



United States
Department of
Agriculture

Forest
Service



Land and Resource Management Plan

Monitoring and Evaluation Report

Fiscal Years 2004 and 2005

**Brown, Crawford, Dubois, Jackson, Lawrence, Martin,
Monroe, Orange, and Perry Counties, Indiana**

Hoosier National Forest

October 11, 2005

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Determination

We carried out the Monitoring and Evaluation Program for Fiscal Years 2004 and 2005 to take a close look at our project activities and other resource uses and determine if they are consistent with *Forest Plan* guidance. This program also provided an opportunity to evaluate whether that guidance meets the goals and objectives established in the *Forest Plan*.

Meeting *Forest Plan* objectives is dependent on the level of funding allocated to the Forest. It is our responsibility, within this allocation and Congressional direction, to emphasize a balanced mix of projects that are environmentally sound and provide benefits to people. We developed many projects in partnership with individuals and organizations.

I have reviewed this Monitoring and Evaluation Report for the Hoosier National Forest for Fiscal Years 2004 and 2005. Our deficiencies are noted. We will take corrective action where appropriate. I am satisfied that management activities accomplished during Fiscal Years 2004 and 2005 were consistent with *Forest Plan* guidance, except where noted, and that the guidance provides solid direction in meeting the goals and objectives set forth in the *Forest Plan*.

This report documents our review of the conditions of National Forest System lands managed by the Hoosier National Forest. For a few years, the Forest has been busy revising the Forest Plan. We have made that document available in draft form and are expecting to finalize it in the next year. The Proposed Plan and FEIS address the changed conditions and demands. During the life of the 1991 Forest Plan, it has been amended seven times. For now, we are continuing to carry out the 1991 *Forest Plan* as we work toward completing our plan revision.

This meets the intent of both the *Forest Plan* (Chapter 5) and the National Forest Management Act planning regulations.

KENNETH G. DAY
Forest Supervisor

Date

Introduction

The *Forest Plan*, as amended in 1991, provides guidance to ensure that National Forest System (NFS) lands in Indiana provide diverse and healthy forest ecosystems while providing high quality recreational opportunities. We are committed to forest activities that lie lightly on the landscape. Our mission is to manage forest resources and allow people to enjoy the values and benefits the Hoosier National Forest (the Hoosier or the Forest) provides.

Projects included here represent on-the-ground application of management practices and guidance to move toward the desired condition identified in the *Forest Plan*. The final budget for any given year determines the annual program of work. This report lists those projects and monitoring activities that help evaluate:

- Whether we are doing what we said we would
- How well the resulting conditions resemble what we predicted
- Whether we need to modify the monitoring targets we were aiming at (in the 1991 Plan), and
- What we may need to do to better serve the public and protect the land in the future.

Project monitoring determines how well we are carrying out the *Forest Plan*. It provides a means to evaluate whether *Forest Plan* guidance is sufficient to achieve management goals and direction in the *Forest Plan*. The National Forest Management Act [36 CFR 219.12(k)] requires monitoring and evaluation on an on-going basis. This report summarizes accomplishments and monitoring during fiscal year 2004 and fiscal year 2005—that is, the period from October 1, 2003 to the end of September in 2005.

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PROGRAM ACCOMPLISHMENTS FY 2004 and FY 2005

Outputs [219.12(k)(1)] -

Table 1 lists many of the more important natural resource management accomplishments.

TABLE 1. RESOURCE ACCOMPLISHMENTS

RESOURCE ACCOMPLISHMENT	UNITS	OCTOBER 2003 THROUGH SEPTEMBER 2004 (FY 2004)	OCTOBER 2004 THROUGH SEPTEMBER 2005 (FY 2005)
Streams restored or enhanced	Miles	2	1
Lakes restored or enhanced	Acres	35	71
Terrestrial wildlife habitat restored or enhanced	Acres	1,090	420
Noxious weed treatment	Acres	54	78
Trails improved to standard	Miles	3	4
Trails maintained to standard	Miles	64	94
Recreation special uses administered	Permit	7	5
Heritage resources managed to standard	Site	15	8
Recreations visits	PAOTs	1,017,724	947,823
Passenger car roads maintained (levels 3, 4 & 5)	Miles	17	8
High clearance roads maintained (levels 1 & 2)	Miles	8	2
Special use permits administered	Permits	55	59
Geologic permits and reports completed	Reports	48	43
Ownership adjusted	Acres	480	324
Land acquired	Acres	623	324
Lands cases resolved through litigation or processed through administrative procedure	Cases	7	9
Boundary line maintained	Miles	12	13
Land use applications processed	Permits	12	15
Wildland/urban interface high-priority hazardous fuels mitigated	Acres	385	689
Non-project integrated inventories	Acres	90,000	63,769

RESOURCE ACCOMPLISHMENT	UNITS	OCTOBER 2003 THROUGH SEPTEMBER 2004 (FY 2004)	OCTOBER 2004 THROUGH SEPTEMBER 2005 (FY 2005)
Non-wildland/urban interface high priority hazardous fuels mitigated	Acres	1,296	295
GIS resource mapping	Quarter quads	271	199
Timber volume harvested	CCF	438	432
Trees planted	Acres	100	57
Projects to improve forest vegetation	Acres	117	95
Openings maintained	Acres	1,090	420
Special products permits administered	Permits	13	16
Interpretation and education provided	Products	8	7
Soil and water resource improvements	Acres	20	53
Wildlife interpretation and education provided	Number	8	7
Education/interpretation in recreation programs	Products	169	103

Table 2 includes information on outputs for fiscal years 1992 through 2005. It includes key indicators identified in the Final Environmental Impact Statement for the *Forest Plan* (p. 2-14 and 2-15).

TABLE 2. COMPARISON OF KEY INDICATORS

Key Indicator	Unit of Measure	Anticipated Outputs for 10 Years— from Plan	1992 Output	1995 Output	1996 Output	1997 Output	1998 Output	1999 Output	2000 Output	2001 Output	2002 Output	2003 Out-put	2004 Output	2005 Output
Recreation Visitor Days (RVD)	MRV D	387		230	510	510	525	525	525	525	525	525	1,018*	948*
Trail Construction														
Hiking	Miles	99	0	0	0	0	0	0	0	0	0	0	7.7	0
Horse	Miles	40	0	0	0	0	0	0	0	0	0	0	0	0
Bike	Miles	0	0	0	0	0	0	0	0	0	0	0	0	0
Multiple-use	Miles	0	0	8.6	7.5	22	0	6.5	0	0	0	1.1	0	0
Trail Reconst. (all)	Miles	0	0	0	0	51.5	28.1	28.0	9	3.3	3.3	12	3	5
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Key Indicator	Unit of Measure	Anticipated Output for 10 Years	1992 Output	1995 Output	1996 Output	1997 Output	1998 Output	1999 Output	2000 Output	2001 Output	2002 Output	2003 Output	2004 Output	2005 Output
Vegetation maintained														
Forest Openings	Acres	4,000	459	322	480	650	439	290	1,373	907	1,040	506	1,090	420
Barrens Maint.	Acres	1,131	40	60	0	83	0	0	20	0	0	855	0	870
Marsh/Wetland	Acres	15	0	0	0	1	20	0	50	105	6	27	0	62
Veg Regen.														
Hardwood 0-9	Acres	4,853	0	0	0	150	44	76	0	0	0	1200	0	0
Pine 0-9	Acres	94	0	0	0	0	0	0	0	0	0	0	0	0
Timber Harvested														
Saw-timber	MMBF	26	0.042	0.159	0.114	0.67	3.839	0.903	0	0	0.06	0.07	0	0.066
--Round-wood	MMBF	17	0.078	0.127	0.066	1.13	1.839	0.373	.0091	.0028	0.04	0.01	0.01	0.016
Total	MMBF	43	0.120	0.286	0.180	1.89	5.728	1.322	.0091	.0028	0.1	0.08	0.01	0.082
Roads Const./Reconst.	Miles	140	3.50	0.60	7.90	10.90	1.0	1.0	7.43	6.85	6.85	3.75	0	0

Costs [219.12(k)(3)]

Quantitatively compares actual cost of applying management practices with Forest Plan estimates.

For both Fiscal Year 2004 and Fiscal Year 2005, expenditures exceeded *Forest Plan* budget estimates. We summarized budget line items into 15 program areas. *Forest Plan* cost estimates did not include land acquisition funds (\$493,839 in FY 2004 and \$429,000 in FY 2005) or the Senior Community Service Program (\$10,000 each year).

In 1990, the estimate of funds necessary to carry out the *Forest Plan* was \$4,992,150 (2002 dollars).

The mix of expenditures does not correspond to plan estimates. In FY 2004, the Forest spent \$847,000 in forest planning, inventory, and monitoring. The interdisciplinary team did not estimate these expenditures in the 1991 *Forest Plan* cost estimates or else accounted for them in other program areas. Expenditures were less (in both fiscal years) in recreation, fish and wildlife, and timber than estimated in the 1991 *Forest Plan*. However, expenditures both years exceeded estimates in soil, water, and air; lands; minerals; engineering; and fire. Law enforcement is no longer included in the Forest budget and is budgeted through a separate process.

Our expenditures for recreation in FY 2005 were about one-third of our *Forest Plan* estimate. Timber funding in FY 2005 was about 28 percent of the *Forest Plan* estimate,

Congress funded the land acquisition program. In FY 2004, \$493,839 were made available for land acquisition, and during that year the Forest acquired 698 acres. About \$429,000 were available for land acquisition in FY 2005, and during the year the Hoosier acquired 389 acres. The *Forest Plan* budget did not estimate land acquisition funds.

TABLE 3. EXPENDITURES COMPARED WITH PRIOR YEARS AND FOREST PLAN COSTS

SUMMARIZED BUDGET LINE ITEM	FOREST PLAN BUDGET ESTIMATE (2002 DOLLARS)	FISCAL YEAR 2002 EXPENDITURES	FISCAL YEAR 2003 EXPENDITURES	FISCAL YEAR 2004 EXPENDITURES	FISCAL YEAR 2005 EXPENDITURES
Recreation	1,976,593	495,763	875,207	783,000	655,000
Wildlife and Fish	606,098	242,855	334,783	518,000	471,000
Planning, Inventory, & Monitoring	0	637,296	1,132,104	847,000	487,000
Timber	864,225	77,522	186,950	294,000	243,000
Soil, Water, & Air	136,906	232,032	274,818	354,000	443,000
Minerals	32,801	49,494	58,200	61,000	61,000
Senior Citizens (SCSEP)	0	199,460	166,065	10,000	10,000
Lands	221,047	1,611,701	2,193,030	1,008,834	991,000
Engineering	283,125	1,097,249	2,312,790	2,047,000	1,555,000
Fire	106,958	620,722	605,811	829,423	637,000
Law enforcement	52,766	20,256	14,326	*	*
General –Cost Pools	711,631	1,266,287	1,255,613	1,496,040	1,500,142
Total All Funds	4,992,150	6,550,637	9,030,253	7,854,463	6,624,142

* Law enforcement dollars no longer come through the forest budget process, but rather through a separate budget process.

