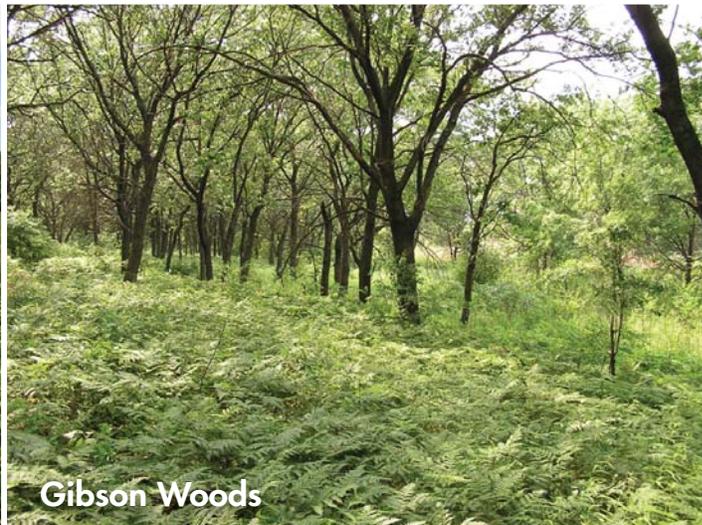




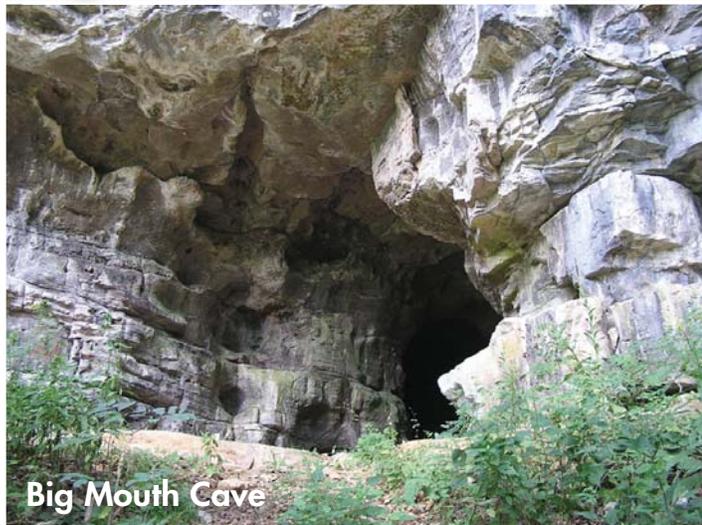
# 2011 WILDLIFE DIVERSITY REPORT



Pisgah Marsh



Gibson Woods



Big Mouth Cave



Agricultural fields with  
flatwoods in the background



Vernon Fork Muscatatuck River



Clark and Pine Nature Preserve

*On the Cover: A small collage of Indiana habitats illustrates the importance of habitat conservation to wildlife diversity. To support Indiana's wildlife diversity we must maintain a variety of habitat and functional connections between those habitats. In nature, one size does not fit all. Through our research projects we continue to learn about habitat characteristics needed to support rare species, and how to manage and protect important habitat features. This year, in partnership with The Nature Conservancy, the Wildlife Diversity Program purchased a permanent conservation easement on Harrison Springs, the state's largest spring and a major water source to the Blue River. Other habitat protection measures are in the works.*

## 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 2011 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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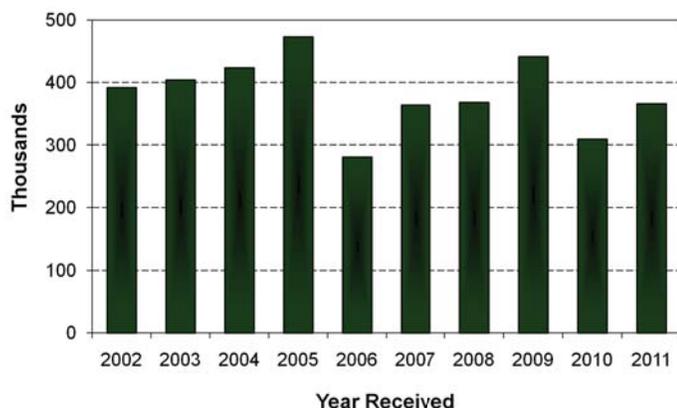
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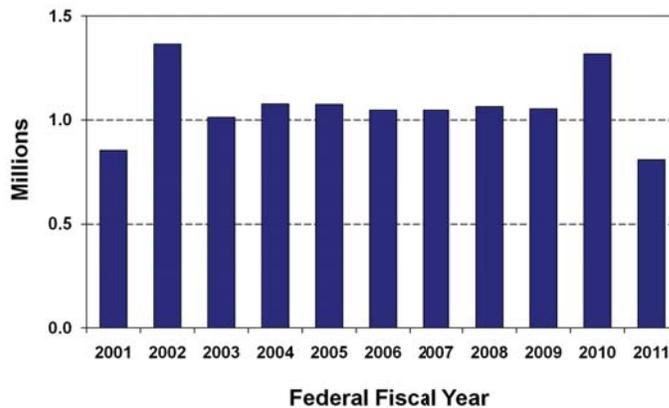
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*\*This year, the Wildlife Diversity Program's five assistants previously classified as intermittent naturalist aids were promoted to permanent part-time assistant biologists. These individuals contribute greatly to the program, and this higher classification better reflects their important contributions.*



*Donations to the Nongame Fund during last 10 tax years in thousand-dollar increments.*



*Federal matching funds for Indiana's Nongame Fund for last 11 years.*

## TEAMWORK TACKLES BAD ECONOMY

The Wildlife Diversity Program appreciates the continued support of Indiana citizens. Despite the slowly recovering economy, Nongame Fund supporters donated \$336,500 in 2011, which represents a 20 percent increase over last year. However, because of a recent adjustment to a 2009 return, \$100,297 was taken back from the Nongame Fund. In spite of this unprecedented event, support for the Wildlife Diversity Program remains steady.

With the help of conservation partners, WDP continues to make good progress and is able to obligate all the federal State Wildlife Grant funds apportioned to Indiana. This year an additional \$226,809 in federal funds was obligated in Indiana for bat population research. Two federal grant programs supporting white-nose syndrome research provided 30 percent of the funds and two Section 6 Endangered Species grants provided the remainder.

Unfortunately, the future of federal support remains uncertain. Finalization of the current fiscal year federal budget was postponed until 2012, 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 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 move Indiana's rarest wildlife to healthy, self-sustaining populations and to protect their habitats.

## 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.

## BIRDS

### 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. The result is a map for each species. This objective will be accomplished by making observations



## 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](http://www.IN.gov/ai/appfiles/dnr-inf/index.html)

in 646 priority blocks, each consisting of one-sixth (approx. 10 mi<sup>2</sup> 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 current atlas should provide indirect evidence for changes in abundance for some species.

Field efforts devoted to creating the atlas were completed during late spring and summer 2011. Contractors were selected and assigned either to blocks that had no previous visits or to those needing additional coverage. Volunteers were encouraged to complete their efforts for assigned blocks. Although some participants have not entered all their observations, the number of records in priority blocks is nearly 45,000. That figure is about 4 percent greater than that for the 1985–1990 atlas project. Records, especially those for rarer species, will now be examined to determine if either entry errors or errors dealing with identification occurred.

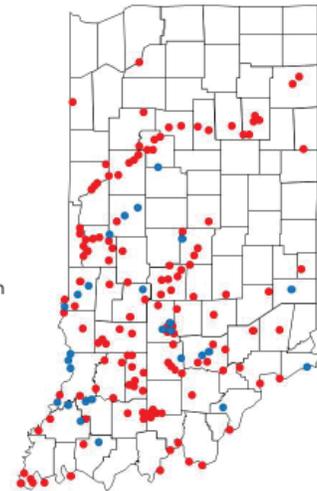
So far, 193 bird species have been recorded with 166 showing confirmed evidence of breeding. During the 1985–1990 atlas project, 158 species were confirmed breeding, and 11 additional species were in the probable and possible categories. Species confirmed breeding during the earlier survey period, but not during the current atlas include Northern shoveler, green-winged teal,

redhead, red-breasted merganser, least bittern, little blue heron, black tern, long-eared owl, short-eared owl, Canada warbler, and pine siskin. Confirmed breeders in the 2005–2011 atlas that were not found in the 1985–1990 atlas include gadwall, ruddy duck, double-crested cormorant, great egret, snowy egret, cattle egret, black-crowned night-heron, Mississippi kite, black-necked stilt, Wilson’s snipe, Wilson’s phalarope, Caspian tern, Eurasian collared-dove, monk parakeet, Western kingbird, red-breasted nuthatch, and Brewer’s blackbird.

A cursory look at the preliminary data show considerably fewer blocks than 20 years ago for the following species: loggerhead shrike, ruffed grouse, blue-winged teal, black-billed cuckoo, chestnut-sided warbler, least flycatcher, American woodcock, sharp-shinned hawk, whip-poor-will, and cerulean warbler. Bird species that were reported in substantially more blocks in the 2005–2011 atlas include bald eagle, osprey, sandhill crane, mute swan, hooded merganser, great blue heron, wild turkey, lark sparrow, blue grosbeak, Bell’s vireo, and Henslow’s sparrow.

### Bald Eagle nest distribution 2011

Blue dots are nests discovered in 2011 while red dots are nests known in 2010



#### Distribution of bald eagle nests in Indiana

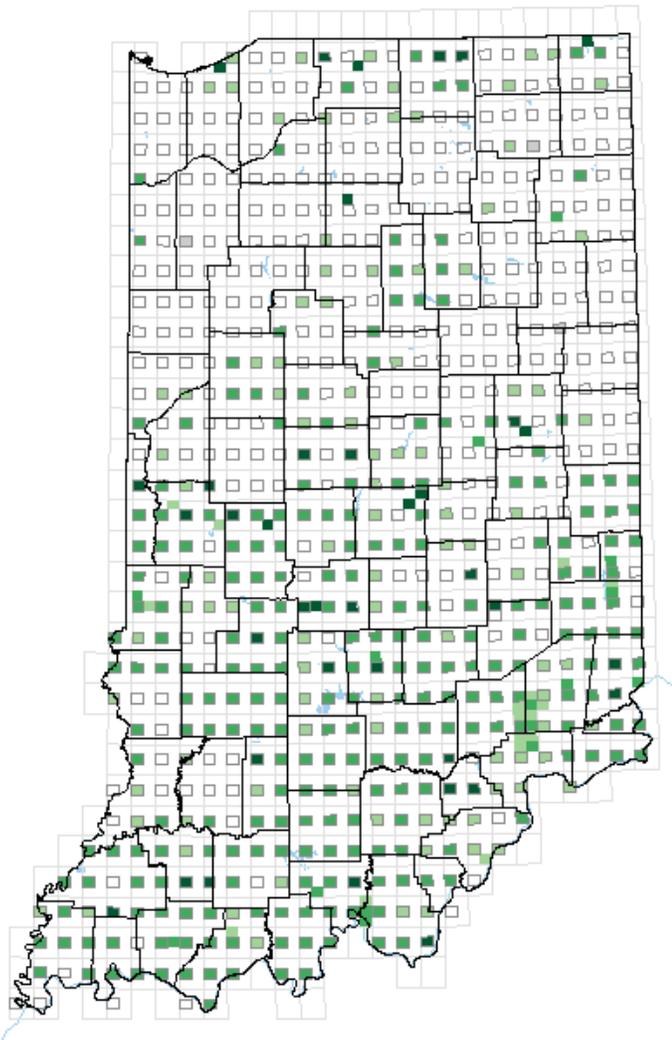
Maps generated from the atlas project can be viewed at: [http://www.pwrc.usgs.gov/bba/index.cfm?fa=explore.ResultsBySpecies&BBA\\_ID=IN2005](http://www.pwrc.usgs.gov/bba/index.cfm?fa=explore.ResultsBySpecies&BBA_ID=IN2005)

### Bald Eagle

For the first time in many years, helicopter surveys to monitor bald eagle nesting did not take place. Budget constraints, shifting priorities, and the overwhelming number of bald eagle nests in Indiana resulted in a decision not to track eagle nests as closely as in the past. It is hard to imagine that just over 20 years ago, this magnificent bird was not nesting in the state. As the first restoration program of the Nongame and Endangered Wildlife Program in the early 1980s, the goal of establishing five nesting pairs in Indiana by the year 2000 seemed formidable at the time, but timid in retrospect. Even a goal of maintaining 50 nesting pairs used to remove this species from the state-endangered species list in 2008 seems conservative compared to the current population. In 2010, at least 120 eagle pairs were known in Indiana, and with the addition of more than 20 new nests reported in 2011, Indiana’s breeding population is approaching 150 territories.

