low population densities. The management challenges presented by these species require use of a variety of information accumulated throughout many

River otter at Tippecanoe State Park





years. The WDP monitors annual reports (collisions with vehicles, sightings, trap-related incidents) and obtains sex, age, and reproductive information for both species to help evaluate their status and distribution. In 2009, a record 48 bobcat mortalities were reported in Indiana, more than twice the total reported just three years before. Bobcats appear most prevalent in southern Indiana where second-growth forests and reclaimed strip mine lands provide the dense, brushy undergrowth they need for food and cover.

Badgers have also expanded their range in the Hoosier state. A study conducted by the WDP found badgers occupied 61 counties in the mid-1990s, an increase of 26 counties from 1955, when the species distribution was last evaluated. Compared to otters and bobcats, fewer reports of badgers are received by nongame personnel each year; however, those that had been submitted in the last three years suggest badgers remain generally uncommon but are stable statewide and well established in suitable habitats in the northern third of Indiana.

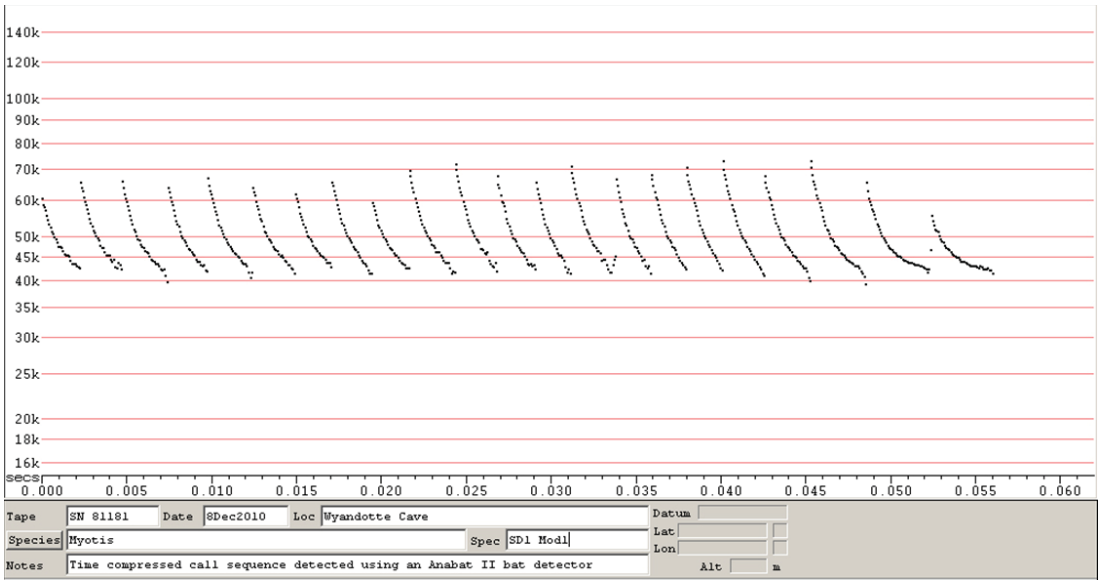
White-Nose Syndrome: An Unprecedented Threat to Bats in North America

Few mammals are as misunderstood and maligned as bats. As a group, they have been persecuted for generations because most of what people believed about bats was based on stereotyped myths rather than fact.

Bats are not blind, nor do they try to become entangled in hair. They are not repulsive flying rodents with an insatiable thirst for human blood. In reality, bats are unique, intelligent and shy creatures that provide tremendous ecological, economic and scientific benefits to mankind. In the midwestern United States, they are the major predator of night-flying insects, many of which damage agricultural and forestry products. Elsewhere, bats are vital as plant pollinators and/or seed dispersers that ensure production of fruits that support local economies.