Research [36 CFR 219.28(a)]

Review and update research activities on the Forest. Find out if the needs in the Forest Plan (pages 3-4 to 3-7) are being addressed and are still appropriate. Identify additional research needs based on monitoring and evaluation and on changing societal needs.

We list below research needs addressed in FY 2004 and FY 2005 (*Forest Plan*, pp. 3-4 to 3-7). One can find published research conducted in other years on the Hoosier webpage at www.fs.fed.us/r9/hoosier. Most research needs recognized in the *Forest Plan* are being addressed, many through partnerships with other entities. Several research studies are still in progress and work continues.

Need: Research concerning Oak-Hickory Regeneration in Central Hardwoods

Seifert, John R.; Selig, Marcus F.; Jacobs, Douglass F.; *et al.* 2004 Native oak regeneration following clearcutting on the Hoosier National Forest. West Lafayette, IN: Purdue University (Extension). FNR-260. 11 p.

Weigel, Dale R.; Dey, Daniel C.; Pen, Caho-Ying Joanne. 2005. Stump sprout dominance probabilities of five oak species in southern Indiana 15 years after clearcut harvesting. In: Connor, Kristina F., ed. [In Press] Proceedings of the 13th biennial southern silvicultural research conference. Gen. Tech. Rep. SRS-XXX. Ashville, NC: US Department of Agriculture, Forest Service, Southern Research Station. 13 p.

Need: Research concerning Ecological Classification System

Zhalnin, Andriy Vladimirovich. 2004. Delineation and spatial analysis of ecological classification units for the Hoosier National Forest. Ph.D. dissertation. Lafayette, IN: Purdue University, 267 pp. [On file with Hoosier National Forest, 811 Constitution Ave., Bedford, Indiana 47421.]

Need: Research concerning Native Plant and Animal Communities

Bess, J. 2004. A final report on insect surveys at three barrens special interest areas (Hoosier National Forest: Perry County, Indiana) with a special emphasis on forester sensitive species. Draft. Wanatach, IN: OTIS Enterprises. 18 p. [On file with Hoosier National Forest, 811 Constitution Ave., Bedford, IN 47421].

Brack, V.; Whitaker, Jr., J.O.; Pruitt, S.E. 2004. Bats of Hoosier National Forest, Indiana. Proceedings of the Indiana Academy of Science. 113: 76-86.

Burr, B.M.; Sipiorski, J.T.; Thomas, M.R.; *et al.* 2004. Fishes, mussels, crayfishes, and aquatic habitats of the Hoosier-Shawnee ecological assessment area. In: Thompson, Frank R. III, ed. The Hoosier-Shawnee Ecological assessment. Gen Tech. Rep. NC-244. St. Paul, MN: U.S. Department of Agriculture, Forest Service, North Central Research Station. pp. 109-171.

McCreedy, Clark D.; Reynolds, Kelle A.; Basile, Cynthia M.; *et al.* Terrestrial animal species in the Hoosier-Shawnee ecological assessment area. pp. 172-221. In: Thompson, F.R.III, ed. The Hoosier-Shawnee Ecological Assessment. General Technical Report NC-244. St. Paul, MN: U.S. Department of Agriculture, Forest Service, North Central Research Station. 267 p.

Olson, Steven D.; Homoya, Michael A.; Shimp, Elizabeth L. 2004. Native plants and communities and exotic plants within the Hoosier-Shawnee Ecological Assessment Area. pp. 59-80. In: Thompson, Frank R., II, ed. The Hoosier-Shawnee Ecological Assessment. Gen Tech. Rep. NC-244. St. Paul, MN: US Department of Agriculture, Forest Service, North Central Research Station.

Species Viability Evaluation (SVE) Panels. 2004. Meetings of Midwest species experts to review models of each SCE species and evaluate effects of proposed Forest Plan alternatives on their specialty species. Terre Haute, Indiana. January 14-16, 21, 2004. Unpublished meeting notes and Species Data Collection Forest. [On file with Hoosier National Forest, 811 Constitution Ave., Bedford, IN 47421]

Need: Research concerning Controlling Problem Plants

Scarborough, Dwight; Juzwik, Jennifer. 2004. Native and exotic insects and diseases in forest ecosystems in the Hoosier-Shawnee Ecological Assessment Area. pp. 222-235 In: Thompson, Frank R., II, ed. The Hoosier-Shawnee Ecological Assessment. Gen Tech. Rep. NC-244. St. Paul, MN: US Department of Agriculture, Forest Service, North Central Research Station.

Other Research Publications from Work on the Hoosier National Forest

Fox, Alan. 2004. Economic analysis of the Hoosier NF area. Northwest Economic Associates. Prepared under contract with Hoosier National Forest. [On file with: Forest Supervisor, Hoosier National Forest, 811 Constitution Ave., Bedford, IN 47421].

Parker, George, R.; Ruffner, Charles M. 2004. Current and historical forest conditions and disturbance regimes in the Hoosier-Shawnee ecological assessment area. In: Thompson, Frank R. III, ed. The Hoosier-Shawnee Ecological Assessment. General Technical Report NC-244. St. Paul: MN: U.S. Department of Agriculture, Forest Service, North Central Research Station. 267 p.

Whiles, M.R.; Garvey, J.E. 2004. Freshwater resources in the Hoosier-Shawnee ecological assessment area, In: Thompson, Frank R. III, ed. The Hoosier-Shawnee Ecological Assessment. St. Paul, MN: USD.A Forest Service, North Central Research Station. pp. 81-108. General Technical Report NC-244. 267 p.

Site-Specific Project Decisions

TABLE 4. DECISIONS IN FISCAL YEAR 2004

Decision	Date	County
Dubois Rural Electric Cooperative FLPMA Permit	10/09/03	Dubois County
Orange County REMC FLPMA Permit	10/09/03	Orange County
Patoka Water FLPMA Permit	10/09/03	Orange County
Pate Hollow Trail	12/09/03	Monroe County
Land Exchange – Hopper	12/16/03	Orange County
Oriole Trailhead and Connector Trail	1/22/04	Perry County
Wesley Chapel Gulf Tree Planting	3/12/04	Orange County
Nebo Ridge Parking – South	3/16/04	Jackson County
Nebo Ridge Parking Area	3/16/04	Jackson County
Charles C. Deam Wilderness Invasive Plant Species Control	7/07/04	Brown, Jackson, and Monroe Counties
Hemlock Trail Reroute	6/04/04	Crawford County
Smithville Fiber Optic Buried Line	8/20/04	Monroe County
Goosetown Salvage	9/21/04	Perry County
Stinking Fork Riparian Restoration	9/30/05	Crawford County

TABLE 5. DECISIONS IN FISCAL YEAR 2005

Decision	Date	County
Hickory Ridge Trail Reroutes	12/21/04	Jackson County
Hickory Grove Hitching Area	2/25/05	Lawrence County
Braun Temporary Road Permit	4/04/05	Perry County
Reforestation Tree Planting	4/12/05	Perry and Orange Counties
Southern Indiana REC Special Use Permit – Along Dexter-Magnet Road	4/14/05	Perry County
Cope Hollow Trail	4/26/05	Monroe County
Sundance Special Use Event	6/13/05	Brown County
Tipsaw Lake Aquatic Plant Control	7/05/05	Perry County
Perry/Spencer Rural Telephone Coop	8/15/05	Perry County
Smithville Telephone	8/17/05	Monroe County
Shirley Creek Salvage	9/12/05	Martin and Orange Counties

Adjacent Lands [36 CFR 219.7(f)]

Consider effects of national forest planned management on land, resources, and communities adjacent to or near the Hoosier National Forest and, conversely, the effects on national forest management from activities on nearby lands managed by other public land agencies or under the jurisdiction of local government. To be addressed from a perspective of current and emerging issues.

There are various interrelationships between national forest management and nearby lands. Here in south central Indiana, where National Forest System (NFS) land is interspersed with private or other public lands, national forest management has the potential to affect communities as well as the land and resources.

One set of activities allowed in the new proposed Forest Plan for the Hoosier that could have potential to affect some small communities is the timber harvesting proposed. The revised Forest Plan is not expected to increase appreciably the level of allowable cutting; in fact, the only increase in the Proposed Plan over the present level is because of increased stand volume (that is, trees on the Forest have grown), precipitating a need to increase the level of harvesting to maintain even the minimal level of management allowed in the 1991 Forest Plan.

A project presently undergoing analysis, the Tell City Windthrow 2004, would salvage an acreage larger than what has been treated on the Hoosier for a number of years. Even that project is so small and scattered that it is not expected to have economic and social effects beyond those on the families of the workers and

temporary displacement of recreationists from selected sites, and that displacement has already occurred as a result of the windstorms.

Trail use has a positive impact on the economy of local communities and the businesses that cater to these users. Horse camps in the northern portion of the Forest are booked to capacity most weekends during the recreation season. There are several trail permits issued to link private horse camps to NFS trails.

Demand [36 CFR 219.10(g)]

The Forest Supervisor shall review the conditions on the land covered by the plan at least every 5 years to determine whether conditions or demands of the public have changed significantly.

The 1991 *Forest Plan* emphasized many demands for the NFS land the Hoosier manages. The Forest Plan displayed and discussed Demand for NFS land (DEIS Appendix B (p. 4-4 to 4-5) and *Forest Plan* (p. 3-3 to 3-4). The interdisciplinary team (ID team) estimated demands for dispersed recreation, developed recreation, timber, young forest, openings and shrubland, natural-appearing forest, and opportunities for solitude and remote recreation. We estimated demand to address the management challenges of land ownership patterns, recreation use, oil and gas exploration, and biological diversity. The following demand and use table shows *Forest Plan* estimates for 2005 and for estimated actual use for the fiscal year.

TABLE 6. FOREST PLAN PROJECTED DEMAND AND ACTUAL USE

Benefit	Projected Demand For 2005 (in 1991Plan)	Estimated Actual Use 2005
Total Recreation Visitor Days – (RVDs)	515,817	948,000
Timber (Million Board Feet)	22.4	0.066

Recreation use exceeded our expectations in 2005. Demand for other benefits has not changed appreciably since the *Forest Plan* estimates.