Although we did not systematically visit bald eagle nest sites this year, we did investigate reports of new nests and received reports of the status of some established nests. Twenty-two new nests were reported in Indiana; an additional two were reported along the Wabash River on the border with Illinois. Other observers reported new nests built by established pairs. Because of their large size, bald eagle nests and the trees in which they are built are subject to loss due to high winds, storms, flooding, aging, disease, or injuries in nest trees.

Another way to keep tabs on long-term eagle population trends in the region has been conducting winter surveys. Nationwide mid-winter 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 2011, eight locations, mainly



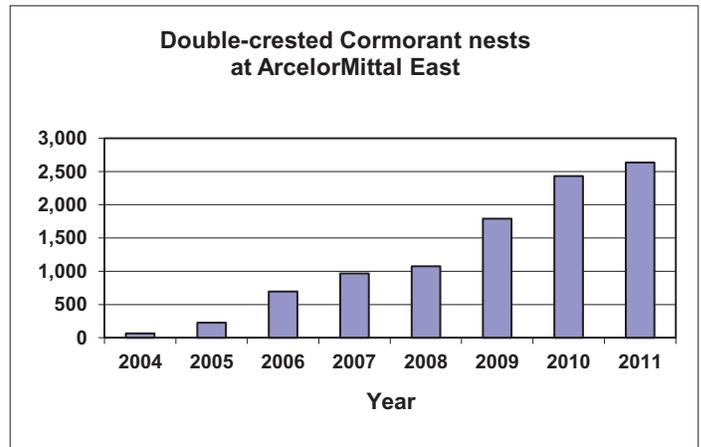
*Atlas map from the current atlas project for the pileated woodpecker showing a statewide distribution but more occurrences in southern Indiana. Degree of shading corresponds to the degree of breeding evidence.*

fish & wildlife areas or public lakes, were surveyed for eagles from the ground. A total of 109 bald eagles was tallied this year: at the West Union bridge along Sugar Creek in Parke County (70 bald eagles), Monroe Lake (25), Brookville Lake (5), Patoka Lake (5), Muscatatuck National Wildlife Refuge (2), Eagle Creek Reservoir (2), Willow Slough Fish & Wildlife Area (0), and Hovey Lake Fish & Wildlife Area (0). The 2011 count of 109 bald eagles was much greater than the 61 tallied at the same sites in 2010, but slightly less than the 116 bald eagles recorded 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.

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 Monroe Lake 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.

## Colonial Waterbirds

Colonial waterbirds refers to a number of different bird groups that nest closely to each other. In Indiana, these include cormorants, herons, egrets, terns and gulls. Colonies consist of fewer than 10 nests to as many as tens of thousands. Great blue herons are the most frequently encountered colonial waterbird in Indiana with more than 100 known nesting colonies. Heron colonies have been surveyed every five years. The most recent census was in 2008. Two large gull colonies along Lake Michigan have been assessed periodically as part of Great Lakes Colonial Waterbird Survey. Nests were counted in 2011 after last being counted by census in 2007. Other species are surveyed more often. The double-crested cormorant has been viewed with concern in the Midwest because increasing populations pose a potential threat to local fisheries, and this species 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.



*Growth in the number of double-crested cormorant nests at a steel mill in East Chicago, Ind.*



*Double-crested cormorants (young birds in foreground, adults in background) at ArcelorMittal Steel East, Lake County.*

Counts at the ArcelorMittal Steel colonies were conducted on May 11–12. At ArcelorMittal Steel West, nesting cormorants were absent and great egrets and black-crowned night-herons were nesting in small trees along the Indiana Harbor. Numbers of black-crowned night-herons detected in 2011 (61 nests) were greater than counts in 2010 (48), but great egret numbers were similar (7 vs. 6) between years. Black-crowned night-herons nested here in the 1990s but disappeared after beavers cut down nest trees. Nesting cormorants were first noted again in 2008 after trees and shrubs became reestablished. Great egret nesting was first observed in 2009. Gulls nest on the ground at these steel mills and are actively managed with scare tactics and egg removal to prevent nesting in selected areas with human activity. Gulls are allowed to nest in other areas. The 2011 count at this site was 9,517 ring-billed gull nests and 205 herring gull nests. These numbers are lower than the 2007 figures (14,789 ring-billed and 243 herring gull nests). Caspian terns also nest on the top of slag piles; 20 nests were found in early June compared to 409

nests in 2007. The finding of fewer nests can be attributed to heavy machinery moving piles of slag that are favored nesting spots.

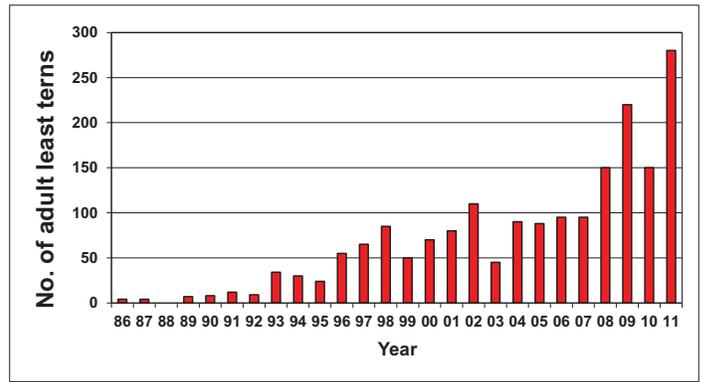
At ArcelorMittal Steel East, double-crested cormorants showed another increase with 2,633 nests compared to 2,429 in 2010, and 1,799 in 2009. The number of black-crowned night-heron nests increased from 79 nests in 2010 to 172 nests in 2011. Great egret numbers were slightly lower with 125 nests tallied in 2011, compared to 132 in 2010. Trees and shrubs available to nesting are becoming scarce, forcing all species to nest increasingly on the ground, where eggs and chicks are more vulnerable to predation. In 2007, tree nesting occurred at a rate of 17 percent for double-crested cormorants, 64 percent for black-crowned night-herons, and 98 percent for great egrets. The percentage rate of tree nesting in 2011 was 2 for cormorants, 5 for night-herons, and 98 for egrets. Damage to trees done by beavers several years ago also has contributed to this decline. Counts of gull nests were lower than in 2007 with 23,899 ring-billed gull nests (27,260 in 2007) and 28 herring gull nests (85 in 2007) tabulated.

Concern about double-crested cormorant numbers possibly hurting Lake Michigan sport fisheries resulted in a visit to the colony in late June to determine what young cormorants were being fed. Close approach to these birds in the colony often results in regurgitation of the most recent meal. Fisheries biologists collected and identified 503 individual items obtained this way. The predominant fish species taken was yellow perch (58 percent of items) followed by alewife (26 percent), round goby (14 percent), and spottail shiner (2 percent). Most yellow perch were 2-3 inches in length. Alewife were 4-6 inches long, and round gobies were 2-6 inches long.

## Least Tern

This petite and active water bird 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 disturbance by people.

Working closely with power companies and the U.S. Fish and Wildlife Service, DNR closely monitors and takes steps to ensure successful nesting at least tern colonies at two locations. The original and largest colony is in Gibson County on properties owned and managed by Duke Energy, USFWS (Cane Ridge Wildlife Management Area), and DNR (Tern Bar Slough). A record 280 least tern adults were present in 2011. The first birds were observed on May 14. Some stayed until the relatively late date of Sept. 7. The number of least tern chicks raised was conservatively estimated at 130-140 young, somewhat less than last year's record of 165 fledglings. This year eggs were laid in 197 nests with a higher number of first nests (123) and fewer later at-



*Annual number of adult least terns counted at the Gibson County nesting colonies.*



*Dike at the AEP Rockport plant in Spencer County where least terns nest.*

tempts (74) indicating relatively low predation or other causes of initial nest failure.

Successful nesting occurred at four distinct sites at or near Gibson Lake. The narrow center dike in the middle of Gibson Lake produced 110-120 chicks to flight age from 155 nests found in several colonies along this 2.5-mile crushed limestone roadway. Approximately 20 tern chicks were raised on the two 3-acre nesting islands in the tern pool at Cane Ridge. An ash disposal area contributed three fledglings from 12 nests. As in 2008, terns were also found nesting in an agricultural field near the Wabash River. Nine nests were found but all failed. Two additional islands surrounded by a narrow moat also were available for nesting by least terns at Tern Bar Slough. Least terns were regularly observed feeding and roosting there but nesting did not take place in spite of ideal habitat conditions. Abundant spring and early summer rains provided adequate water levels around nesting islands at Tern Bar Slough and Cane Ridge, minimizing the chance of mammalian predation in 2011. A pump supplying water from the Wabash to these areas failed but a temporary pump was put in place that provided additional water at times.

Nearly 50 miles southeast of the Gibson Lake colony,

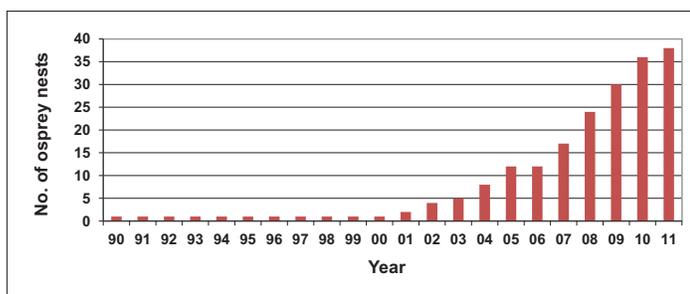
a smaller population of least terns has been present since 2003 at the American Electric Power Plant near the Ohio River in Spencer County. The nesting site is a short, narrow dike separating some retention ponds. As many as 50 adult terns were counted in 2011, and 29 nests were discovered at AEP with an estimated five chicks produced. On a nearby dredge island in the Ohio River, at least seven nests and six chicks were observed. It was not known if any chicks survived to flight stage.

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.

## Osprey

This large, eagle-like bird is an active angler 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 nest, building large stick nests in dead trees near the shoreline or on islands in lakes, rivers or wetlands. In recent times, most common nest sites are 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 DNR and private groups and individuals, Indiana's osprey population has grown steadily.

During 2011, 46 pairs of osprey were known in Indiana, with 38 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 47 pairs and 36 active nests in 2010. The distribution of ospreys is clustered in Indiana. The most nests are found in St. Joseph and adjacent counties (14 nests or pairs), Patoka Lake (8), Pigeon River Fish & Wildlife Area (7), Kosciusko Co. and adjacent areas (5), and Brookville Lake (3). Nests in 2011 were built on nesting platforms (24), cell towers (9), dead trees (6), metal utility towers (3), wooden utility poles (3), and a water tower (1). Nesting success has been good. With ongoing



*Annual numbers of active osprey nests in Indiana.*

efforts to maintain clean water, healthy fish populations, and suitable nest sites, the population of ospreys in Indiana should continue to grow.

## Peregrine Falcon

With Web cameras positioned at five nest boxes in the state, bird enthusiasts worldwide can view the trials and tribulations of peregrine falcons nesting in Indiana. The breeding season of 2011 brought a bit more drama than usual at two of these sites. The downtown Indianapolis box, the state's most popular and successful location, was again attended by 18-year-old Kinney, the most productive male in the Midwest, having raised 58 young peregrine chicks from 1994–2010. He was again paired with SuzyQ, for her 10th year nesting in downtown Indianapolis. She laid four eggs as usual, but only two hatched. The chicks did not seem vigorous. One died within a week. The fate of the other chick was also in doubt, but at banding time she seemed healthy. Except for having to be picked up once off the street a couple of days after her first flight in mid-June, she turned out fine.