Despite the fundamental roles that bats play in maintaining ecosystem integrity and function, many species

GateKeeper beam-break system to monitor bat activity at Wyandotte Cave



Compressed bat echolocation call recorded on ultrasonic detector

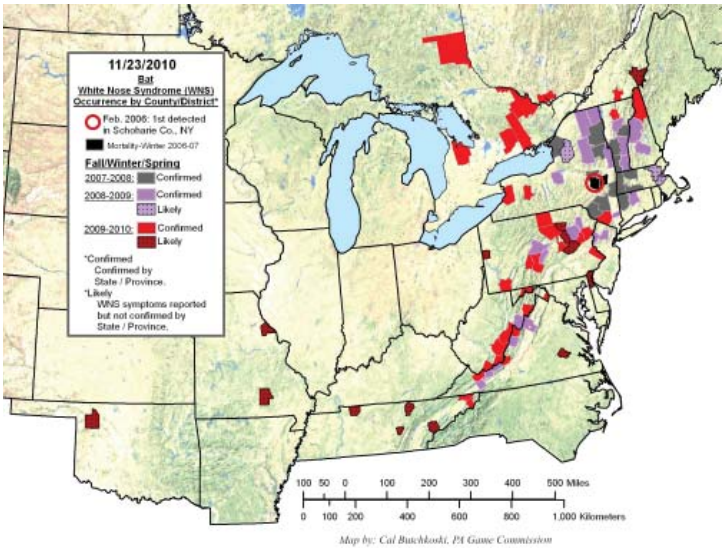
are vulnerable to population declines because of particular aspects of their life history. To illustrate, bats differ from other small mammals in that they have an unusually low reproductive output. Bats first breed at a comparatively later age and produce one litter each year. That litter often consists of only one pup. Additionally, some species form large clusters to hibernate or raise young, and safe, suitable roost sites may be limited or lost because of human actions. Widespread loss of natural habitats and use of insecticides and other environmental contaminants have also negatively affected populations at various scales.

Unfortunately, bats are now facing a new and unprecedented threat to their survival, white-nose syndrome. WNS is a fungal disease that is causing exceedingly high levels of mortality of bats in and around caves and mines in which they hibernate. The disease has devastated populations—more than a million hibernating bats have died from it in the eastern United States. WNS is named for a distinctive white fungus that invades the skin of the nose, ears and/or wing membranes of affected bats. The fungus appears to be new to North America, but it is unclear if WNS directly causes death, or is a contributing factor or secondary symptom of some other cause of death. Most experts believe the fungus is spread primarily by bat-to-bat contact, but human-assisted transmission may also be possible if fungal spores persist on clothing, footwear, or gear of people who have visited infected caves or mines.

WNS was first documented in New York in 2006 and has spread rapidly. Entering the 2010-11 hibernation season, WNS had been confirmed or was suspected in 14 states and two Canadian provinces stretching from southern Quebec/Ontario, south through the Appalachian Mountains into eastern Missouri and western Oklahoma. Although WNS has not been found in Indiana, most biologists believe it will continue to spread unchecked, including into Indiana, and as a result, threaten some of the largest concentrations of wintering bats in the country.

Thirteen different bat species have been reported in Indiana, including eight of the nine known to have been affected by WNS thus far. Because of the potential for human-assisted transmission of the fungus associated with WNS, the Indiana Department of Natural Resources closed public access to its caves, sinkholes, tunnels, and

Ultrasonic bat detector positioned at cave entrance to record bat echolocation calls



Map of WNS by county/district as of 11/23/2010 (Cal Butchkoski, Pennsylvania Game Commission)

abandoned mines in 2009. Although the closure affects less than 10% of the estimated number of caves in Indiana, it protects several significant bat colonies. Nearly 190,000 Indiana bats, a federally endangered species, were found hibernating in Indiana caves in 2009. That figure represents nearly half of the total known population. These caves, as well as others, are also home to thousands of other hibernating bats—little brown bats, Northern bats, tri-colored bats, and big brown bats—all of which would be at imminent risk if WNS reaches Indiana.