Conservation of Threatened and Endangered Species Habitat

[36 CFR 219.9]

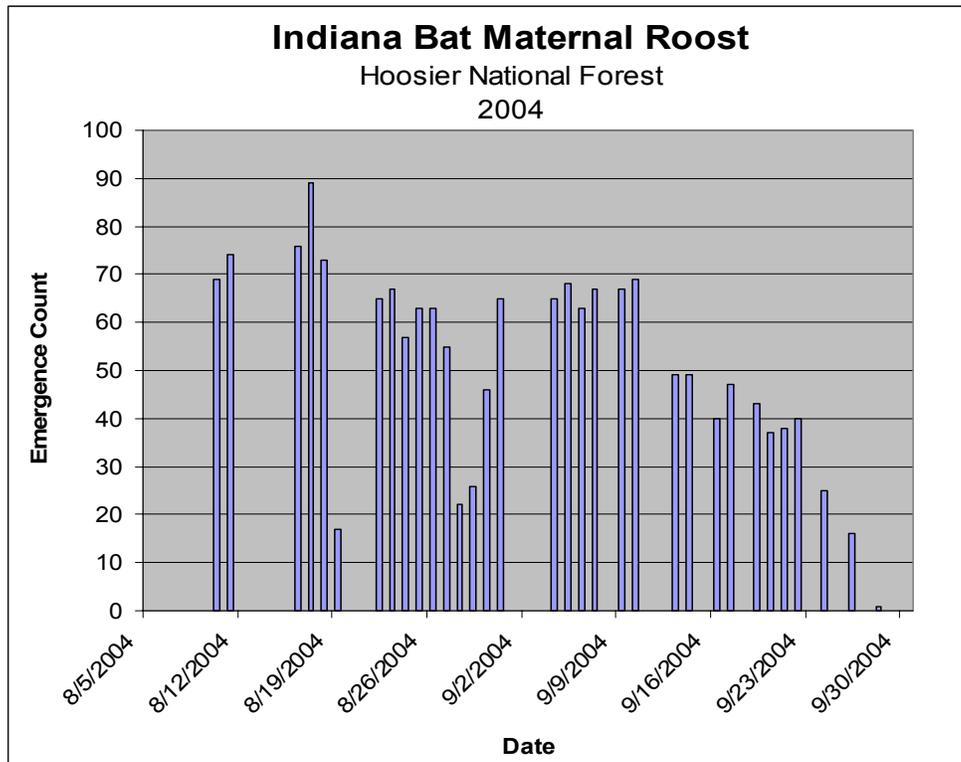
This section of the report addresses threatened and endangered species and their habitats.

Indiana Bat Maternal Roost Emergence Study

Methods: In conjunction with the Buzzard Roost Bat Survey, the Hoosier conducted a study to document the use of a primary maternal roost occupied by a colony of Indiana bats (*Myotis sodalis*). On August 8, 2004, the bat team captured an adult post-lactating female Indiana bat at site BR #3, representing the first evidence of reproduction for this species within the Forest. We attached a transmitter between the scapulae of this bat using surgical cement. After attaching the radio-transmitter, we retained the bat for several minutes to allow the surgical cement to harden. The bat was then released and tracked for a short distance to ensure that it was still capable of flight. Tracking began August 9, 2004 and continued until the battery life of the transmitter ended on August 25, 2004. The signal from the radio-transmitter was tracked using a TRX1000 receiver and hand-held Yagi antennae from Wildlife Materials Incorporated of Murphysboro, Illinois).

Observations: On the day following release, the bat was tracked to a 26.4-inch dbh, live shagbark hickory (*Carya ovata*). This roost tree was approximately 0.2 mile from the point of capture. This was the only day the bat used this roost during the period when we were tracking it. On the second day, the bat had moved underneath the loose bark of a 24-inch dbh dead American elm (*Ulmus americana*). This American elm had approximately 40 percent bark coverage; most of it above a major fork of the trunk. This roost tree was located a few feet from Little Oil Creek and approximately 1.1 miles from site BR #3. The bat used the American elm for two consecutive days before moving to a third tree, which we located on August 12, 2004. This roost was a dead soft maple (*Acer spp.*) with a 10.5-inch dbh. Only the trunk of the tree was standing; no bark was present. The bats were located in vertical fissures. The Indiana bat with the transmitter attached could be seen along with several other bats in the larger crevice of this tree. The bat was tracked to this roost for two consecutive days before returning to the American elm where it remained for the duration of tracking. Both the elm and maple roosts were located in canopy gaps; the hickory roost occurred beneath the forest canopy. Periodically, Hoosier personnel monitored the elm roost to record the number of emerging bats. We monitored this roost from August 10, 2004 through September 28, 2004, when only one bat was observed emerging. As many as 89 bats (August 17) were observed emerging from beneath the bark of the roost.

Figure 1. Emergence count for Indiana bat maternal roost, 2004.



Buzzard Roost Bridge Survey

Methodology: Two Hoosier employees checked 27 bridges within the project area for daytime use by bats. They searched bridges searched on July 29, 2004. Identification of bridge structure and indices of use by bats followed the protocol described by Keeley and Tuttle (1999). All bridges within the Buzzard Roost Bat Survey project area were inspected for evidence of use by bats; bats were present at 4 of the 27 bridges surveyed: This underscored the importance of artificial structures as roosting habitat for Eastern forest bats.

Following inspection of project area bridges, the County Road 62 bridge over Stinking Fork was added as a mist net site (HH #22) for this survey. A total of 50 bats were captured at the site, including 27 big brown bats (*Eptesicus fuscus*) of both sexes. This bridge provided a notable day roost for big brown bats. Other bat species captured at the site included males and female eastern pipistrelle bats (*Pipistrellus subflavus*), northern bat (*Myotis septentrionalis*), and eastern red bat (*Lasurus borealis*).

Observations: Roosting bats were also found under CR #6 bridge over the Little Blue River. This concrete bridge was a cast-in-place design using beveled slabs. These beveled slabs provided bats the opportunity to grip the concrete. Upon first inspection, a cluster of approximately 12 to 15 bats was observed and photographed, but the species of the bats could not be positively identified. During a visit to the bridge on August 11, 2004, a cluster of nine bats was observed roosting near the location where bats had been seen previously. A large fishing net was used to capture the clustered bats for positive identification. The bats were a mixture of juvenile and adult female eastern pipistrelles. This represents the first maternity colony of eastern pipistrelles identified on the Hoosier and possibly the first known use of a bridge by a maternal colony of pipistrelles in Indiana.

Keeley, B.W.; Tuttle, M. 1999. Bats in American bridges. Austin, TX: Bat Conservation International. 44 p.

Gypsy Bill Allen Cave – Winter Bat Census

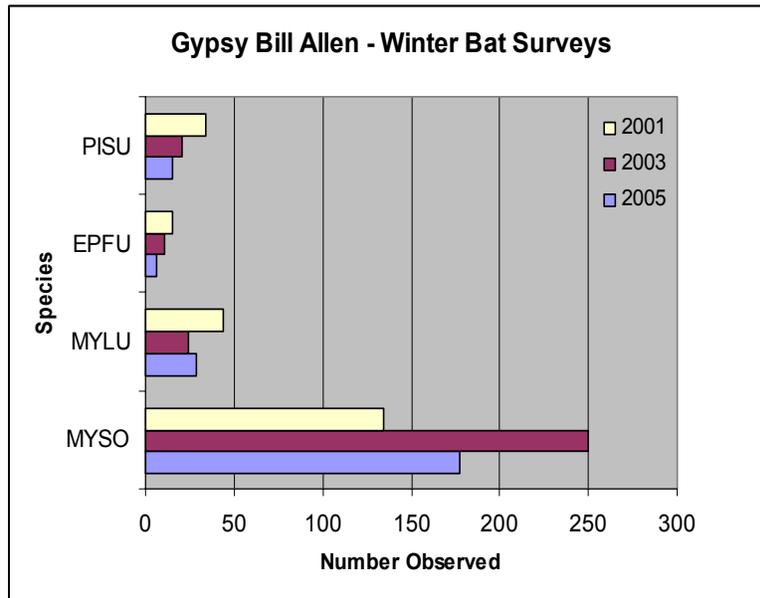
Methodology: The Gypsy Bill Allen Cave represents the only known Priority III hibernacula of the Indiana bat on the Forest. Biologists survey this cave every two years to monitor the number of bats using the cave as a hibernacula and, specifically, to monitor the number of Indiana bats using the cave. The cave is surveyed every two years to minimize disturbance to hibernating bats.

Survey protocol follows that described by Brack *et al.* (1995). Bats were tallied by species, and the locations in the cave were noted. Cave wall temperature at the entrance and temperature of roost areas were obtained using a commercially available infrared thermometer. Where possible, Indiana bats were tallied individually, and the area of tightly clustered bats was estimated using a carpenter's rule. Density of clusters was assumed to be 300 bats per square foot of cluster. All other species of bats were tallied directly, as no estimates of cluster size were necessary.

Observations: Survey of the Gypsy Bill Allen Cave began in 2001. In that year 134 Indiana bats were observed. In 2003, 250 Indiana bats were tallied during hibernation surveys. During the latest survey of the cave in 2005, 177 Indiana bats were tallied (Figure 2). Three other species of eastern forest bats have been observed in the cave previously, as well as during this latest survey: the Eastern pipistrelle (*Pipistrellus subflavus*); the big brown bat (*Eptesicus fuscus*); and, the little brown bat (*Myotis lucifugus*).

Brack, V., Jr.; K. Tyrell, K.; Dunlap, K. 1995. A 1994-1995 winter census for the Indiana bat (*Myotis sodalis*) in hibernacula of Indiana. Unpublished report to Indiana DNR, Nongame and Endangered Wildlife Program, Indianapolis, Indiana. 66 p.

Figure 2. Winter bat surveys at Gypsy Bill Allen Cave, 2001-2005.