A rather bizarre scenario occurred in South Bend. It was discovered that the veteran male Zephyr, that was nesting there for the eighth year, was missing his right foot. Falcon watchers doubted he would survive long because he's be unable to provide food for himself and his family. But his mate Guinevere assumed a greater role in capturing prey, and the pair raised two female chicks. Zephyr was still present in late summer. It will be interesting to see if the impaired bird survives and returns to nest next year.

Overall, the 2011 nesting season was similar to that of previous years, with 17 territories in the state and 11 of 12 nesting attempts producing 28 young. For the first time in many years, all chicks were in accessible sites and were banded. An unbanded adult male also was captured and banded. At four sites where nesting took place in 2010, pairs either did not nest or the nest site eluded the observers. One nest site was new this year after a pair finally took up residence at a box erected in 1994, on the catwalk of a smokestack at a Duke Energy power plant along the Ohio River near New Albany. Another established nest site was counted in the state's total for the first time. This pair has been nesting since 2002 under a highway bridge spanning the Ohio River between Madison, Ind., and Milton, Ky. Due to construction activities on the Kentucky side of the bridge, the nest box was moved to the Indiana side of the river, where the pair raised four young.

The 17 territories sites in Indiana are unevenly distributed around the state. There area nine along Lake Michigan, two along the Ohio River, one near the Kankakee River with the remaining in urban areas of Indianapolis, Fort Wayne, South Bend, and Terre Haute. Four of the pairs were found associated with city skyscrapers, six at power plants, five at steel mills, with others at an oil refinery and a highway bridge. All but two pairs laid eggs in nest boxes specifically designed for peregrine falcons. The exceptions both failed, but one pair re-nested, this time successfully in a nest tray.

The Midwestern population of peregrine falcons continues to grow with more than 250 pairs now present. This number is much greater than the 60-80 pairs estimated to have been present historically primarily due to peregrines now using man-made structures. As long as prey (other birds) populations remain abundant and free of harmful chemicals and nesting pairs have secure nesting sites, this species should do well. Peregrines have dedicated followers and cameras set up at selected nests are viewed thousands of times on the internet during the breeding season. Three Indiana nests (Indianapolis, Fort Wayne, South Bend) have “falcon-cams”.

The recovery of the peregrine falcon, the world’s fastest animal, has been 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 wild. An effort to restore peregrines in the Mid-

west began in 1981, when young chicks that hatched in captivity were released in Minnesota. In later years, the 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 has 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.

## Sandhill Crane

The sandhill crane is a long-legged, long-necked water bird that can be confused with the somewhat similar appearing but totally unrelated great blue heron, sometimes inappropriately referred to as the blue crane.

Sandhill cranes fly with their necks outstretched and are seldom seen alone. An individual is almost always with its mate, family group, or in a flock numbering from a couple of dozen to hundreds. During fall and spring migratory periods, groups of 50-100 are most commonly encountered flying in a loose V formation, 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 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 eat a variety of aquatic plants, invertebrates and small vertebrates, as well as waste grains in agricultural fields. At night, they normally roost in the 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 & Wildlife Area (FWA) in northwestern Indiana before venturing south to wintering areas in Tennessee, Georgia and Florida.

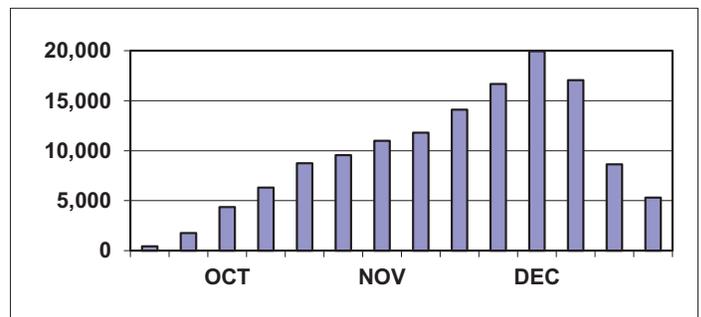
Public properties and other areas with a history of stopovers by sandhill cranes were surveyed in 2011. Bird watchers were asked to report sightings of cranes on the



*Counting eggs at a peregrine falcon nest is not always easy.*



*Three peregrine falcon chicks back in their nest box after banding at an East Chicago steel mill on June 2. The bird on the right was photographed on Oct. 1 at Eagle Creek Park in Indianapolis.*



*Average weekly counts of sandhill cranes at Jasper-Pulaski FWA, 2006–2010.*

target survey date of Oct. 29. Jasper-Pulaski reported 5,670 sandhill cranes present. Lesser numbers showed up at Pigeon River FWA (550), Boot Lake (127), Pisgah Marsh Wildlife Diversity Area (40), Knightstown Reservoir (30), Tri-County FWA (20), Kingsbury FWA (7), Willow Slough FWA (5), and Pipewort Pond (3). No cranes were observed at the more southern areas surveyed: Atterbury FWA, Monroe Lake, Brookville Lake, Goose Pond FWA, and Ewing Bottoms in Jackson County. Many sandhill cranes had not yet moved south into Indiana from Wisconsin, Michigan and other northern locales. Numbers on weekly counts at Jasper-Pulaski exceeded 10,000 birds from early November to early December. The peak count of 16,822 occurred on Nov. 30. Cold temperatures by mid-December caused approximately 2,000 birds to shift to open water areas at a power plant just west of Jasper-Pulaski for the remainder of the winter. In recent years, greater numbers spend winters in the state. Northern movements are noted in February, with large concentrations at Goose Pond FWA in spring.

With the completion of a management plan for the Eastern sandhill crane by the Mississippi Flyway Council, Eastern states can now establish limited hunts. Indiana officials discussed allowing a hunt, but decided not to pursue a harvest season at this time. Tennessee and Kentucky proposed hunting seasons for 2011. Tennessee postponed action on its proposal, and Kentucky is awaiting approval.

## FISH AND MUSSELS

### Survey for Rare Southwestern Fishes

The distribution for several of Indiana's fish species is restricted to the southwestern portion of the state. For many, southwestern Indiana defines the northern extent of their North American range. Accurate information on the distribution of many of these species is lacking. The purpose of this survey was to document the current status of three listed species thought to still inhabit southwestern Indiana: 1) the state-endangered bantam sunfish, 2) the cypress darter, a state species of special concern; and 3) the banded pygmy sunfish, also a state species of special concern.

Interestingly, these three species have always been considered a part of Indiana's fish fauna, even though no historical collections from Indiana exist. They were not collected during a statewide survey in the 1940s, although all three were considered "species of probable or possible occurrence." All have, however, been documented from areas along the Illinois side of the lower Wabash River or farther south in Illinois.

Bantam sunfish, cypress darter and banded pygmy sunfish all prefer oxbows, sloughs, swamps, backwaters and ditches with copious amount of submerged aquatic vegetation that have soft mud or organic-debris bottoms. Because of their diminutive size and secretive nature, they can often go un-noticed in these unique habitats. A survey was initiated in 2007 to determine the current distribution of these three species.

Fish were collected using electro-fishing techniques



*Big Bayou in Posey County was a sample location in 2011 at which none of the targeted species was found.*



*Jackson Pond in Daviess County was another 2011 sample location at which none of the targeted species was found.*

(used in open water areas and along edges of stands of aquatic vegetation) and small-meshed dip nets and seines (used in shallow edge areas and pulled through areas of thick aquatic vegetation).

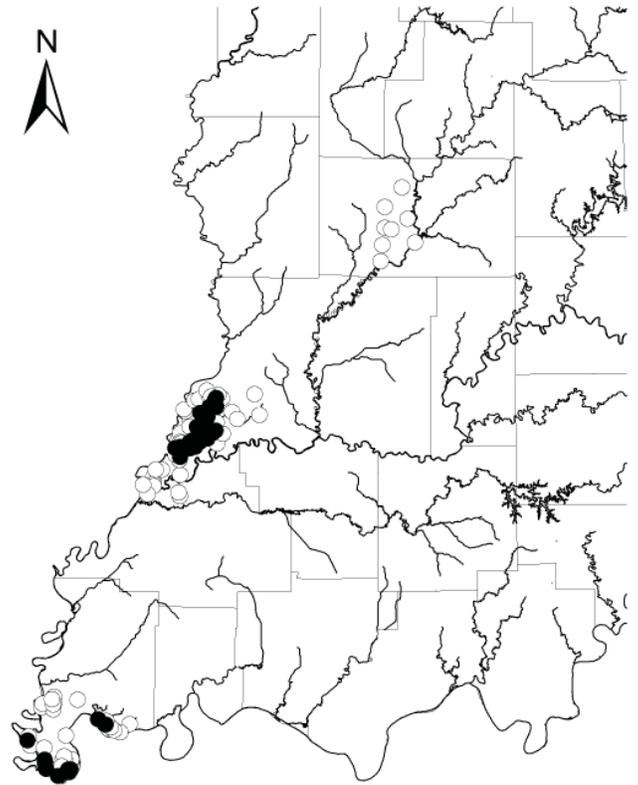
To date, portions of Knox, Greene, Gibson and Posey counties have been sampled. No bantam sunfish or cypress darter have been collected; however, large populations of banded pygmy sunfish have been found in the weedy ditches of southwestern Knox County and several different areas of Posey County.

## Statewide Freshwater Mussel Survey

Of the 77 species of freshwater mussels historically known from Indiana, 19 are now completely gone from the state, or are no longer reproductively successful. They are one of Indiana's most endangered groups of



*JoAnne Davis samples with a dip net at Overcup Oak Swamp in Posey County. None of the targeted species was found.*

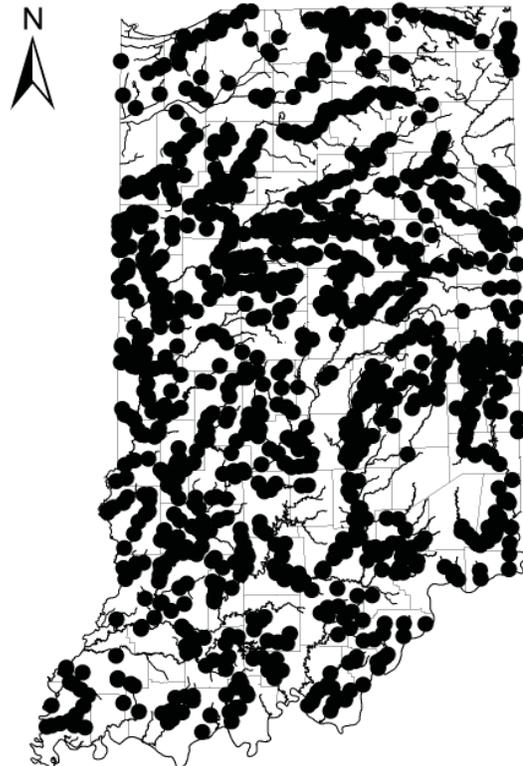


*This map depicts all collection locations (in white) and those locations (in black) where banded pygmy sunfish have been collected through 2010.*



*Wetlands like this one near Big Cypress Slough in Posey County are prime habitat for banded pygmy sunfish. Many were collected from this location in 2011.*

animals. Water pollution, habitat alteration and destruction, competition with exotic species, and over-harvest in the past (for use in the button and cultured pearl industries) have been detrimental. The general lack of mobility of the freshwater mussel and its complex life cycle has exacerbated the declines.



*This map depicts all locations sampled for freshwater mussels, 2001–2010.*



*Sampling for freshwater mussels with Illinois biologists in the Wabash River in Knox County. Live mussels are collected in these deeper, murky locations by feeling along the substrate with your hands.*



*Les Frankland, Illinois DNR biologist, holds a live washboard collected from the Wabash River in Knox County.*



*JoAnne Davis (far left) with Illinois biologists, records information from mussels collected from the Wabash River in Vigo County.*

Freshwater mussels are an important component of Indiana’s aquatic habitats. They are natural filters, taking microscopic plants and animals from the water column and converting them into food for other organisms. Once dead, their shells act as colonization surfaces for insect larvae, sponges and algae, and as homes and nest locations for fish and crayfish. As live mussels burrow into the substrate, they help stabilize it and increase the exchange of oxygen and nutrients between the substrate and overlaying water column.