Several WNS-related projects were initiated by the Indiana Nongame and Endangered Wildlife Program in 2010. Bats affected with WNS often exhibit unusual behavior during the winter hibernation period, including exhibiting abnormally high levels of activity and flying outside during the day. Using funding obtained by Bat Conservation International, a GateKeeper beam-break system was installed at the entrance to one of the state's most significant bat hibernation sites. The system consists of a series of paired infrared beams that covers about 70% of the cross-sectional area of the passage. Bats exiting or entering the cave are detected by event counters as they "break" the beams. Biologists are able to access the information remotely, thus allowing constant monitoring of levels of bat activity at this cave. Another form of WNS surveillance initiated in 2010 involves the use of ultrasonic bat detectors at the entrances of caves that harbor particularly large and diverse winter populations. These detectors record the echolocation calls of bats, including date and time, as they emerge from the cave. Temperature data are also recorded to see if any observed activity could be related to ambient temperature. Equipment for this form of passive monitoring was purchased with WNS funding made available from the U.S. Fish and Wildlife Service.

WNS closure sign posted at DNR-owned cave

Little brown bats with white-nose syndrome in New York. Photo by Nancy Heaslip, New York Department of Environmental Conservation.

Little brown bat with white-nose syndrome in New York. Photo by Al Hicks, New York Department of Environmental Conservation.

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 state herpetologist recruits more than 40 volunteers to recognize the mating calls of Indiana's frogs and toads while conducting survey routes throughout the state. Volunteers must follow strict protocols for data collection and pass a frog- and toad-call identification test.

Each driving survey route stops 10 times near suitable amphibian habitat. Observers listen for 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 2010, 28 volunteers submitted data for 26 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 e-mail 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, see http://www.IN.gov/dnr/fishwild/3325.htm.

A salamander from the Jefferson salamander complex was discovered as part of the surveys on Fish and Wildlife Areas.

A marbled salamander discovered as part of the surveys at the Patoka River National Wildlife Refuge.

A juvenile Eastern hog-nosed snake, feigning death. This snake was encountered during the ornate box turtle surveys.

Ornate Box Turtle

The ornate box turtle is the slightly smaller relative of the Eastern box turtle. These two species are hard to tell apart by looks alone. Both have a domed shell (carapace) on the top and a hinged underside (plastron) that allows them to pull their body fully inside the shell. The ornate box turtle, unlike the Eastern, will inhabit sandy areas of plains and prairies that are dominated by grasses.

These turtles are active during the morning and evening hours during hot weather, and spend the rest of their time in underground burrows. They like to eat a diet largely consisting of insects and especially caterpillars.

The ornate box turtle reaches maturity at approximately 8 to 10 years of age, and may live up to 50 years. This turtle is especially vulnerable to land-use changes because it requires a more specific habitat than other turtles. Automobiles, lawnmowers, farm machinery, and over-collection of this animal for pets have made nega-

Juvenile wood frog, one of 13 new county records discovered during a two-year herpetological survey of Patoka River National Wildlife Refuge.

tive impacts on the populations. This is an endangered species in Indiana, due to limited habitat availability and rarity. In 2010, ornate box turtle surveys were conducted at three nature preserves that historically were known to have had populations. Unfortunately, no populations has been found so far.

Surveying for Reptiles and Amphibians at Fish and Wildlife Areas

Surveys for populations of reptiles and amphibians at Indiana's State Fish and Wildlife Areas were continued in 2010. Tri-County, Winamac, Hovey Lake, and Goose Pond were selected to begin long-term sampling in 2004, 2005, 2006 and 2008, respectively. Surveys involve placing coverboards (wood squares that mimic logs and rocks) along sections in areas where you want to sample for reptiles and amphibians. Coverboards provide excellent habitat and places to hide, especially for salamanders. Once the coverboards have been placed, biologists check under each one and record the species found beneath. These surveys can be especially beneficial to the statewide monitoring of species. For example, in 2006, a previously unknown population of the four-toed salamander was discovered.

Patoka

WDP 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 13 new county records for the refuge, which occurs in both Gibson and Pike counties. Records for the wood frog, lesser siren, and the red-bellied snake were new for 2010. 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—More Important Than Ever

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.

WDP 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 external project links associated with this year's report to view the current status of these projects. The external project reports were written by the students and staff conducting the studies.

The Wildlife Diversity Staff took many of the photos in this publication. Others are taken by DNR photographers or are in the public domain unless otherwise noted.