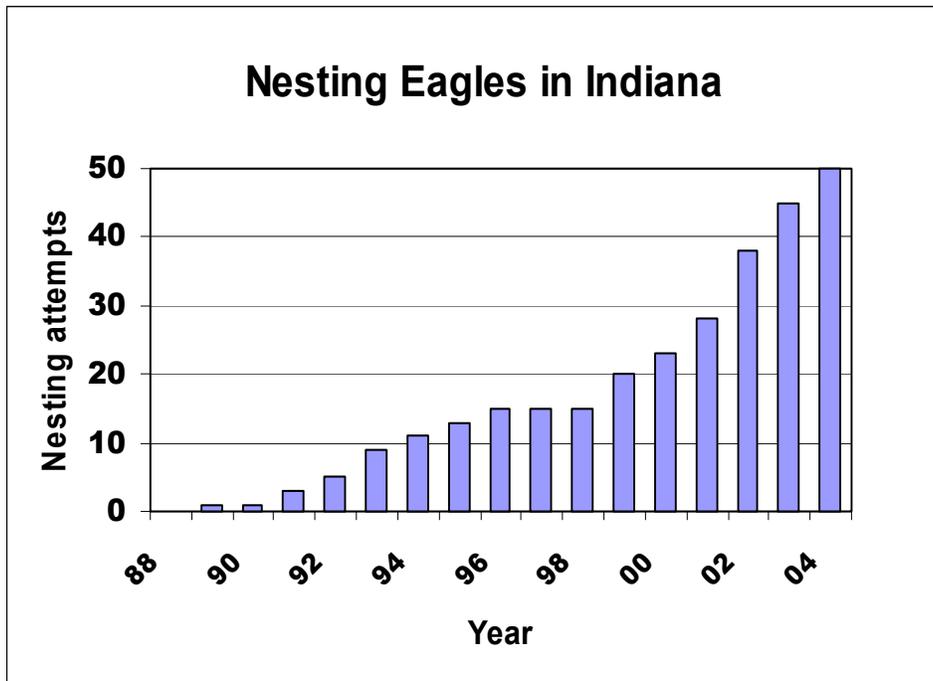
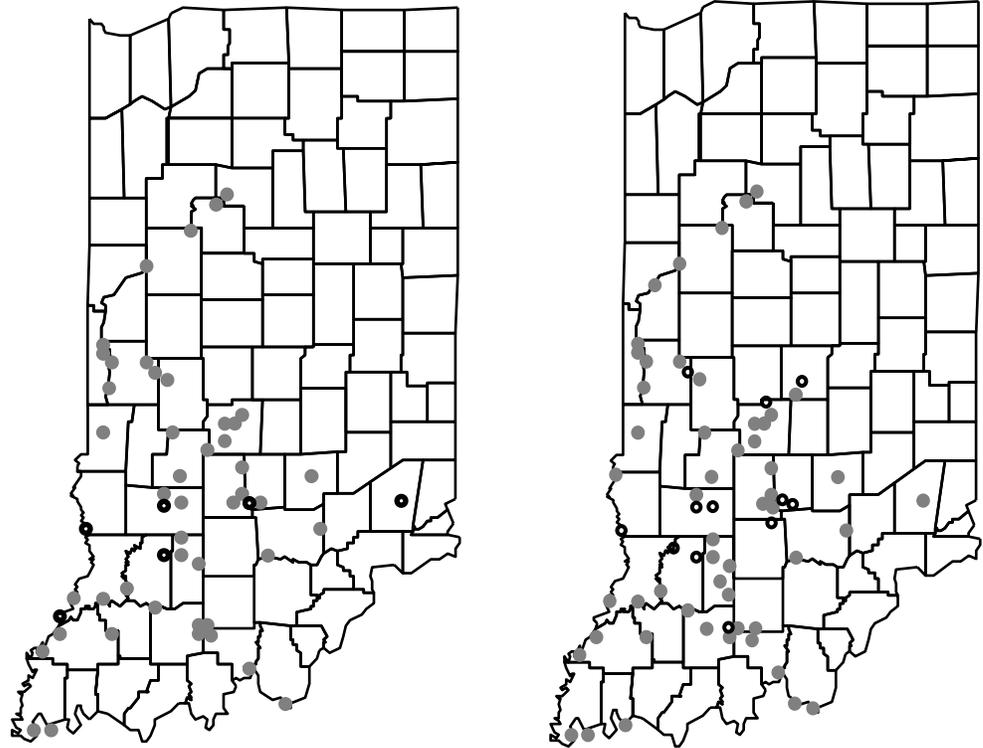
MYSO = *Myotis sodalis* (Indiana bat)
MYLU = *Myotis lucifugus* (little brown bat)
EPFU = *Eptesicus fuscus* (big brown bat)
PISU = *Pipistrellus subflavus* (Eastern pipistrelle)

Bald Eagle Nest Monitoring

Methodology: The Indiana Division of Fish and Wildlife annually conducts statewide monitoring of nesting activity of the Federally threatened bald eagle. The Division conducts these by aircraft and has designed the surveys to assess nesting and chick production. They conduct the surveys along major river systems, lakes, and reservoirs where eagle nesting activity is most likely to occur. Flights are conducted in the early spring to assess nesting activity and early summer to assess chick production.

Observations: In 2003, biologists identified 45 active nests throughout the State (Figure 5); the nests produced 63 eaglets. In 2004, biologists observed 85 chicks in 44 of 50 active nests. In 2004, three known nesting attempts by the bald eagle on NFS land resulted in two nests having chicks produced.

Fig. 3. Nesting attempts by bald eagles in Indiana in 2003 (left) and 2004 (right). Solid gray circles represent successful nests, and open dark circles represent failed nest attempts by bald eagles.



Appendix A contains a summary of Hoosier activities affecting threatened and endangered species. It does not provide details about activities, but it does list a variety of activities the Hoosier has been, and continues to be, involved in related to threatened and endangered species. The following are among the items of interest in that appendix.

- Coordinated with USDI FWS to complete the Biological Opinion for revision of the *Forest Plan*
- Presented dozens of school programs concerning T&E species to school classes and other groups
- Completed *The Hoosier-Shawnee Ecological Assessment*
- Completed the Hoosier's Cave and Karst Management Program
- Reconvened Species Viability Evaluation panels to review selected species, including the Indiana bat
- Developed Habitat Suitability Index model for the Indiana bat
- Karst Conservancy has been surveying features, including presence of bat species, and providing GPS locations of Hoosier caves
- John Whittaker and Virgil Brack completed a paper summarizing bat studies on the Forest
- Will survey hibernacula on the Forest as part of Indiana bat census count

Protect and Manage Ecosystems

Restocked Lands [36 CFR 219.12(k)(5)(i)]

Assure lands are adequately restocked as specified in the Forest Plan (App. B, B-11 to B-13), FY 2004 and FY 2005

Reference: Annual National Forest Management Act (NFMA) Stocking Report.

Methodology: Newly planted stands typically receive a first and third year stocking survey to determine seedling survival. The survival rate is determined using two methods. The first method uses survival plots. When a stand is initially planted, survival plots are established which are scattered throughout the stand. Each survival plot consists of 10 representative trees. For stands or plantations of less than 10 acres, two to three survival plots are established. For plantations over ten acres, an additional survival plot is established for each five acres. During first and third year plantation survival checks, the survival plots are monitored and the quality and quantity of the surviving seedlings is recorded.

The second method is the general walk-through of the plantation, which verifies the results of the survival plots. The general walk-through is used to check for blocks where survival may be low and to locate stands where future stand improvement

treatments may be needed.

Results: In 2005, the Forest completed the first year stocking survey of a mixed species planting, mostly white oak, on the Wesley Chapel Gulf site. The survival there to date is 85 percent on the 42 acres. We planted the site at a rate of 800 seedlings per acre. A 3-acre portion was hand planted, and it appears that survival on that portion is only 50 percent. We will not replant the three acres at this time. Both plantings in the table below used bare root stock

TABLE 7. TREE PLANTING FY 2004 AND FY 2005

Month/ Year Planted	Species	First Or Third Year Survey	Avg Trees/ Acre Planted	No. Of Trees Sampled	Number Of Trees Alive	Avg. Weighted Survival %
April 2001	White oak	Third	771	150	109	71
April 2003	White oak	First	800	160	125	77

Insects and Disease [36 CFR 219.12(k)(5)(iv)]

Methodology: Coordinate with State agencies to monitor insect and disease outbreaks, and examine stands on the Forest to detect insect and disease presence.

Results: We coordinated with and worked with the State of Indiana to detect outbreaks. After aerial flights by the State, the State Entomologist reported only one small area of light defoliation—in the Nebo Ridge area. The light defoliation was caused by the linden looper. This year defoliation caused by the Eastern tent caterpillar and forest tent caterpillar was extremely light, and it appears that the population has collapsed for the time being.

A recent infestation of emerald ash borer (*Agrilus planipennis*) in the forests of southern Michigan has heightened concern among natural resource managers regarding the epidemic spread of this and other forest pathogens. Other pathogens the Hoosier may be required to address include:

Insects--

- Asian long-horned beetle (*Anoplophora glabripennis*)
- Forest tent caterpillar (*Malacosoma disstria*)
- Gypsy moth (*Lymantria dispar*)
- Half-wing geometer (*Phigalia titea*)
- Linden looper (*Erannis tiliaria*)

- Red oak borer (*Enaphalodes rufulus*)
 - Southern pine beetle (*Dendroctonus frontalis*)
- Diseases--
- Lucidus root and butt rot (pathogen: *Ganoderma lucidus*)
 - Oak decline (pathogen: environmental/insect/fungal)
 - Oak wilt (pathogen: *Phytophthora ramorum*)
 - Sudden oak death (pathogen: *Phytophthora ramorum*)

The emerald ash borer and the gypsy moth may represent substantial future risks to the health of the forest. The red oak borer, which to date has caused no mortality on the Forest, has caused extensive mortality in Missouri and the forests of the Ozarks. A recent outbreak of the Asian longhorn beetle, a sawyer beetle, has likely been contained in the vicinity of Chicago, Illinois.

Recommendations: Continue to work with the State in the effort to slow the spread of gypsy moth and emerald ash borer and to detect the changes in the presence and extent of other insects and diseases. Animal Plant Health Inspection Service (APHIS) continues to monitor exotic beetles throughout the State. No exotic beetles have been identified on the Forest.

There was very little oak defoliation in fiscal year 2005, but the Forest needs to continue the monitoring.

Soil and Water [36 CFR 219.27(a) (1) (2) (4), (b) (5), (e), (f)]
Forest Plan Appendices J and K

Monitor to ensure effectiveness of soil mitigation and protection measures applied to management activities.

Relevant laws and handbooks:

- 36 CFR 219.27(a) (1) & 2 (f).
- Forest Service Handbook (FHS) 2309.18 section 3.12b – Exhibit 02.
- FSH 2509.18 Soil Management Handbook.
- Draft R9 FSH 2509.22, Soil and Water Conservation handbook
- Draft R9 Supplement, FSH 2509.18, Chapter 2, Soil Quality Monitoring
- "Logging Roads and Skid Trails - A Guide for Soil Protection and Timber Access" by Larry Owen and Thomas Lyons, Indiana Department of Natural Resources.
- Logging and Forestry BMP's for Water Quality in Indiana 1998

Goosetown Salvage Sale

Payment Unit 1

Methodology: On July 20, 2005, the Forest's soil scientist visited the Goosetown Salvage Sale project to monitor the implementation and effectiveness of soil and

watershed mitigation and protection measures. He also did a follow-up visit on July 27, 2005 with a group of other employees. We have combined observation comments from both days.