The current statewide survey was initiated because



*Vernon Fork Muscatatuck River in Jackson County was a mussel survey location.*



*Sheepnose collected from the Tippecanoe River.*



*A variety of live mussels were collected from Vernon Fork Muscatatuck River in Jackson County.*

freshwater mussel inventory data were lacking for many of Indiana’s rivers and streams. Those drainages where previous freshwater mussel surveys had never been attempted were targeted, starting in 2001. More than 1,000 sites have been sampled to date. The current statewide distribution for most of our species is now fairly well understood. New locations for several of Indiana’s rarer species were also uncovered.

Areas surveyed in 2011 included portions of the Eel River in Wabash County, at the upper limits of the rabbitsfoot’s (state endangered and federal candidate) distribution in the drainage; the lower mainstem Wabash River where it forms the border between Indiana and Illinois; the Fawn River in Steuben County; the Tippecanoe River in Fulton and Pulaski counties, where live rabbitsfoot, sheepnose (a state-endangered and federal candidate) and round hickorynut (a state species of special concern) are still reproducing; the West Fork White River in Delaware and Madison counties; and portions of the Muscatatuck River drainage in Jackson, Washington, Jennings, and Scott counties.



*A variety of juvenile mussels were collected from Vernon Fork Muscatatuck River in Jackson County.*

## Lake Sturgeon

Annual sampling and study of the lake sturgeon population of the East Fork White River has taken place since 1996. Although lake sturgeon once inhabited most of the largest rivers of the Ohio River drainage, only a remnant remains in portions of the East Fork White River, primarily in Lawrence and Martin counties. Much like Indiana’s freshwater mussels, water pollution, habitat alteration, and destruction and over-harvest have played a role in their decline.

Gill and trammel nets have been used to sample lake sturgeon at least once per year at several locations in the East Fork White River. Basic information such as length and weight are taken from collected lake sturgeon, and all lake sturgeon are tagged with PIT (passive integrated transponders) tags, so individual fish can be tracked over time. More than 100 lake sturgeon have



*Egg mat set out to collect lake sturgeon eggs during the 2011 spawning run downstream of Williams Dam.*



*A closer look at the spawning area downstream of Williams Dam.*



*Lake sturgeon eggs (slightly larger and darker yellow) and sucker eggs.*



*Spawning lake sturgeon during April 2010.*



*The area downstream of Williams Dam where lake sturgeon spawning takes place.*



*JoAnne Davis holds a lake sturgeon with transmitter attached to the base of its dorsal fin.*

been tagged to date, with many being caught several times over multiple years.

Several lake sturgeon over the years have been fitted with radio tags to track their movements using radio telemetry. 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 then, usually during the first two weeks of April.

Tracked lake sturgeon have shown similar annual movement patterns since the beginning of the telemetry study. Little movement occurs during winter months, until water temperatures reach about 50 F. At that point lake sturgeon participating in the year's spawning activities make an impulsive movement upstream. When they reach Williams Dam, they are blocked from migrating farther upstream. They remain in the Williams Dam area until water temperatures approach 60 F, at which point they spawn. Once the spawning activity ends, lake sturgeon redistribute downstream to locations where they spend the summer until the next year's spawning migration takes place.

## Northern Brook Lamprey Survey

Six species of lamprey are native to Indiana waters. Sea lamprey, an exotic species, is also found in Indiana, and is confined to the Lake Michigan drainage. Lampreys have a unique life cycle, unlike that of any other fish species in the state. After hatching they spend several years in a larval form (ammocoete). As ammocoetes, they remain buried in the mud or sand of smaller streams, where they filter-feed on microscopic animals and organic material. After a period of several years that varies among species, the larval lamprey transforms into the adult form.

After transforming, some lampreys (four of Indiana's species) migrate to bigger rivers and attach to other fish. These 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, then die. The state-endangered Northern brook lamprey is one of Indiana's three non-parasitic lamprey species. Northern brook lampreys do not feed as adults, and shortly after transforming, they spawn and then die.

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 about the effects of lampricides (a 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 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. The Northern brook lamprey is limited to northern Indiana, encom-



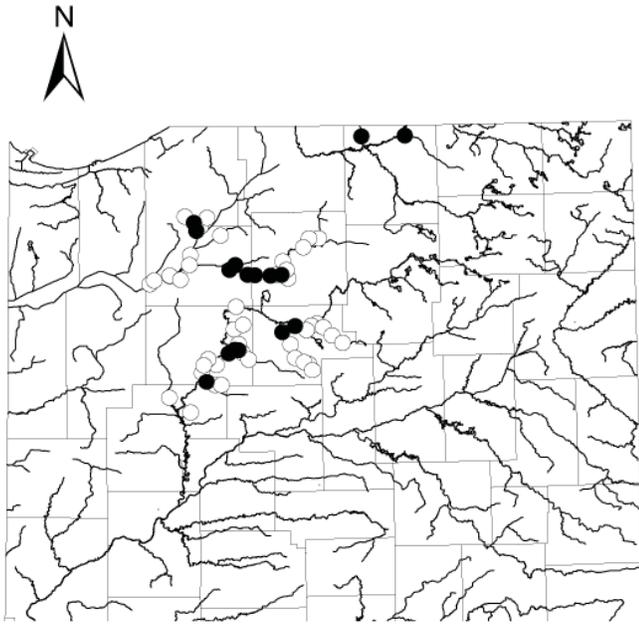
*Whitman Ditch in Laporte County is a typical Northern brook lamprey stream in the Kankakee River watershed.*



*A newly hatched Northern brook lamprey from Yellow River in Marshall County.*



*A newly transformed Northern brook lamprey from Mill Creek in Pulaski County.*



*A collection of locations for Northern brook lamprey through 2010. Locations with Northern brook lamprey are indicated by black dots.*

passing portions of the Ohio River drainage (upper Tippecanoe River watershed), Kankakee River drainage (Yellow River and Whitman Ditch watersheds), and the Lake Michigan drainage (St. Joseph River watershed).

## Silt (Southwestern Indiana Lentic Tracking)

Oxbows, sloughs, swamps, embayments, backwaters, and other lentic (non-flowing) aquatic habitats are a staple of the southwestern Indiana landscape. Although there have been a few historic studies of these interesting habitats, for the most part, little is actually known about the annual variation in their physical attributes and biological components. Changing climate patterns may accentuate the variation.

The purpose of this project is to track the physical characteristics and biological constituents (mainly fishes) of five lentic habitats in southwestern Indiana over an extended period of time. Each location will be sampled at least twice annually (late spring-early summer and then again in the fall). Methods are being developed to monitor the physical attributes. Fishes will be sampled using backpack electrofishing, seining, and dip-netting techniques developed during previous survey work.

This past field season was used to visit many prospective lentic habitats and to narrow down the list to the five locations that will be used in the study. Exact locations have not been determined yet, but will likely include one each from along the mainstems of the East Fork White River, West Fork White River, Wabash River, Patoka River, and Ohio River.



*Goose Pond, shown southeast of Mt. Vernon, Posey County, in October 2009.*



*Goose Pond, shown southeast of Mt. Vernon, Posey County, in October 2010.*

## MAMMALS

### Mobile Acoustic Bat Survey Program New project targets summer bat populations

Nongame biologists are launching a new project in 2012 that seeks to monitor the statewide distribution and abundance of bat populations in their summer range in Indiana. To date, survey efforts have focused on winter populations of species that regularly hibernate in caves such as the little brown bat, Indiana bat and tri-colored bat. This project not only will provide information on the abundance of these species outside the hibernation season, but also will offer insight into the distribution of migratory species that occur in Indiana only during summer months, such as the hoary bat and Eastern red bat.

The new project uses acoustic equipment in which a vehicle-mounted microphone and ultrasonic detector record the echolocation calls emitted by bats in the environment. Survey participants drive a pre-determined route, about 25 miles in length, shortly after sunset, which is when bats become active. The same routes will be driven each year, thus allowing biologists to monitor multiple species at different locations in the state and across years. These non-invasive surveys are common in Europe but have only recently been used in the United States as a means of monitoring long-term trends in bat populations.

Mobile acoustic surveys were completed in 28 Indiana counties during pilot studies initiated in 2011. Forty-seven additional counties will be added in 2012, resulting in one of the most comprehensive programs to monitor bat populations at a statewide scale.

## 2011 Winter Hibernacula Survey

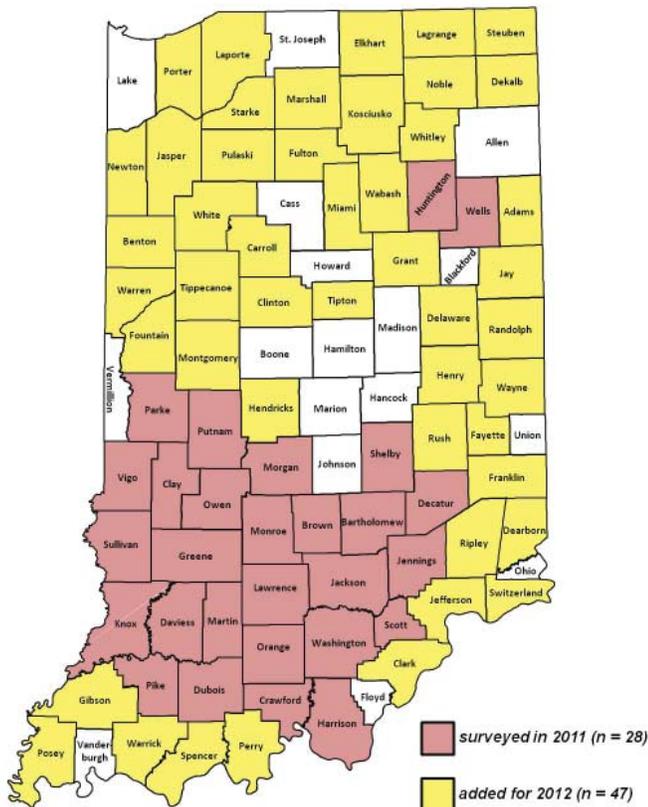
Threats due to white-nose syndrome prompt changes to long-term monitoring program

Indiana is fortunate to have one of the longest-running data sets available to monitor trends in populations of hibernating bats. During every other winter for 30 years, a team of biologists and volunteer cavers have entered most major hibernation sites in Indiana and systematically estimated the numbers of bats present.

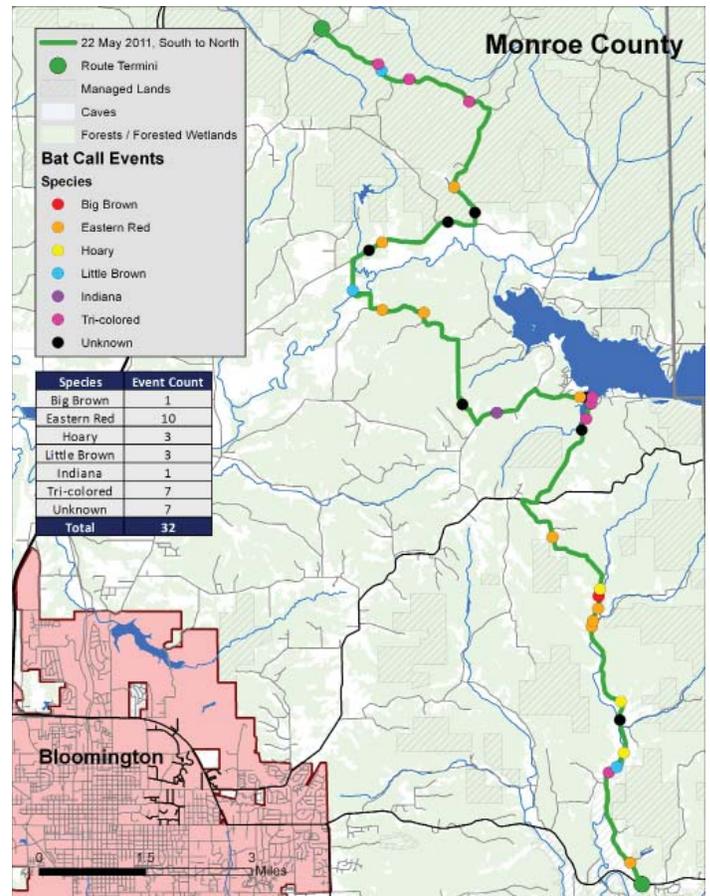


*A vehicle-mounted microphone records ultrasonic echolocation calls of bats.*

## INDIANA Mobile Acoustic Bat Survey Program



*Counties included in the mobile acoustic bat survey program.*



*Results of the mobile acoustic survey in Monroe County.*

Surveys are usually directed toward caves used by the state-and-federally endangered Indiana bat to assess progress toward the species' recovery. However, the surveys have also provided insight into the abundance of other cave-dwelling species such as the little brown bat, tri-colored bat and big brown bat.

The threat of WNS brought new, but certainly not unexpected, challenges to the 2011 survey. Far fewer caves were visited so efforts could be focused on only the largest hibernation sites and disturbances to smaller populations could be avoided. Survey personnel used the recommended decontamination products and procedures to reduce the likelihood of unintentionally transferring the fungal spores responsible for WNS between caves. One of the most significant changes from the traditional survey methodology was the use of digital photographs as the primary means of determining the size of the Indiana bat population in each cave. Hibernating Indiana bats typically form dense, compact clusters ranging from 300 to nearly 500 bats per square foot. In previous surveys, a tape measure or a set of laser ("red-eye") pointers positioned 6 inches apart were used to estimate cluster sizes, which were then multiplied by an estimated density (e.g., 300 bats/square foot). Digital photography, however, proved to be a much quicker approach that allowed biologists to spend considerably less time in the cave, thus reducing survey-associated disturbance to hibernating bats.

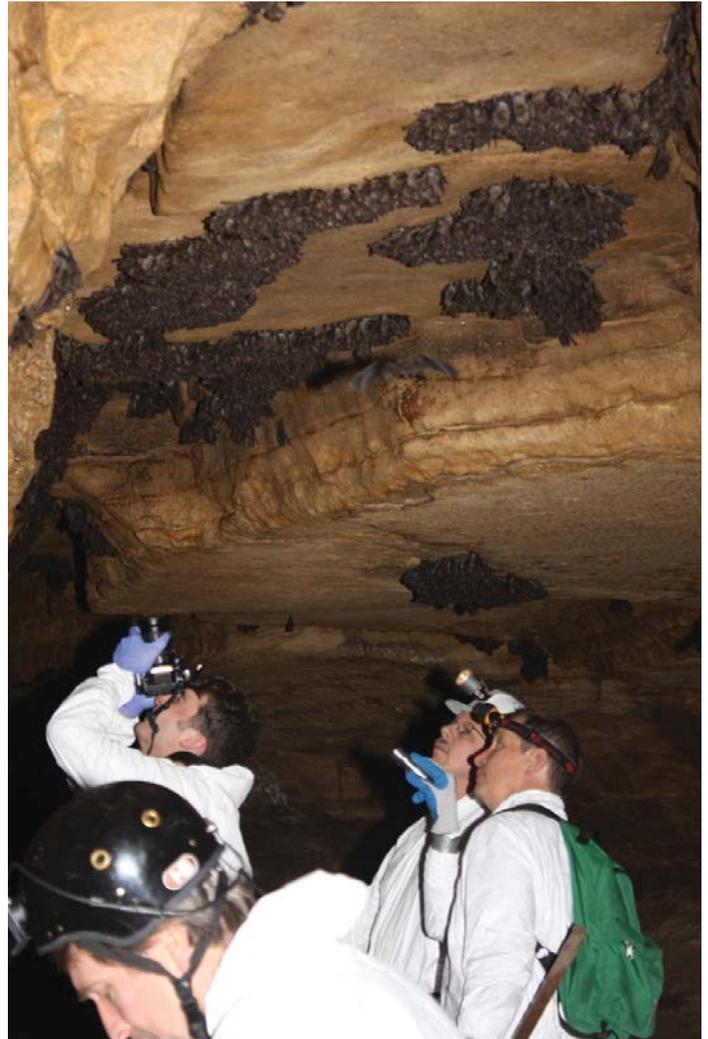
Back at the office, each photograph was examined on a computer monitor using a GIS (geographic information system) platform, and the nose of each bat was manually "dotted" with the click of the mouse. The GIS software then automatically counted the number of dots, which produces an accurate estimate of the true number of bats in each cluster. The photographs also provide a permanent record of bat populations that can be examined for future changes. Additionally, each photograph was closely examined for individuals exhibiting the white fungal growth characteristic of WNS infection.

Nearly 220,000 Indiana bats were counted in the 10 caves visited in 2011. Although this represents a 5% increase (about 9,900 bats) above the 2009 estimate for these same 10 caves, a direct comparison may be inappropriate because the methods used to count bats differed between those survey years. Nonetheless, the state's namesake bat was still present in relatively high numbers in 2011 despite the presence of WNS at some caves. Given the growing threat of WNS to Indiana's wintering bats, some biologists believe the switch to photographic survey methods was timely and provided multiple benefits, including an overall improvement in accuracy and efficiency of this long-standing monitoring program.

## White-Nose Syndrome Reaches Indiana

Wildlife populations rarely acknowledge geopolitical boundaries such as townships, counties or states, so it should come as no surprise that many factors influencing these populations, such as disease and climate

change, often follow suit. White-nose syndrome (WNS) is an emerging disease associated with a newly identified fungus (*Geomyces destructans*) is responsible for record levels of mortality among hibernating bats in

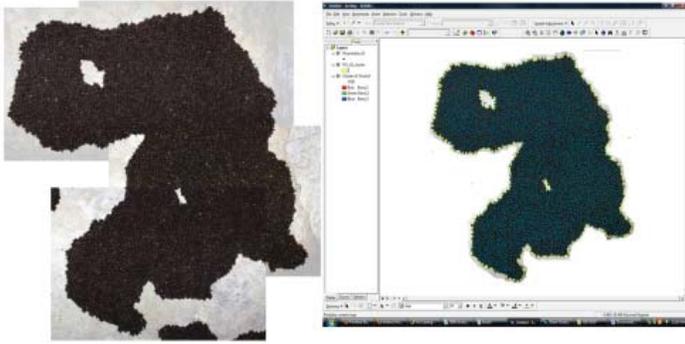


*Photographs of hibernating bats taken during surveys are used to determine population size. Photo by Andy King, USFWS.*



*Survey participants don protective coveralls and footwear before entering bat hibernation site.*

## Using Digital Photography in Bat Surveys



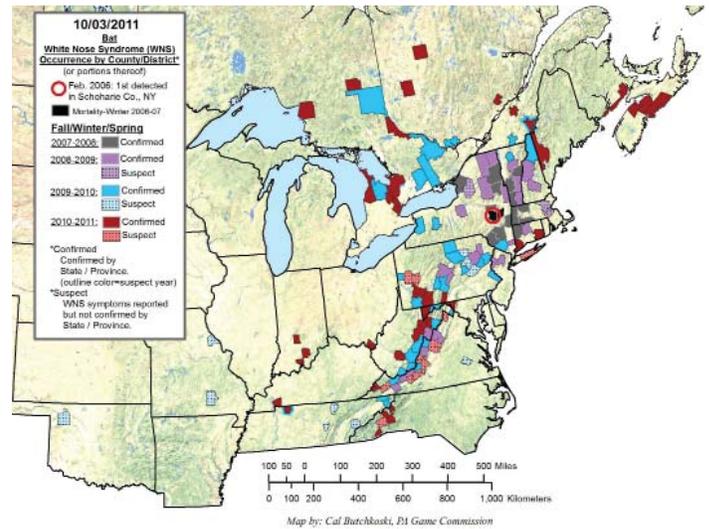
*Digital photograph of a cluster of hibernating Indiana bats taken during winter survey. This photograph is later imported into a geographic information system, which manually “dots” (and counts) each bat nose in the photograph. Using this approach, this cluster contained nearly 7,000 bats and covered about 15 square feet of the cave ceiling. Photograph and analysis by Andy King, USFWS.*

North America. WNS is named for the white fungus that invades the skin tissue on the muzzle, wings and ears of affected bats. It was first noted in New York in 2006 but has since spread unchecked. WNS was documented in Indiana in 2011.

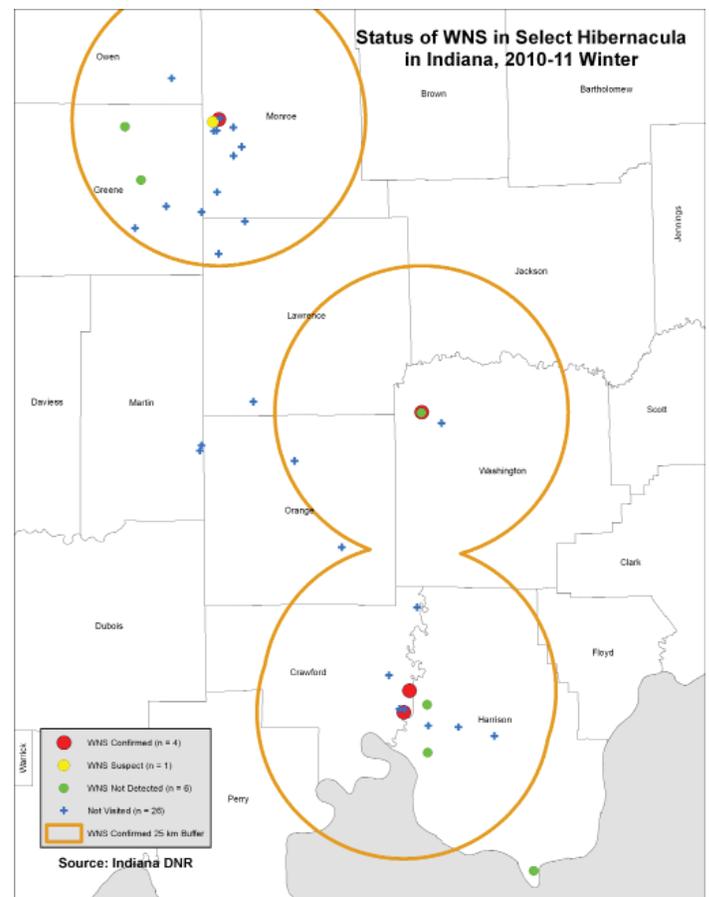
Anticipating the arrival of WNS in the Hoosier state, nongame biologists had initiated several disease surveillance projects the previous year. Bats affected with WNS often exhibit unusual behavior in winter such as flying outside in the day, exhibiting high activity levels, and choosing roost sites at or near the cave entrance. In partnership with Bat Conservation International, the DNR installed a “GateKeeper” beam-break system in Wyandotte Cave, arguably one of the state’s most important bat hibernation sites. As they “break” the beams, bats exiting or entering the cave are detected by event counters. This system constantly monitors bat activity. Ultrasonic detectors were set up at the entrances of other caves to record echolocation calls of any bats leaving the cave in winter. The Division also posted a “Report Sick Bats” link on its website to allow public reporting of bats observed on the landscape during winter months.

WNS was first detected in Indiana during surveys to census winter bat populations in January 2011. Biologists noted white fungus on the wings and muzzles of bats roosting in three caves in Crawford and Washington counties. Tissue samples collected from bats at these sites were submitted to the National Wildlife Health Center in Madison, Wis., and later tested positive for WNS. Additionally, the disease was confirmed several months later in a cave in Monroe County after biologists noticed an increasing level of daytime echolocation calls recorded by bat detectors.