Payment unit 2 had been closed, and the salvage operation was still active in payment unit 1.

We monitored this sale to determine implementation and effectiveness of mitigation measures and Forest Plan standards and guidelines. We monitored the log landing, access road, skid trails, stream crossings, and streamside management zones to ensure practices were implemented to protect the soil and water resources. Impacts to the soil and water resources are to be avoided or minimized. We used a clinometer to determine the grade or percent slope of the trail and used the pacing technique to measure the distance between waterbars. We also made visual observations to see if mitigation measures were effective in diverting water from the trail before soil erosion occurred.

Criteria for being acceptable:

Compliance for cross drains or waterbar construction and spacing:

- recommendations found in FSH 2309.18 and FSH 2509.22.
- "Logging Roads and Skid Trails - A Guide for Soil Protection and Timber Access" by Larry Owen and Thomas Lyons, Indiana Department of Natural Resources.
- Logging and Forestry BMP's for Water Quality in Indiana 1998.
- Woodlands of the Northeast - Erosion and Sediment Control Guides" by Robert Hartung and James Kress, USDA Soil Conservation Service and USDA Forest Service, 1977.

Observations: A log landing was located in a riparian area without an adequate filter strip between a small intermittent drainage and landing operations. The landing was between two intermittent streams and very near both of them. Sediment and wood debris from the landing was moving into one drainage. At least 12 trees were cut to allow for a landing of adequate size.



Drainage with landing nearby

Forest Plan met?:

No. The landing was located in a riparian area. The filter strip between the landing and adjacent intermittent stream was not wide enough.

Specific Forest Plan Guidance:

Riparian Filter Strip – The area between sediment source areas and watercourses. must be wide enough filter and to reduce sediment and soil-absorbed nutrient/pesticide delivery to watercourses, by maintaining duff and humus to ensure natural infiltration rates.

Recommendations:

Locating log landings and cutting trees in riparian areas should only be considered on a case-by-case basis after consultation with wildlife biologist, botanist, fisheries/aquatic specialist, or watershed specialist.

Specialists need to maintain coordination with each other and should take responsibility to assist in layout of roads, skid trails, and landings to ensure resource protection.

Stream Crossing

Observations: Helwig Hollow is an intermittent stream that was dry during the period when the logging was completed. The stream crossing is on a system road. The side slope on the channel is fairly gentle. A bundle of 10-foot long PVC pipes was cabled together to be used as a stream crossing. Gravel was placed on top of the installed pipe bundles to help hold them down when the skidder drove over them and logs were dragged across them. Some of the gravel washed downstream. The pipe bundle was not long enough to protect the stream bottom from damage by the tree-length logs. Sediment from the road and stream bank dragged into the stream each time a log was pulled across a stream. Sediment and debris plugged most of the pipes. Sediment from the main skid trail was also being delivered to the stream at the crossing.

The bundles were too short, especially in concert with whole tree skidding and not being able to approach the stream perpendicular to the crossing. Whole tree longing should not have been allowed in tis instance.

Forest Plan met?: No. The stream crossing was not adequately built and was not installed according to design and thus did not prevent adverse impacts.

Specific Forest Plan Guidance:

Stream crossings, regardless of size, and other ground-disturbing activities in riparian areas shall be consistent with the goals for riparian-dependent resources. Adverse impacts will be prevented or mitigated.

Roads and trails will not be constructed in riparian areas unless no practical alternatives exist. Road and trail approaches to streams will be located to minimize erosion and sediment introduction to the stream. Roads and trails will generally cross channels at right angles.

Channel crossings will be accomplished using ridges, culverts, or fords. Stream fords will only be permitted when (1) the stream morphology and geology is suited to vehicular traffic, and (2) traffic volume will be sparse or intermittent. Fords and their approaches will be rock hardened, as needed, to minimize sedimentation.



Crossing from landing access road

Recommendations:

Consult with engineering and fisheries/aquatic specialist or watershed specialist on appropriate crossing for such intermittent streams. When log landings are approved in riparian areas, Forest personnel should ensure adequate filter strips are established between streams and logging activities.

If 10-foot pipes are not working, longer additional PVC pipes should be added as soon as possible. The Forest should disallow tree-length skidding near streams. As appropriate (on a site-by-site basis), consider different crossing methods, such as a culvert or a constructed low water crossing as alternatives. When using pipe bundles for crossing, follow directions in the Tech Tip mentioned below.

As stated in Tech Tip 9524 1301 – SDTDC

- Two layers of pipe bundle mats should be used.
- Place geotextile material under and between the pipe mats.
- A10-foot width is too narrow.
- Bottom and top pipe mats should extend beyond stream edge for protection of stream banks.
- Tractive surface, such as grating, Terra Mat, or timber mats, should be connected.

When resource damage is being caused by long log lengths, such as skidding whole trees, Direct loggers to cut trees into shorter lengths before dragging them across a stream.

Skid Road and Skid Trails

Observations: The main skid road, also a system road, is located in the riparian area. It is entrenched 18 to 30 inches (or more), carries runoff water for about 1,100 feet, is not graveled, and has no erosion control structures or sediment basins. The road intercepts several side hill drainages which carry the sediment-laden water to the stream crossing where it dumps into the stream. One drainage allows sediment to flow directly into the intermittent stream. No temporary sediment basins or traps were constructed. The distance between the road and the stream ranges from 4 feet to 20 feet.

The approaches to the crossing were not graveled or protected. The right angle turn from the main skid road to the crossing is such that tree length logs could not make the turn without rubbing on the streambank and dragging soil and other debris into the stream. No diversion or sediment basin was installed to intercept sediment-laden runoff before it was dumped into the stream. A check dam was constructed at the entrance to skid road leading to the main crossing. Portions of the main skid road are in the ephemeral stream that was being damaged by skidding activities.

Skid trails north of the main skid road seemed to be about the right number and were in good shape. However, east of the German Ridge recreation trail, rather than use just one skid trail to access the main skid trail, the loggers used multiple trails.

Another leadoff was also built within 3 feet of the stream.

Recommendations:

Construct diversions to divert the water into leadoffs. Sometimes leadoffs need to be constructed on the side of the road away from the stream.

Specialists should ensure proper diversions are planned and implemented.

Forest Plan met?: No Skidding down an entrenched system road without providing measures to mitigate the damage is not acceptable. Functional filter strips of sufficient length need to be provided to remove the bulk of the sediment before the water enters a stream. The integrity of the stream was potentially compromised. Even if the language in the Forest Plan is not absolute and perfectly clear, this sort of threat to the resource needs to be avoided.

No appreciable soil movement was detected on another visit approximately two months after the first visits. This was after more than one heavy rainstorm. The

rocky soil base of the road (located long before the salvage sale was planned) was holding up in spite of the poor location of the road. The visit also showed that the filter strip worked rather well even though the width was not to standard. Inspection of the stream showed that almost no gravel had been washed more than 3 or 4 feet from the crossing.

Specific Forest Plan Guidance

Mitigation measures:

From *Forest Plan p.2-7 to 2-21*

- Identify any mitigation measures needed for road construction during site-specific project planning and describe them in an environmental analysis document.
- Plan, construct, reconstruct, and maintain roads and bridges to the minimum standards appropriate for their intended uses while also meeting environmental protection standards for non-point water pollution control.
- [Emphasis added] Stabilize disturbed areas as soon as practical, or at least within the same growing season as the disturbance occurs. *Priority is given to stabilization of areas discharging soil into watercourses.*
- Soil protection and management for all activities is guided by site capabilities identified by interpretation of soil and other ecological site factors.

From *Forest Plan Appendix J:*

Roads and trails will not be constructed in riparian areas unless no practical alternatives exist. Road and trail approaches to streams will be located to minimize erosion and sediment introduction to the stream. Roads and trails will generally cross channels at right angles.

Recommendations:

Use sediment basins or catch basins to intercept sediment-laden runoff when it rains. When a payment unit is being closed, consider the need to construct some kind of temporary sediment trapping structure alongside the main road. This could include straw bale sediment traps or rock catch basins. Straw bales should extend the full width of the road and should be installed properly—with strings on the side, each bale stacked and imbedded into the roadway 3-4 inches, and spaced approximately 200 to 250 feet apart for the first 1100 feet.

This system road needs to be brought up to a minimum standard if it remains a system road. Ideally, the system road location would be moved from the riparian area and the existing road would be decommissioned.

Only one skid trail should cross a stream and go up to a ridge before splitting off into two or three directions.

Do not layout skid trails adjacent to ephemeral streams in the riparian area.

Multiple skid trails going to the same point should combine into one trail as soon as possible to reduce the area impacted by skid trails.

Before, during, and at end of sale contracts, the soil scientist and other specialists are to work with the sale administrators to lay out roads, to ensure proper placement of drainage efforts, and to otherwise ensure that soil, water, and other resources are protected.

Waterbars

This payment unit had been closed and approved by sale administrator.

Observations: Waterbars were built with a skidder, were less than one foot high, and were not angled correctly. Most of them had no outlet for the water to run off. Water was washing around the end of most of the waterbars and causing erosion in the road. Most could be kicked through with no effort. One pass with an ATV would have breached the waterbars.

Waterbars adjacent to streams were located too close to the streams without an adequate undisturbed vegetated filter strip.

Sometimes waterbars in payment unit 1 were also built too close to the drainages. On August 11, straw bale sediment basins were installed in the main skid road and the pipe bundle crossing was removed.

Forest Plan met?: No Conditions on the ground cannot always be ideal, and nature can recover from mild abuse, but improper implementation of mitigation measures (such as waterbars too close to riparian areas) is not in compliance with direction and allows degradation of the resources, both soil and water.

A visit two months later showed that, although a couple of water bars were indeed too close to the ephemeral stream, the water bars had functioned through at least two heavy rainstorms and were still intact, even though their construction was less than ideal.

Recommendations:

Require waterbars to be built to a minimum standard as described in any of the references listed in Appendix K.

- Ensure waterbars are built high enough and packed to resist breaking through.
- Waterbars should extend 1 to 2 feet on either side of the skid trail. Water breaks need to be outsloped at two to four percent and at about 30 degrees to the slope, to drain water off the road without causing a channel.
- If waterbars cannot be built adequately with a skidder, then the logger should be required to build them with a small dozer.
- Use guides to properly space waterbars.

- Waterbars uphill from stream crossings should be placed far enough from the stream to allow a filter strip wide enough, usually a 20- to 30-foot filter strip, to absorb the sediment in the muddy water..

Follow Up Monitoring

On July 29, 2005, payment 1 was completed and closed. On August 3, 2005, the soil scientist conducted a monitoring trip to the recently closed payment 1. On September 22, decisionmakers visited the crossing and looked at waterbars.

Observations: Log landing area was bladed smooth, mulched, and seeded. Waterbars and water diversions in payment unit 1 were built to a higher standard than those in payment unit 2.

The main skid road was bladed to remove ruts caused by skidding and dragging logs. No temporary or permanent sediment basins were built into the entrenched system road to trap the recently graded loose soil. The later visit showed that the filter strip, although not to standard in its width, had functioned and kept sediment from the streamcourse. The visit also showed that the waterbars, also less than ideal in their construction, had functioned through heavy rainstorms, removed water from the roadways, and were still intact. The visit also showed that gravel did not appear to have been washed downstream more than 4 feet or so.

Caves and Karst [36 CFR 219]

Conduct surveys for development of cave management plans

Legal or Regulation Reference: *Federal Cave Resources Protection Act of 1988 (FCRPA), 36 CFR 290, Forest Plan Appendix I.*

Methodology: A large percentage of this program depends on volunteer cavers. Members of the Indiana Karst Conservancy (IKC) conduct the actual base level inventories and cave mapping.

- The Hoosier/IKC Karst Inventory Committee meets each quarter to discuss items of interest on the Hoosier and to discuss cave and karst issues.
- IKC volunteers continue to review caves to determine if they meet the criteria for significant caves.
- IKC and Forest activities also include identifying the archaeological, biological, cultural, educational, geological, hydrological, mineralogical, recreational, and scientific resources within a number of caves.
- A Hoosier information specialist has presented several programs to school children on bats and cave conservation each year
- Lands have been and continue to be surveyed for acquisition and project activities. These surveys help the Hoosier meet its goal of acquiring properties with outstanding karst features.
- The karst coordinator has continued to provide guidance on Hoosier projects including the Forest Plan Revision (Proposed Plan), trails projects, prescribed burns, and land acquisitions.

2004

Employees and volunteers were involved in a number of activities including:

- The Forest drafted five cave management plans, and one has been approved.
- IKC prepared information on 24 caves to evaluate the caves for significance.
- Kriste Lindburg hosted a training session on Project Underground.
- Ten individuals helped plant tree seedlings at Wesley Chapel Gulf as part of Take Pride in America. The goal of this project was to create a forested protection area around several karst features to preserve microclimate, soil cover, and aesthetics. This area would also protect the features from management activities that could increase erosion washing into caves or karst features.
- The Forest participated in participating agreements to fund conservation assessments for 26 cave species. The Forest Service will use this information to assist in population viability analysis for selected cave species, for reference information in biological evaluations, and for information on how activities may affect cave species.

- IKC volunteers began re-evaluating caves on the Forest. This includes taking new GPS coordinates, verifying cave maps, and photographing each cave entrance.
- IKC volunteers recovered, downloaded, and re-deployed the SpeLoggers maintained on the Forest to determine the number of visits to selected caves.

Figure 5. During the inventory of the subterranean fauna of the Hoosier National Forest, the investigators conducted 258 trips into 124 caves, 17 springs, and 2 abandoned coal mines. Collecting manually and placing pitfall traps were the primary methods of sampling.



2005

Employees and volunteers were involved in a number of activities including:

- The Forest and IKC have drafted six cave management plans, and two have been approved.
- The Forest sent nominations of significance for 28 caves to the Regional Interagency Review Team for approval.
- All caves were approved as Federally significant. The Forest has also submitted a list of caves to the Regional Forester for final approval.
- Dr. Julian Lewis completed a biota inventory of the caves on the Hoosier National Forest through part of FY 2005. Several members of the Hoosier/IKC committee assisted Dr. Lewis in his work. These surveys

have resulted in 29 cave species being added to the Regional Foresters sensitive species list for Region 9. Dr. Lewis has discovered several species that are new to science [HOW MANY?]. Dr. Lewis submitted his final report to the Forest in December 2004.

- In January 2005, Dr. Lewis presented a summary of his findings to staffs of the Hoosier, Shawnee, and Mark Twain National Forests. There were 75 species of significant global rarity found within the caves on the Hoosier.
- The karst coordinator completed surveys evaluating sinkholes prior to a trail reroute.
- The Forest participated in cost-share agreement to replace an old wooden “cover” structure over the entrance of a well and cave in Orange County. The replacement cover will be constructed of steel and will prevent accidental exposure. The front side of the cover structure will remain open for access by biota and intentional visits by recreational users.
- The Forest participated in agreements to fund conservation assessments for six cave species. The Forest Service will use this information to assist in population viability analysis for selected cave species, for reference information in biological evaluations, and for information on how activities may affect cave species.
- The Hoosier is working with Ravenswood Media Inc. to produce a video about the diversity of life in caves, the delicate complexities of these species, and their dependence upon one another and the surface. This 30-minute documentary will focus on caves on the Hoosier and will involve interviews with noted experts such as John Whitaker, Virgil Brack, Scott Johnson, Julian Lewis, and Horton Hobbs, III. Clips of the video can be viewed at www.cavebiota.com.
- Virgil Brack, 3D/Environmental Services, Keith Dunlap, Indiana Karst Conservancy, and three Hoosier employees conducted surveys on known Indiana bat hibernaculum within the Forest boundary.
- The Forest drafted a Cave and Karst Program charter to be approved with the new Forest Plan.

The description and inventory of karst fauna on the Hoosier is a distinctly recent achievement (Lewis 1994, Lewis 1998, Lewis *et al.* 2002, Lewis *et al.* 2003, Lewis *et al.* 2004). Undertaken to acquire baseline inventories, this work continues to describe species new to the scientific literature and to document new distribution of previously described species. The recent inventories of karst biota on the Hoosier have revealed that there are at least 75 species of significant global rarity inhabiting our caves.

Forest Plan met: Yes. We continue to protect and manage our caves in accordance with the Federal Cave Resource Protection Act of 1988; memorandums of Understanding between the Forest Service and the National

Speleological Society and the Indiana Karst Conservancy, Inc; the Forest Cave Management Implementation Plan; and individual cave specific management plans. To ensure cave and karst features are allowed to function naturally, we continue to carefully inventory and examine each cave on the Forest. From this information, we write management plans for caves, and caves are nominated for significance. The karst coordinator consulted on 12 projects in FY 2004 and 10 projects in FY 2005 to ensure that cave and karst ecosystems were considered in project layout. We continue to evaluate the gating of cave entrances on a case-by-case basis. We installed one cave gate in FY 2005.

Recommendations: The Forest should collect inventory values of caves, and significant nominations should be completed for several more caves. Future activities could be expanded to include dye tracing to determine water flow paths in karst areas or the effects of prescribed burning on karst systems. Science knows little about many of the invertebrate species inhabiting the caves on the Hoosier. A study of the ecology of these species could be an important project, and the Hoosier should help scientists describe these newly discovered species.

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Vegetative Management [36 CFR 219.15 and 219.27(b)]

Garlic Mustard Inventory and Monitoring in the Charles C. Deam Wilderness

Methodology: Conduct a visual inventory of roads adjacent to the Charles C. Deam Wilderness for populations of garlic mustard (*Alliaria petiolata*), a nonnative invasive plant species. Inventories began in 1994, with the first garlic mustard plants found along the road shoulder adjacent to the Blackwell Horse Camp in 1995. This infestation is the population where past hand-pulling efforts and monitoring has occurred over the last ten years.

In 2004, the Forest botanist collected data on the Blackwell infestation using standard Forest Service protocol and methodology for invasive plant sites. Garlic mustard plants were present beyond the initial roadside population in three groups on approximately 1.4 acres. The estimated portion of the land area occupied by garlic mustard within these infestations ranges from 2 percent to 30 percent.

Nonnative invasive plant inventories conducted in 2005 located four new garlic mustard infestations occurring along trails and next to a small pond. Forest personnel recorded data at each site according to current invasive plant protocol that includes information on both the gross area and infested area.

Results: In FY 2004 and FY2005, Forest personnel examined the area for garlic mustard and pulled plants each year within the three population areas near the Blackwell Horse Camp. In 2005, the size of each infestation was unchanged, but personnel observed some reduction in overall numbers compared to the previous year.

Table 8 (below) shows a relative downward trend in population numbers based on hand-pulling of mature plants at the Blackwell Horse Camp site. The increase in plant numbers in 2004 is primarily due to a more complete inventory of the site and the discovery of two additional subpopulation groups nearby that were not part of the original monitoring project. It further illustrates the importance to conduct both long-term monitoring and multiple years of control measures for species such as garlic mustard that develop an extensive seed bank and thus require several years to deplete the seed source before removal of the infestation.

Following the initial discovery and documentation of four garlic mustard populations within the wilderness, Forest personnel later hand-pulled and removed the plants from the sites in 2004. In 2005, the plants were hand-pulled and removed from all four sites. Population size and numbers at each site remained relatively constant between 2004 and 2005.

No other garlic mustard infestations were observed along the Tower Ridge Road corridor immediately adjacent to the Charles C. Deam Wilderness in 2004 or 2005.

TABLE 8. GARLIC MUSTARD PLANTS PULLED

(Estimated number of garlic mustard plants hand-pulled at the Blackwell Horse Camp)

Year	# of Plants	Year	# of Plants	Year	# of Plants
1995	2000	1999	0	2003	50
1996	700	2000	Not recorded	2004	1400
1997	509	2001	20	2005	1000
1998	220	2002	50	2006	???

Forest Plan met: Yes

Recommendations: Forest Service personnel will continue monitoring the Blackwell Horse Camp infestation sites in FY2006 and FY2007 or longer to determine if the plants are still present and conduct control measures where needed. Future monitoring should continue recording data according to standard invasive plant protocol methods. Monitoring should emphasize changes to the size of each infestation and the net infested area of garlic mustard occupying each area.

For the newly found populations of garlic mustard occurring within the interior of the Charles C. Deam Wilderness where the Forest has begun control treatments, each infestation should require, as a minimum, effectiveness monitoring every three years. This monitoring should consist of an visual observation of the area to record the presence of plants and changes in population size.

Other NNIS Plant Inventories and Monitoring in the Deam Wilderness

Methodology: In 2004, Forest personnel conducted inventories for nonnative invasive plant species throughout the Charles C. Deam Wilderness. These surveys led to the discovery of 15 new invasive plant populations not previously known or documented. Species found included crown vetch (*Coronilla varia*), Japanese stilt grass (*Microstegium vimineum*), periwinkle (*Vinca minor*), and tree-of-heaven (*Ailanthus altissima*). Surveyors observed an undetermined amount of widely scattered populations of Japanese honeysuckle (*Lonicera japonica*) and multiflora rose (*Rosa multiflora*), but did not record information regarding these species. These plants are new occurrences, but not new species for the wilderness. In 2005, botanists located another population of tree-of-heaven along the Tower Ridge Road. Data collection at each site adhered to standard Forest Service invasive plant protocol methods.