In total, WNS was confirmed in four caves and is suspected at a fifth site distributed across three southern Indiana counties during the 2010–11 winter. Mortality attributed to WNS, however, was evident at only one

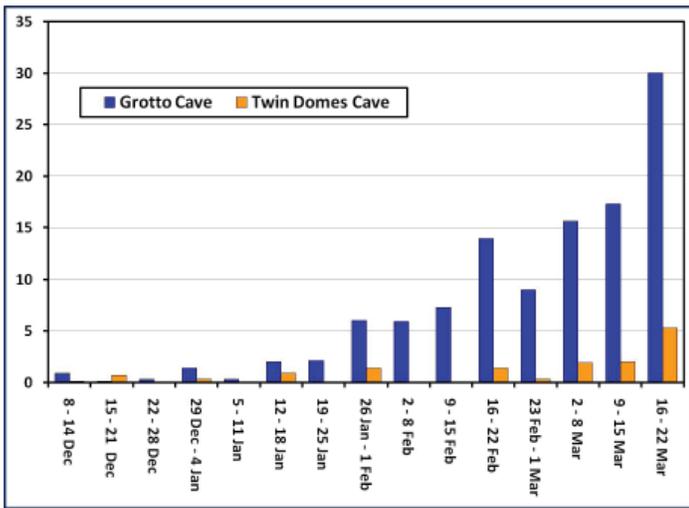


*Map of WNS by county/district as of 10/3/2011; (Cal Butchkoski, Pennsylvania Game Commission)*



*Status of WNS in select hibernacula in Indiana, 2010-11 Winter*

cave during this first winter of known occurrence. In future years, biologists will continue surveillance activities to determine the extent and distribution of WNS in Indiana’s caves and mines, and to monitor the responses of bat populations to the disease. Censuses in other regions of the country with a longer history of WNS infection have revealed continued population declines in bats in af-



*Average number of daytime echolocation calls recorded by bat detectors at select caves during the 2010–11 winter. Bats affected with WNS often exhibit unusual behavior in winter, such as flying outside the cave during the day. The increasing number of calls at Grotto Cave was alarming and prompted a visit in late March during which WNS was confirmed.*



*Cluster of little brown bats from an Indiana cave in January 2011. The bat with visible sign of WNS (red circle) was not noticed during census, but was later detected during examination of digital photographs.*



*Ultrasonic detector positioned at cave entrance to record echolocation calls of bats.*



*Little brown bat with visible signs of WNS from an Indiana cave.*



*Two little brown bats with visible signs of WNS roosting in an Indiana cave.*

affected areas, often exceeding 90 percent at caves with multiple years of infection. The ultimate impact to Indiana’s cave-dwelling bats remains to be seen. WNS has been confirmed in six species, all of which have been recorded in Indiana, although there appears to be some variation in susceptibility among species. Limited evidence from the northeast United States also suggests some populations in affected sites may have stabilized, although at historically low levels. While there is much to learn about WNS, such observations, coupled with continued WNS research, offer the possibility of recovery for those populations currently being decimated by the disease.

## **Record Number Of Allegheny Woodrats Captured In 2011**

For the last five years, the Indiana Nongame Program has partnered with The Nature Conservancy and researchers at Purdue University on multiple projects to benefit the Allegheny woodrat, a state-endangered species found in Indiana only on the limestone cliffs bordering the Ohio River in Crawford and Harrison coun-

ties. These projects include an assessment of the genetic diversity of Indiana’s remnant population, releases of woodrats obtained from other states, and an ambitious captive-breeding program (see links to external projects).

The fruits of these collective efforts were realized in 2011 when a record number of woodrats were captured during Indiana’s standardized monitoring program. Woodrats typically occupy 12 cliff sites distributed along nearly 40 river miles from Rosewood in Harrison County downstream to Alton in Crawford County. These sites, however, separate into three subpopulations (Harrison-Crawford State Forest, Bull’s Point Bluff, Laconia/Rabbit Hash Ridge) that are both spatially and genetically isolated from one another. Since 1991, biologists have periodically conducted two-night live-trapping sessions at these sites to monitor the species’ status, distribution, and relative abundance. In 2011, a record high of 186 individual woodrats were captured, a whopping 55 percent increase from the number captured the previous year. Most of the overall gain is attributed to six sites in the Bull’s Point Bluff and Laconia/Rabbit Hash Ridge areas that collectively yielded 116 woodrats in 2011 (62 percent of the statewide total). A new population was also discovered in the Laconia area at Pinnacle Point, where 11 woodrats were captured.



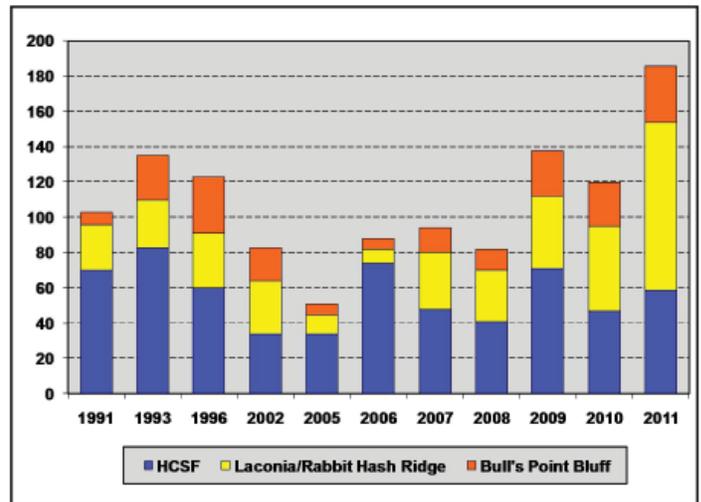
*Cassie Hudson and Tim Shier prepare to process an Allegheny woodrat captured in a live-trap at Pinnacle Point.*



*Newly released woodrat returns to its habitat.*



*Allegheny woodrats inhabit the limestone cliffs bordering the Ohio River in southern Indiana.*



*The number of Allegheny woodrats captured at three main population centers in Indiana (Harrison-Crawford State Forest, Laconia/Rabbit Hash Ridge, and Bull’s Point Bluff) during 11 surveys spanning 20 years. An all-time high of 186 woodrats was captured in 2011.*

## REPTILES AND AMPHIBIANS

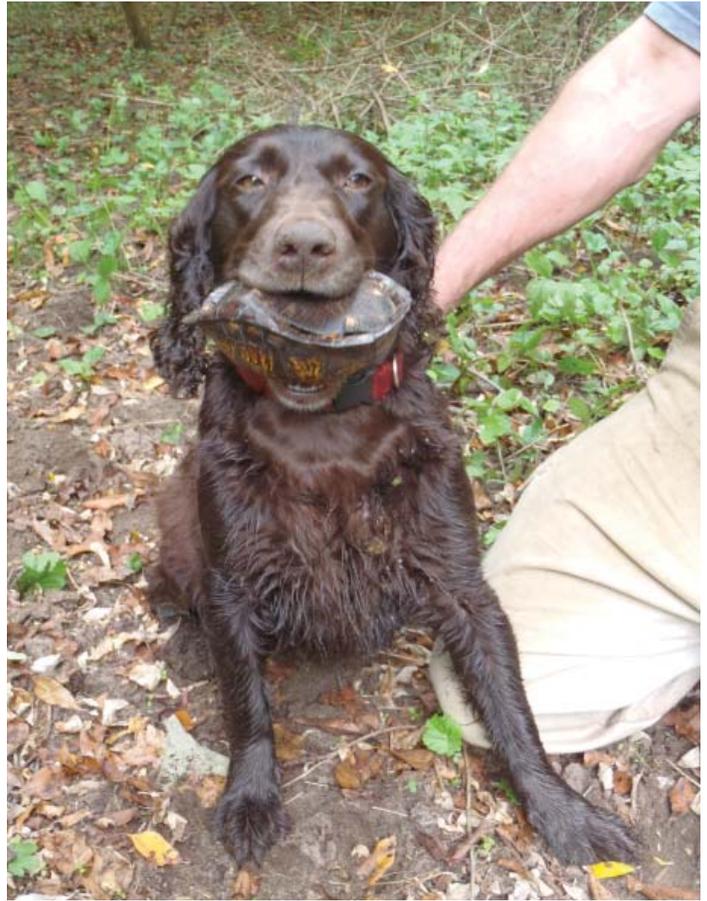
### Eastern Box Turtle

The Eastern box turtle is one of the most endearing reptiles, loved by children and adults alike. You may see them when you hike in the woods. You may see so many of them trying to cross the road after a warm spring rain that you would assume that their populations are doing great or think that it is OK to take one home as a pet. Both assumptions are incorrect. The Eastern box turtle is declining in numbers across the United States. In 2004 Indiana passed a law making it illegal to take an Eastern box turtle from the wild. It is also a violation to take the state-endangered ornate box turtle.

The Eastern box turtle is a long-lived species that must be 8-10 years old before it can reproduce. An adult female may lay close to 100 eggs during her lifetime but few will survive to adulthood. For a population to remain stable, each adult has to be able to replace itself with one surviving offspring. If a turtle is taken from the wild, or if it is killed on the road by a vehicle, the population loses a breeding adult. When this happens, fewer offspring are produced, which lessens the chance the adult was able to replace itself, and the overall population will decrease. If this happens repeatedly, the population will eventually be reduced to small numbers. Unlike many animals that can rely on sense of smell or vocalizations to help find a mate, the Eastern box turtle must see another box turtle. As a population is reduced to few individuals, the low density reduces the probability that an adult turtle will encounter a potential mate.

Eastern box turtles have a homing instinct. Although some males appear to be continual wanderers, most box turtles spend their entire life in a small home range of fewer than 40 acres; therefore, most relocated box turtles want to return to their original hatchling range. For instance, if a turtle is collected and later returned to the wild, or collected from the road and moved a long distance, it will make every effort to return to its original home area. During that trip it will likely attempt to cross more roads, putting them at greater risk of getting hit by a car. Before having to endure automobiles and highly mobile people who have a tendency to relocate turtles, box turtles were well suited to their environment and thrived. Now their traits of long life, delayed sexual maturity and their homing instinct are not as suited to today's human-dominated landscapes. As a result, the loss of even one box turtle from the wild can have long-lasting negative effects on the population. Helping the public understand box turtle life traits and leave box turtles in the wild can ensure that box turtles will be enjoyed by future generations of Americans.

What is the DNR doing to ensure that Eastern box turtle populations will persist for years to come? The Wildlife Diversity Program worked with the public to adopt laws that reflect this species' vulnerability. In addition, work is being conducted with Purdue University to determine the effects of timber harvest on the Eastern box turtle and, through genetic analysis, to determine



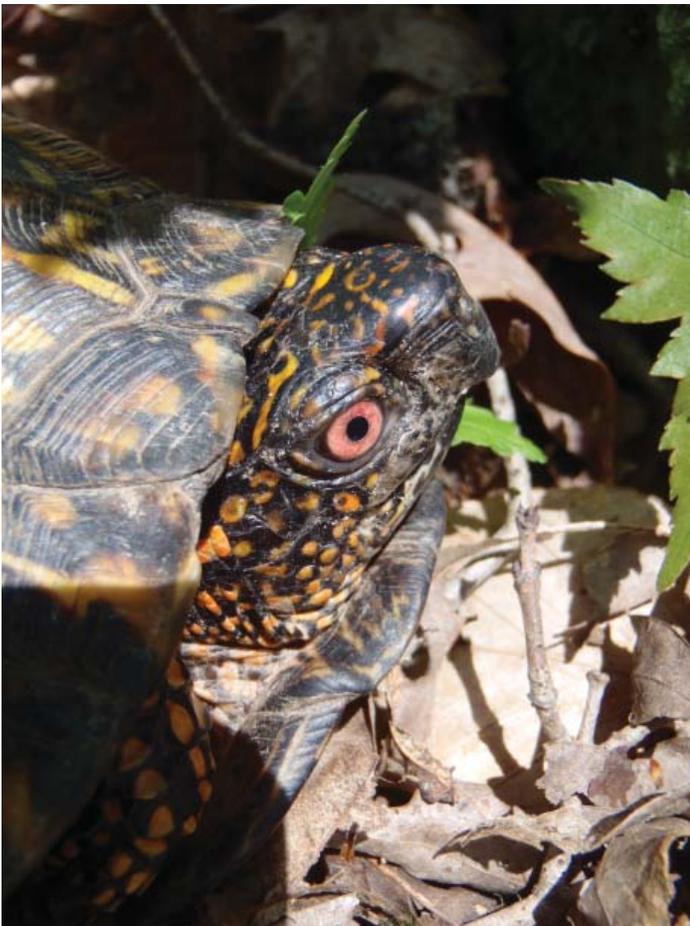
*Specially trained turtle dog with Eastern box turtle.*



*Eastern box turtle with its new identification number.*



*A young Eastern box turtle eats a mushroom.*



*Note red eye of a male Eastern box turtle.*

the health of Indiana's box turtle population. In fall 2011, the DNR worked with INDOT to gain access to the right-of-way for the proposed Section 4 of I-69. With the help of specially trained dogs, biologists found approximately 80 Eastern box turtles. Each was given a unique identification number and will be cared for in a secure, semi-natural habitat. Biologists will go out again in spring 2012 to survey more segments of section 4 in order to get as many turtles out of the construction area as possible. The

Wildlife Diversity Program hopes to work with INDOT to learn as much as it can from this project to determine a long-term solution so that this charismatic species will be around for many years to come.