Results: In 2004, Forest wilderness crewmembers hand-pulled plants at four of the stilt grass populations. Forest personnel removed tree-of-heaven from the site discovered in 2005. As part of a new participating agreement with Indiana University, School of Public and Environmental Affairs, work began in FY 2005 to conduct control measures on targeted nonnative invasive plant species. In the future, work associated with this partnership will also include further inventory and monitoring.

Forest Plan met: Yes

Recommendations: Conduct effectiveness monitoring at sites where control measures have occurred to record any changes in population area size and plant numbers. Monitoring should occur at least every three years.

Research Natural Areas (RNA's) and Special Areas (SA's) [36 CFR 219.25]

Monitor Rare (RFSS, etc.) and Nonnative Invasive Plant Populations

Methodology: During FY2004 and FY2005, the Forest botanist, wildlife biologists, and technicians conducted surveys for rare plants within various project areas and various designated special areas. The designated special areas where we conducted surveys included portions of Clover Lick, Faucett Chapel, Hemlock Cliffs, Horse Mill Branch, Oil Creek, Pioneer Mothers' Memorial Forest, Potts Creek, Rockhouse, and Tincher Special Areas. Biologists also revisited several previously documented populations to evaluate the effects of project activities on rare plants. Other revisits occurred at sites of known populations to observe their continued existence where the Forest did not conduct any new project or activities.

These surveys also recorded information on nonnative invasive plant species infestations. Forest personnel recorded data using nationwide invasive plant protocol methods and will then enter this information into the TERRA database for invasive plant species.

Results: New populations of Regional Forester Sensitive Species found within special areas were:

- French's shootingstar (*Dodecatheon frenchii*) - four populations
- Pink dot lichen (*Baeomyces absolutus*) – three populations
- Sword moss (*Bryoxiphium norvegicum*) - seven populations

Forest personnel conducted site visits to previously documented Regional Forester Sensitive Species populations of American bluehearts (*Buchnera americana*), American ginseng (*Panax quinquefolius*), Appalachian vittaria (*Vittaria appalachiana*), blue monkshood (*Aconitum uncinatum*), eastern featherbells

(*Stenanthium gramineum*), French's shootingstar (*Dodecatheon frenchii*), Illinois wood-sorrel (*Oxalis illinoensis*), netted chain fern (*Woodwardia areolata*), and trailing tick-trefoil (*Desmodium humifusum*). Plants at these populations appeared equal to or greater than previously documented amounts for each site monitored. Other plant populations located nearby of rare state listed or Forest Species of Concern had numbers consistent with past accounts for their respective populations.

A site visit to the single population of roundleaf water-hyssop (*Bacopa rotundifolia*) was negative for its occurrence. Botanists have not seen the species for several years and consider it extirpated from the site. Plants at one of the known populations of yellow gentian (*Gentiana alba*) were not relocated, but the visit to the site was before the plant is usually in bloom. Our effort to relocate the previously known population of pink dot lichen was also not successful, but due to its inconspicuous nature it may still occur at the site, and suitable habitat is abundant on nearby cliffs.

None of the invasive plants found within special areas were new species for the Forest and did not represent previously documented infestations. At some locations, earlier surveys and data had documented the occurrence of the invasive plants, but botanists had not mapped these infestations or recorded data using standard Forest Service invasive plant protocol methods. Nonnative invasive plant surveys done in 2004-2005 recorded the estimated net infested area within the larger gross area of each infestation.

Forest personnel also conducted nonnative invasive plant surveys outside of designated special areas. These surveys documented over 33 new infestations consisting of nine species. None of these plants was a new species occurrence for the Forest. Species found included autumn olive (*Elaeagnus umbellata*), Chinese or sericea lespedeza (*Lespedeza cuneata*), crown vetch, garlic mustard, Japanese honeysuckle, Japanese stilt grass, multiflora rose, periwinkle, and tree-of-heaven.

Forest Plan met: Yes

Recommendations: Continue periodic monitoring of selected rare plant sites where future project activities or continued spread of nonnative invasive plants could potentially affect these populations.

Vegetative Monitoring after Prescribed Burning

Methodology: The Forest has established permanent transects and plots in both of the Harding Flats and Clover Lick Barrens (Mogan Ridge). Data collection last occurred at these sites in 1995 and 1997.

Results: The Forest conducted a prescribed burning project in 2005 within the Clover Lick Special Area that burned nearby barrens communities. The 2005 burn project did not occur within the area of the monitoring transects and established plots. The Hoosier did not conduct a prescribed burning project in the Harding Flats barrens area during 2004 or 2005.

The Forest botanist reviewed the project area prior to ignition of the prescribed burning project in 2004, including a revisit to several documented rare plant populations within the Clover Lick Special Area. Visual observations after the prescribed burning in 2005 showed that the American bluehearts population, a Regional Forester sensitive species, had expanded in both numbers and area. The population area has expanded to at least 50 feet by 150 feet in size. Rare plant numbers observed at other known population sites appeared to be equal to past numbers or they have slightly increased in numbers. The burn project created a mosaic of burnt vegetation, but generally consumed more vegetation and encroaching woody plants within barrens, old fields, and adjacent dry forest. This action reduced shading and aids in maintaining habitat for the benefit of both typical and rare herbaceous plants inhabiting barrens communities.

Forest Plan met: Yes

Recommendations: Continue monitoring along these established routes following the next prescribed burning project. We also recommend that, shortly after implementing prescribed burning operations, placing rebar at predetermined intervals along each transect to help in relocating established plots and subsequent data collection.

Survey for RFSS and FSOC Plants

Methodology: The Forest botanist, wildlife biologists, and qualified technicians conducted site-specific rare plant surveys for all Regional Forester sensitive species (RFSS) and Forest species of concern (FSOC) species with appropriate habitat within various project areas in FY 2004 and FY 2005. Biologists conducted these surveys using either cursory or intuitive-control survey methods. The collection of data for new rare plant sites complied with the procedures in the Indiana Special Plant Survey Form, with appropriate information and forms sent to the State Natural Heritage Program. The Forest botanist also conducted presence/absence monitoring of selected known rare plant sites where they exist within or near project areas.

Results: Botanists, biologists, and technicians found new populations of both RFSS and FSOC species scattered across the Forest. The following new sightings are for populations located outside of special areas. See above for the species and populations found within special areas.

New populations of Regional Forester sensitive species found were:

- American ginseng (*Panax quinquefolius*) - 17 populations
- Illinois wood-sorrel (*Oxalis illinoensis*) - 2 populations
- Valerian (*Valeriana pauciflora*) – 2 populations

New populations of Forest species of concern found were:

- Orange coneflower (*Rudbeckia fulgida* var. *fulgida*) - 2 populations
- Southern skullcap (*Scutellaria parvula* var. *australis*) – 1 population

Forest Plan met: Yes

Recommendations: Continue rare plant surveys in future project areas in appropriate habitat, especially for land undergoing ground-disturbing activities. Monitor selected rare plant sites in future project areas where project activities could potentially affect these populations.

Fish and Wildlife [36 CFR 219.19]

Monitor Breeding Populations of Birds throughout the Forest

Methodology: The Hoosier began conducting monitoring studies of breeding birds on the Forest in 1991. These studies, designed by Frank Thompson, have concentrated on birds found in middle-aged to mature forest stands, a bird community that includes many species of management interest. Scientists know that birds in mature deciduous forest are affected by a variety of environmental factors, including age of the forest stand, composition of the overstory (especially the dominance of conifers versus broad-leaved trees), vegetative structure of the understory, ground layers, and slope and aspect of areas with significant topography. Thompson designed the monitoring program to control for many of these factors, so that the resultant data would reflect primarily the long-term response of bird species to forest management.

Points were permanently marked in 19 different study areas on the Forest. We conduct point counts during two 10-minute visits to each point between 5:30 am and 10:00 am during May and June. Purdue University has been completing most of the work for this monitoring program.

Relevant laws and regulations: 36 CFR 219.9, 36 CFR 219.27

Results -- 2004: Investigators conducted point count surveys at 11 areas in the Hoosier during the summer 2003. They conducted surveys on two days at each of 25 points in each area and found 82 species during the 2003 surveys. The most abundant species reported across all sites were the red-eyed Vireo (*Vireo*

olivaceus, 435 observations), Acadian flycatcher (*Empidonax virescens*, 340 observations), American crow (*Corvus brachyrhynchos*, 299 observations), Eastern wood-pewee (*Contopus virens*, 293 observations), and scarlet tanager (*Pirangus olivaceus*, 279 observations). The number of species per site ranged from 42 to 53. We completed the report containing the results of this study in FY 2004.

2005 Results: Investigators conducted point-count surveys at nine areas in the Hoosier during the summer of 2004, and they found 68 species. The most abundant species reported across all sites were Acadian flycatcher (*Empidonax virescens*, 270 observations), brown-headed cowbird (*Molothrus ater*, 255 observations), ovenbird (*Seiurus aurocapillus*, 328 observations), the red-eyed Vireo (*Vireo olivaceus*, 462 observations), scarlet tanager (*Pirangus olivaceus*, 236 observations), and tufted titmouse (*Baeolophus bicolor*, 224 observations). The number of species per site varied between 36 and 52. As observed in previous years, areas varied dramatically in species composition and abundance, presumably due to habitat variation within the Forest. The report containing the results of this study was completed in FY 2005.