## Green Salamanders

The green salamander is one of Indiana's most distinct salamanders, with its green lichen-like markings, slender body, and rounded head. They have long toes that are squared off on the tip, allowing them to climb freely up and down vertical cliff faces or trees. This salamander is better known as an Appalachian species. The bulk of its range occurs in West Virginia, Kentucky, and Tennessee. The species was first discovered in Indiana in 1993, when researchers were looking for Allegheny woodrat habitat. Green salamanders prefer wooded sandstone and limestone outcrops with deep crevices that are moist, but not wet. These crevices serve as protective hiding places as well as areas where female green salamanders will suspend their eggs from the overhead rock surface.

Currently, the green salamander is a state-endangered species due to its specific habitat requirements and limited distribution. It is only known to exist in Crawford and Perry counties. After the initial discovery in 1993, no additional green salamander populations were located until 2007. In fall 2010, three more locations were noted, increasing the total number of green salamander sites to five.

During spring 2011, burlap bands were attached to 10 trees at four different sites in Perry and Crawford counties. Recent research has shown that trees appear to be an important component of the green salamander's life history. Artificial cover, such as burlap bands or cover-boards, are commonly used in reptile and amphibian surveys because they mimic the species' natural environment and provide safe places for animals to stay. Burlap bands, which mimic loose bark on a tree, were placed near the cliff face to determine if they would be an effective tool for detecting green salamanders. During each visit to check the burlap bands, rock crevices were checked. To date, no green salamanders have been observed using the burlap,



*Jason Mirtl attaches a burlap band.*



*Close-up of a green salamander from Crawford County.*



*Size perspective of a green salamander from Crawford County.*

but two five-lined skinks used the bands at separate sites. From April through October, green salamanders were observed in crevices in every month except July. The highest total from one site was seven.

## **North American Amphibian Monitoring Program**

Ever wonder what species of frog you hear calling on a warm spring night?



*A burlap band used as a cover-object to mimic loose bark. The bands were used as a detection tool during green salamander surveys.*

If so, you might be interested in helping frogs and toads in Indiana.

You can do so by becoming a volunteer for 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. NAAMP was started because of increasing concerns about global amphibian declines.

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 at each stop, recording the species present.

Volunteers need to collect data a minimum of three times between February and June each year. In 2011, 22 volunteers submitted data for 24 routes statewide. We are grateful to all our dedicated volunteers for their invaluable assistance in monitoring this important group of animals statewide. Many of these volunteers have participated for multiple years. We could not have a successful program without them. All volunteers that were able to run routes in 2011 are mentioned in this year's annual report.

If you are interested in becoming a NAAMP volunteer, please check out [www.pwrc.usgs.gov/naamp](http://www.pwrc.usgs.gov/naamp), or email [naamp@dnr.IN.gov](mailto: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 [dnr.IN.gov/fishwild/3325.htm](http://dnr.IN.gov/fishwild/3325.htm).



*With flashlights and clipboard in hand, NAAMP volunteer Dwayne Caldwell and his daughters, Breanna and Shannon, get ready to run their route.*



*Breanna and Shannon Caldwell record data on their NAAMP route.*

## NAAMP VOLUNTEERS

The Wildlife Diversity Program recognizes all of the dedicated volunteers that participated in NAAMP for 2011. (Spring flooding caused many routes to be underwater for most, or all, of window 1.)

### Volunteers that ran all 3 windows:

Vicky Meretsky\*  
 Bill Dean\*  
 Dwayne Caldwell\*  
 Robin Stark\*®  
 Wesley Wilson\*  
 Barbara Harcourt\*®  
 Peggy Renn\*  
 Darrel Joy\*  
 Jane Fuller\*  
 John Bednar\*  
 Julie Henricks\*®  
 Steve Trippel\*  
 Mike Lodato\*

### Volunteers that ran 2 windows:

Jim Horton  
 Merilee Britt\*  
 Noah Shields\*  
 Debbie Russell\*  
 Mary Hayes\*  
 Nancy Stark\*  
 Rick Dold\*  
 Jeremy Ross

### Volunteer that ran 1 window:

Katherine Taylor

\* Denotes volunteers who have participated for multiple years

® Denotes volunteers who ran multiple routes

## Ornate Box Turtle

The ornate box turtle is a small land turtle that people often confuse with the larger Eastern box turtle. While Eastern box turtles can grow to 6 inches in length, the diminutive ornate box turtle grows up to 4 inches in length. In addition, Eastern box turtles are much more widely distributed across the state than ornate box turtles. Ornaments are sand prairie specialists. They are found primarily in the northwest portion of the state. Due to its special habitat requirements and low populations numbers, the ornate box turtle is a state-endangered species.

The ornate box turtle reaches reproductive maturity after 8-10 years of age and may live up to 50 years or more. 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 use as pets have negatively affected populations.



*Jason Mirtl and Sarabeth Klueh take data on an ornate box turtle.*



*Ornate box turtle found in northwest Indiana.*



*Ornate box turtle from northwest Indiana.*



*The plastron (belly) of an ornate box turtle.*

Surveys for ornate box turtles were initiated in 2010 to determine the presence or absence of this species from several previously known locations. In fall 2011, a total of 10 properties were surveyed at various state parks, fish & wildlife areas, and nature preserves with the help of specially trained dogs. Only eight ornate box turtles were found, confirming that this species is not doing well in the state.

## **WILDLIFE NOTES**

### **Dealing With Bats In Buildings**

As a group, bats are probably some of the most misunderstood and persecuted animals worldwide. They have a dreadful public image that has been fueled by decades of myths, misconceptions and half-truths.

In reality, bats provide tremendous ecological and economic benefits to mankind. In the Midwest, including Indiana, they are the major predator of night-flying insects, many of which are serious pests to agricultural and forest-product interests. In other parts of the world, bats are essential plant pollinators and/or seed dispersers that assist with the growing of fruits that support local economies. A recent study in *Science* magazine found that the economic impact to the agricultural industry due to the loss of insect-eating bats in North America could exceed \$3.7 billion each year.

Yes, conflicts between bats and people do occur, and these encounters are, by far, the most frequent inquiries I receive as the nongame mammalogist. Most calls originate when bats are found in or around someone's home or outbuilding. The calls begin in late spring and usually peak through the summer months, when females are raising their young. In early fall, I often get calls about one or a few bats or hanging in an odd spot, such as on the side of a house, in a porch, or on a window ledge. These bats may be in transit to their winter quarters or perhaps waiting out a cold spell. I instruct the caller to be patient. The bats will likely move on after a few days.

A basic understanding of some key aspects of bat biology can help people understand bat behavior. Bats do not build nests; they use roosts, which are the particular locations from which bats hang. Examples of common roosts include the leaves of a tree, the space beneath shutters or soffit vents, the walls or ceiling of a cave, and among the rafters in an attic. Bats require specific temperature and humidity conditions, depending on the purpose of the roost. For example, adult females have a short reproductive cycle. In summer they need warm roosts that promote rapid pre- and post-natal growth of their offspring. Newborn bats must grow quickly and accumulate the sufficient fat reserves they will need to migrate successfully in fall and sustain them through winter when insects are not available. Similarly, roosts used for hibernation must have appropriate conditions that allow bats to conserve precious energy by hibernating at lower temperatures. One of the most important facts to know when dealing with bats in an unwanted area is that once bats have found a secure roost site that provides these conditions, they tend to return to it each year.

When helping a homeowner deal with bats, one of the first things I try to determine is what type of colony (a group of bats) is using the roost at what time of year. In addition to summer nursery colonies, bats may form bachelor colonies composed mostly of males, night roosts used briefly to rest or consume prey, and temporary roosts that provide shelter during migration. Two species that occur in Indiana, the big brown bat and little brown bat, are the most likely to occupy buildings. At times, their colonies may become a nuisance to people due to their noise or a buildup of droppings.

Bat populations in the United States are declining for various reasons, including chronic loss of habitat and natural roost sites. While some people may take pleasure in sharing their dwelling with "house bats," larger colonies can become a nuisance. In those situations, excluding bats from their roost is the only effective means of control as well as the safest. People should not handle bats because they are wild animals. They may carry disease, and they may bite in self defense. Under no circumstances should bats be intentionally killed or poisoned. Remember, the conditions that invited them will still exist. Other bats may find the roost equally attractive.

Bat exclusion is more art than science. Homeowners can do a little detective work to maximize their chances

of success. Most colonies leave their roost shortly after dusk to feed. Spend a few minutes each night looking for common entry points such as small openings beneath the siding, eaves or loose shingles, as well as vents and loose flashing around chimneys. Seal off these openings using hardware cloth, sheet metal or another similar material that bats cannot chew through. Do not try to exclude the colony when young bats may be present—avoid mid-May through mid-August. Wait until mid-November to ensure all bats have left for the winter before you start bat-proofing. Complete the process by the following April, before the colony begins to return. This approach should give the bats sufficient time to locate an alternative roost.

In short, if you find yourself with bats in your belfry, don't panic. If necessary, you can safely and permanently exclude them with a little effort and resourcefulness. For those seeking to keep the colony in the immediate area, which will allow people to continue to enjoy the multiple benefits provided by bats, should consider building a suitable bat house near the old roost. Plans for successful designs and installation are available online at [www.bat-houses.org](http://www.bat-houses.org).

—*Scott Johnson*

## A Matter of Perspective

You have probably heard the adage "You can't judge a man until you've walked a mile in his shoes." This saying reminds us there is always more than one perspective. Viewing life from a different angle can be instructive, enriching and entertaining, and viewing habitat from the perspective of different wildlife species can make us better natural resource stewards.

Animals may experience their habitat primarily through one sense, such as a bat hearing ultra-sonic echoes in a dark cave, or by multiple senses, such as a bobcat smelling, hearing and seeing the land around his rock-ledge resting place. Because humans mainly encounter the natural environment with their sense of sight, you may benefit by taking this exercise, which is provided to help you see the world through different eyes

Figures 1 through 5 on pages 26-27 were taken at the same place, on the same day and in the same general direction but the camera lens was at different heights above the ground for each

Figure 1 was taken 2 inches above the ground, the approximate height of a box turtle's eyes. There is not much of a view from that level—no wonder they move slowly and steadily. From the box-turtle-eye point of view there can be lots of barriers, such as a downed log, a cliff, a railroad rail, or a steep ditch lined with riprap. Taller animals often overlook all of them.

Yet box turtles find all their life-needs from only that one point of view. As the seasons and weather change, the turtles use their sense of sight to survive. They secure food, water, shelter, mates, nesting and overwintering sites. Animals experience and learn in their environment during favorable times and rely on that knowl-

edge to find the resources they need to survive. There is no animal instinct that allows an animal to automatically locate needed resources in a new environment. Learning a new environment can be hazardous. That is why transplanting animals is often unsuccessful.

Figure 2 was taken from 9 inches above the ground at the raccoon-eye level. Small mammals such as raccoons, opossums and squirrels can climb trees to get a better view of their environment. Although they can encounter the same survival challenges as animals less likely to climb, such as woodchucks and skunks, all these species are often attracted to habitat edge, areas where two different habitat types meet, such as where a forest meets a shrub/grassy area. Food items such as insects, fruits, berries and small mammals are often more common at an edge; however, edge associated with roads and traffic poses great hazards to wildlife. Regardless of their vantage point, animals still have a perception problem when it comes to traffic.

Figure 3 was taken at approximately coyote-eye height (18 inches). This perspective may look more familiar because it would have been our view as a small child. At this level the coyote can look down to detect the movement of a vole or look out to see a retreating rabbit. Coyotes are more mobile than a box turtle, for example. A coyote's perspective allows it to move to a less-cluttered habitat for a better view. Part of their survival strategy is stealth; however, and the same vegetation that obscures their view also, at least partially, obscures the view of their prey. Thus a game of cat-and-mouse plays out between coyote and rabbit in cover. Which animal wins may depend on which has the better view

Cover is an important requirement of wildlife. We don't often see animals just standing out in the open. Larger animals often make trails through their cover, and these trails can be good places to set up trail cameras to learn more about how animals perceive and move through their habitat.

Figure 4a on page 28 provides a deer-eye view (50 inches), which would be the same view many adult humans would see. In this particular fence-row setting the animal still cannot see far because of the dense vegetation. Wild animals are wary and especially visually attuned to movement when moving through cover. Deer can move through heavy cover so effectively that they may seem like unstoppable mobile animals but that is not always the case. The fence, just visible behind the tree trunk in the center of picture 4b on page 28, posed no obstacle to an adult doe but was a temporary barrier to her young fawn.

To observe wildlife, even from eye-level cover, one has to be both quiet and still, often a hard requirement for most children and some adults. To overcome the wariness of animals, hunters and wildlife viewers alike, from Indiana to Africa, have resorted to using tree blinds to take advantage of the animal's limited perspective.

Figure 5 on page 28 was taken from 82 inches, the



*Figure 1 Habitat view from 2 inches above the ground or box-turtle-eye view.*



*Figure 2 Habitat view from 9 inches above the ground or raccoon-eye view.*



*Figure 3 Habitat view from 18 inches above the ground or coyote-eye view.*



**Figure 4(a)** *Habitat view from 50 inches above the ground or deer-eye view.*



**Figure 4(b)** *Close-up of the fence behind the tree in Figure 4(a).*



**Figure 5** *Habitat view from 82 inches above the ground or low-flying bird's-eye view.*

height of a low-flying bird or professional basketball forward. Of course birds can get much higher, which makes them the envy of the sighted world. Terms like “hawk-eye” and “bird’s-eye-view” attest to their positional visual advantage over other creatures.

The open sky beyond the trees in Figure 5 clearly indicates the lack of trees on the other side of the fence row, which is a detail not as evident from the other views. When in flight, birds certainly would have a longer view than other animals, yet they still have many of the same concerns as non-flying wildlife. Non-migratory birds must fulfill all their life requirements in the same general area year round. For them, ideal habitat is vertically complex, which means having vegetation at different heights and possessing native-plant diversity. Such a habitat is more likely to provide birds with year-round food, cover and nesting habitat; however, different species have different requirements ... and prefer different views. Watch a grassland, wetland or forest bird closely. Even within its own territory, the bird will often change its perspective, moving to different perches. Changing perspectives can be an important survival skill.

Next time you go out to view wildlife, enrich your adventure, and consider an animal’s point of view. Pretend to walk a mile in a box turtle’s tracks and take more notice along the way of the complex microcosm they encounter. Image the challenges a young animal faces as it learns its home range. Remember, wildlife species have the neural capacity (brain power) to successfully meet a wide variety of situations and natural challenges. After birth or hatching, the young animal gradually learns about its surroundings, but for many wildlife species, only a few young animals survive this learning period. As adults, they establish a known home range and develop a degree of security. These natural processes are designed to lead to neither over- nor under-population, but to a balance that allows the species to survive.

Double your fun by adding another dimension to your experience. Sharing, especially with a child, is great way to make your outdoor venture even more entertaining. Children provide a different perspective. They call attention to details often overlooked by their adult companions and can infuse the familiar with a fresh sense of wonder. These shared moments are opportunities to instruct any novice in the ways of wildlife. Encourage your companions to view habitat from the animal’s perspective and to see themselves as guest in the animal’s home. Practicing good outdoor manners can benefit wildlife watchers and wildlife alike.

So, be bold. Step outdoors and try on different wildlife views. Seeing through the eyes of an animal can be instructive, enriching and entertaining, and can make us better wildlife guests and habitat neighbors helping ensure a wide variety of wildlife for future generations

—Katie Smith

## There's This Hawk In My Backyard And I'm ...

Wildlife diversity biologists get many phone calls and emails about the species with which we work. As the bird biologist, a large majority of inquiries I get have to do with hawks. Most fall into two categories: 1) "I have a peregrine falcon (or other hawk) hanging around (or found dead at) my house, and it is (was) eating my birds;" or 2) "I have a large hawk around and I'm afraid it will attack my small dog, cat, kids or me."

Usually the first thing I try to do is determine the hawk species observed. In this digital age, homeowners can usually get a decent photo and email it to me. Almost inevitably, the culprit is a Cooper's hawk. This dashing hawk is about the size of a crow, with a long banded tail, rounded wings, yellowish-to-reddish eyes, and under-parts that are white with brown streaks in young birds and reddish-brown barring in adults. Peregrine falcons are similar in size but have dark eyes, pointed wings, a shorter tail, and prominent sideburns. Cooper's hawks prefer areas with trees and bird feeders, whether they are in urban, suburban, or rural areas and numbers have been increasing in recent years. Resident peregrine falcons are almost always found in the center of large cities or in industrial areas along Lake Michigan where they nest on high ledges or nest boxes on buildings, smokestacks, or under bridges and hunt medium-sized birds such as pigeons, doves, and blue jays in open skies. Cooper's hawks build stick nests in trees, especially pine trees, and chase birds, squirrels, and chipmunks, often low to the ground. One hazard is that they commonly collide with glass windows. The size and diet of the Cooper's hawk (and the closely related, but smaller and rarer sharp-shinned hawk) preclude them from being a hazard to pets and humans; however, if a nest is close by, they may feel threatened by people and animals, and may dive at them to prevent a closer approach. Given some space, they will get used to the presence of a human.

To people concerned these birds will eat all the small birds at their feeders, I respond in several ways. First, bird feeders attract small birds, and small birds attract predators, including hawks. All are looking for an easy meal. Having a hawk visit a feeder makes bird watching more interesting, from the drama of whether the hawk's hunt will be successful (more often than not they go away hungry), to the interesting behaviors of the songbirds as they detect, give alarm calls, mob the hawk, freeze to avoid detection, or head for cover. When the intended prey can run or fly away, as with the hawk's, it is much more difficult to get a meal. Songbirds, by comparison, feed on sedentary seeds, fruit, or slow-moving invertebrates. Because of this difference, predators are unlikely to deplete the much more abundant population of potential prey. The number of predators is mostly controlled by prey numbers, not the other way around. Most animals are opportunists and will only linger at a spot if the food is unusually abundant and concentrated. Cooper's hawks range quite widely; they rarely frequent

a single feeder location for long. If a hawk appears to be hanging around your feeders almost every day, stop putting out food for a few days, and the hawk will likely move on.

A couple of other larger hawks, primarily red-tailed and red-shouldered hawks, may cause problems when encountered in suburban and rural areas. The red-tailed hawk is the largest hawk in Indiana with which such encounters occur. Although their diet consists primarily of mice, voles, rabbits, squirrels and snakes, red-tails sometimes take birds, including free-ranging chickens. Better husbandry is in order if such predation is occurring, and if coyotes, foxes, mink, and other mammals are also being attracted to free-ranging chickens. Furthermore, while I don't know of any credible reports of a red-tailed hawk attacking a small dog, if you have a toy breed or puppy, be wary. For the most part, hawks and other birds may dive at people and animals when a nest is nearby or their young are out and about, but this is defensive behavior.

Long gone are the days when hawks were routinely shot, but it still happens on occasion, even though they are protected by state and federal laws. Birds of prey are an integral part of our environment and are fascinating creatures that should be enjoyed, not feared.

—*John Castrale*

## A Human Brain? Or Alien Being? Neither, It's Just A Moss Animal ...

Believe it or not, occasionally we get calls during the summer similar to these: "We found something that looks like a human brain in our pond. Could you take a look at it?" or "Do you know what this huge slimy blob is that we found in our lake?"

More commonly, pond and lake owners call thinking they have found a massive pile of fish or amphibian eggs, and they want to know of which species.

Don't feel bad if you have come across one of these unusual aquatic inhabitants and had no idea what it was—you are not alone. These unique finds are freshwater invertebrates known as bryozoans, or moss animals.

Most bryozoans are found in marine environments but a group is also adapted to live in freshwater. The large gelatinous mass is actually a colony made up of individual units known as zooids. Although they live in colonies, each zooid maintains its own mouth, gut, muscles, and nervous and reproductive systems. Each zooid filter feeds by using a whorl of ciliated tentacles to bring small microscopic animals and plants to their mouths. Colonies attach to submerged objects such as sticks, rocks, or even boat docks; colonies of certain species can even develop to the size as large as a bowling ball.

Bryozoans can reproduce asexually (through fragmentation, fission or budding) or sexually. Statoblasts, encapsulated structures, are produced through budding and allow bryozoans to persist from year to year. Statoblasts can remain dormant for years, surviving under



*Bryozoa colony attached to a stick.*



*Bryozoa colony from a pond at Minnehaha FWA.*

freezing or extremely dry conditions. Under proper conditions, they germinate, producing a zooid, which then can bud to form a new colony.

So the next time you come across that large, slimy blob in your pond or lake, don't freak out—it is probably just a bryozoan.

Additional information can be found at the following websites:

[www.wright.edu/~tim.wood/bryozoans.html](http://www.wright.edu/~tim.wood/bryozoans.html)

- Dr. Timothy Wood, Wright State University

[www.bryozoa.net](http://www.bryozoa.net)

- International Bryozoology Association (IBA)

[www.bio.umass.edu/biology/conn.river/bryozoa.html](http://www.bio.umass.edu/biology/conn.river/bryozoa.html)

- Bryozoans from the Connecticut River

[www.millermicro.com/bryozoa.html](http://www.millermicro.com/bryozoa.html)

- Moss Animals Invade Lake Cochituate

—Brant Fisher

## What Species Of Snake Is This?

Snakes are perhaps one of the most polarizing animals out there.

Some people have such severe phobias of snakes that they can hardly look at a picture of one without feeling like fainting. Others have such a fondness of snakes that they keep several different species as pets.

As the reptile and amphibian biologist, I receive many requests asking me to help identify a snake. Sometimes people believe the snake in question to be venomous, and are scared for their safety or the safety of loved ones. Identifying a snake from a picture can help alleviate these fears if the snake proves to be non-venomous (and in Indiana, it is almost always a harmless species).

The best thing you can do if you want a snake identified is to send pictures. While I can give an educated guess based on a description and location within the state, it is difficult. Many of our native snakes have similar sizes and patterns. This makes it hard to distinguish one species from another based on a spoken or written description alone.

Snakes move quickly, especially when disturbed. This can make them difficult to photograph. If possible, get a shot of the entire body, and then one of the head. If you are able, get a shot of the belly, too. Make sure that the picture is in focus. Blurry pictures complicate identification and may make it impossible.

The best pictures that are sent in to me for identification show the distinguishing markings of the snake. These marks include color, pattern, shape of head, shape of tail, and noteworthy markings such as a colored ring around the neck. Some snake species, such as the Kirtland's snake, have distinct belly markings that can be used for identification, so this shot can be helpful, too.

Please keep in mind that snakes may act aggressively if they feel threatened. Some may flatten their heads, hiss, coil up, strike, attempt to bite, or even stand up tall like a cobra, but they are only trying to scare you. If they do this, just walk away and leave them alone. Many times they will end up moving on their own. Humans are huge compared to snakes, and they see us as a threat, not as a meal.

Remember, besides being for the most part harmless, snakes help our environment by controlling pest populations such as mice, chipmunk, and insects.

—Sarabeth Kleuh

*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.*