TABLE 9. RELATIVE ABUNDANCE OF BIRDS

(recorded in nine study areas on the Hoosier during the summer 2004 breeding bird surveys)

Common Name	Scientific Name	Number	Relative Abundance
Acadian Flycatcher	<i>Empidonax virescens</i>	270	0.061545475
American Crow	<i>Corvus brachyrhynchos</i>	163	0.037155231
American Goldfinch	<i>Carduelis tristis</i>	13	0.002963301
American Redstart	<i>Setophaga ruticilla</i>	2	0.000455892
American Robin	<i>Turdus migratorius</i>	15	0.003419193
Baltimore Oriole	<i>Icterus galbula</i>	5	0.001139731
Barred Owl	<i>Strix varia</i>	3	0.000683839
Black-and-white Warbler	<i>Mniotilta varia</i>	4	0.000911785
Blue-gray Gnatcatcher	<i>Polioptila caerulea</i>	75	0.017095965
Brown-headed Cowbird	<i>Molothrus ater</i>	255	0.058126282
Blue Jay	<i>Cyanocitta cristata</i>	173	0.039434693
Black-throated Green Warbler	<i>Dendroica virens</i>	20	0.004558924
Broad-winged Hawk	<i>Buteo platypterus</i>	13	0.002963301
Blue-winged Warbler	<i>Vermivora pinus</i>	1	0.000227946
Carolina Chickadee	<i>Poecile carolinensis</i>	61	0.013904718
Carolina Wren	<i>Thryothorus ludovicianus</i>	90	0.020515158
Cedar Waxwing	<i>Bombycilla cedrorum</i>	26	0.005926601
Cerulean Warbler	<i>Dendroica cerulea</i>	6	0.001367677
Chipping Sparrow	<i>Spizella passerina</i>	6	0.001367677
Common Yellowthroat	<i>Geothlypis trichas</i>	16	0.003647139

Downy Woodpecker	<i>Picoides pubescens</i>	36	0.008206063
Eastern Kingbird	<i>Tyrannus tyrannus</i>	1	0.000227946
Eastern Phoebe	<i>Sayornis phoebe</i>	7	0.001595623
Eastern Wood-Pewee	<i>Contopus virens</i>	214	0.048780488
Tufted Titmouse	<i>Baeolophus bicolor</i>	224	0.051059950
Field Sparrow	<i>Spizella pusilla</i>	11	0.002507408
Great Crested Flycatcher	<i>Myiarchus crinitus</i>	36	0.008206063
Gray Catbird	<i>Dumetella carolinensis</i>	3	0.000683839
Hairy Woodpecker	<i>Picoides villosus</i>	6	0.001367677
Hooded Warbler	<i>Wilsonia citrina</i>	92	0.020971051
Indigo Bunting	<i>Passerina cyanea</i>	179	0.040802371
Kentucky Warbler	<i>Oporornis formosus</i>	33	0.007522225
Louisiana Waterthrush	<i>Seiurus motacilla</i>	20	0.004558924
Mourning Dove	<i>Zenaida macroura</i>	31	0.007066332
Northern Bobwhite	<i>Colinus virginianus</i>	1	0.000227946
Northern Cardinal	<i>Cardinalis cardinalis</i>	73	0.016640073
Northern Parula	<i>Parula americana</i>	32	0.007294279
Orchard Oriole	<i>Icterus spurius</i>	1	0.000227946
Ovenbird	<i>Seiurus aurocapillus</i>	328	0.074766355
Pine Warbler	<i>Dendroica pinus</i>	43	0.009801687
Pileated Woodpecker	<i>Dryocopus pileatus</i>	78	0.017779804
Prairie Warbler	<i>Dendroica discolor</i>	15	0.003419193
Rose-breasted Grosbeak	<i>Pheucticus ludovicianus</i>	1	0.000227946
Red-bellied Woodpecker	<i>Melanerpes carolinus</i>	88	0.020059266
Red-eyed Vireo	<i>Vireo olivaceus</i>	462	0.105311147
Red-headed Woodpecker	<i>Melanerpes erythrocephalus</i>	1	0.000227946
Red-shouldered Hawk	<i>Buteo lineatus</i>	12	0.002735354
Eastern Towhee	<i>Pipilo erythrophthalmus</i>	39	0.008889902
Red-tailed Hawk	<i>Buteo jamaicensis</i>	2	0.000455892
Ruby-throated Hummingbird	<i>Archilochus colubris</i>	29	0.006610440
Red-winged Blackbird	<i>Agelaius phoeniceus</i>	4	0.000911785
Scarlet Tanager	<i>Piranga olivacea</i>	236	0.053795304
Summer Tanager	<i>Piranga rubra</i>	28	0.006382494
Swainson's Thrush	<i>Catharus ustulatus</i>	5	0.001139731
Tennessee Warbler	<i>Vermivora peregrina</i>	2	0.000455892
Tree Swallow	<i>Tachycineta bicolor</i>	5	0.001139731
Veery	<i>Catharus fuscescens</i>	8	0.001823570
Unknown Warbler		1	0.000227946
White-breasted Nuthatch	<i>Sitta carolinensis</i>	111	0.025302029
White-eyed Vireo	<i>Vireo griseus</i>	7	0.001595623
Worm-eating Warbler	<i>Helmitheros vermivorus</i>	96	0.021882836

Wild Turkey	<i>Meleagris gallopavo</i>	14	0.003191247
Unknown Woodpecker		86	0.019603374
Wood Thrush	<i>Hylocichla mustelina</i>	204	0.046501026
Yellow-breasted Chat	<i>Icteria virens</i>	13	0.002963301
Yellow-billed Cuckoo	<i>Coccyzus americanus</i>	177	0.040346478
Northern Flicker	<i>Colaptes auratus</i>	38	0.008661956
Yellow-throated Vireo	<i>Vireo flavifrons</i>	17	0.003875085
Yellow-throated Warbler	<i>Dendroica dominica</i>	19	0.004330978
Yellow Warbler	<i>Dendroica petechia</i>	1	0.000227946
TOTAL		4387	1

To date, the monitoring program has spanned thirteen years (1991 – 2003). However, no one collected data in 1994 or 1996 through 1999, and in the latter years, data were collected only at about half of the points. Thus, for most areas included in the original design, we have data from about six years. In 2004, an analyses of the accumulated data set, with the goal of determining if population trends could be determined for the most common species detected and for selected species of conservation priority. This past April, one of the biologists presented some of the preliminary data from this study at the Wilson Ornithological Society's annual meeting at Cornell.

TABLE 10. REGRESSION ANALYSIS OF BIRD POPULATION TRENDS

(over seven years (1991-1993, 1995, 2000-2003) for 17 species over all areas combined in the Hoosier. Outputs provided are regression coefficient (r), significance of the population trend (p), and the population trend (slope). Significance was determined at the Bonferroni corrected level of $p < 0.003$)

	r	p	slope
POSITIVE TRENDS			
Eastern Wood-Pewee	0.096	<0.001	0.019
Hooded Warbler	0.137	<0.001	0.024
Kentucky Warbler	0.128	<0.001	0.020
Red-bellied Woodpecker	0.111	<0.001	0.017
White-breasted Nuthatch	0.210	<0.001	0.034
Woodthrush	0.109	<0.001	0.022
NEGATIVE TRENDS			
Acadian Flycatcher	0.140	<0.001	-0.036
American Crow	0.103	<0.001	-0.028
Brown-headed Cowbird	0.107	<0.001	-0.022
Pileated Woodpecker	0.133	<0.001	-0.022
Red-eyed Vireo	0.240	<0.001	-0.085
Scarlet Tanager	0.156	<0.001	-0.034
Worm-eating Warbler	0.102	<0.001	-0.019
NO SIGNIFICANT TREND			
Blue Jay	0.044	0.083	0.008
Tufted Titmouse	0.019	0.449	0.004
Indigo Bunting	0.060	0.017	0.013
Ovenbird	0.067	0.008	-0.018

TABLE 11. BREEDING BIRD SURVEY RESULTS

Common Name	Expected Forest Level Trend	Hoosier NF BBS (3 years: same points, surveyors, and methods)					Interior Low Plateaus: PIF breeding scores ^a	Indiana BBS: 1966-2003 trend data	
		2000	2002	2004	Avg	% change / year	Trend	% change / year	# of survey routes in analysis
Ruffed Grouse ^b	Sig. Decrease	1	1	0	1	-25.00	no data	no data	no data
Yellow-breasted chat	Sig. Decrease	48	14	13	25	-18.23	Sig. dec.	-0.80	44
Prairie Warbler	Sig. Decrease	35	34	15	28	-14.29	Sig. dec.	-3.10	12
Pileated Woodpecker	Stable	169	134	78	127	-13.46	Sig. inc.	4.50	26
Louisiana Waterthrush	Stable	31	10	20	20	-8.87	Stable	3.10	11
Worm-eating Warbler	Mod. Decrease	117	110	96	108	-4.49	Mod. dec.	1.80	7
Acadian Flycatcher	Stable	324	244	270	279	-4.17	Stable	-2.10	34
Eastern Wild Turkey ^c	Sig. Increase	14	13	14	14	0.00	Sig. inc.	24.00	15
Scarlet Tanager	Mod. Increase	231	232	236	233	0.54	Sig. inc.	1.50	41
Black-and-white Warbler	Mod. Decrease	3	5	4	4	8.33	Sig. dec.	-27.90	3
Wood Thrush	Mod. Decrease	134	187	204	175	13.06	Mod. dec.	-0.30	56
Pine Warbler	Sig. Increase	8	27	43	26	109.38	Sig. inc.	6.50	4
Broad-winged Hawk	Stable	1	5	13	6	300.00	Stable	-3.40	6

a. Partner's in Flight breeding score trends for the Interior Low Plateaus physiographic region. This region includes southern Indiana, Illinois, and Ohio, plus central Kentucky and central Tennessee

b. Ruffed grouse populations are declining based on annual ruffed grouse surveys (McCree *et al.* 2004)

c. Eastern wild turkey population trends are likely increasing based on State harvest and hunter success rates (annual harvests / annual hunters) (McCree *et al.*).

Forest Plan met: Yes. We continue to detect population trends of forest birds that are Management Indicator Species, Regional Foresters Sensitive Species, and other selected forest species.

Recommendations: Continue to monitor study sites. Establish routes for American woodcock, since the protocol for the breeding bird surveys are not conducive to

detecting this species. Migrate point count data into FAUNA. Consider participation in Cornell Lab of Ornithology's Birds in Forested Landscapes. Part of the Forest Plan's Forest-wide guidance states that vegetative types are interspersed to provide viable habitat for the wildlife and fish species native to southern Indiana. We should review this data with that guidance in mind.

Ruffed Grouse Population Monitoring

Methodology: Since 1979, Indiana Division of Fish and Wildlife biologists have conducted ruffed grouse (*Bonasa umbellus*) breeding population surveys--that is, drumming activity center counts--on the Forest. Biologists annually survey four routes--Hickory Ridge (Brown, Jackson, and Monroe counties), Oriole-St. Croix (Perry County), Lost River East (Lawrence and Orange Counties), and Lick Creek (Orange County). The Lost River East and Lick Creek survey routes were first surveyed beginning in 1987.

Each survey route consists of 15 stops along previously identified routes where biologists listen in the early morning to detect drumming male grouse. Each of the routes is surveyed twice under similar weather conditions. Activity center counts ranged from 0 to 0.13 grouse per survey route stop. The five-year mean drumming index (2000 to 2004) is 0.09 drumming grouse per survey stop represents approximately one grouse heard per 10 survey stops.

Observations: The population trend for this species is unmistakable (Figures 7, 8, and 9): the ruffed grouse, as well as other species associated with early successional forest habitat, is rapidly disappearing from the Forest. Unfortunately, private land management is unlikely to provide the habitat necessary to support the suite of species represented by the grouse.

Figure 6. Results of breeding activity center counts for ruffed grouse along four survey routes on the Forest (see text for route locations).

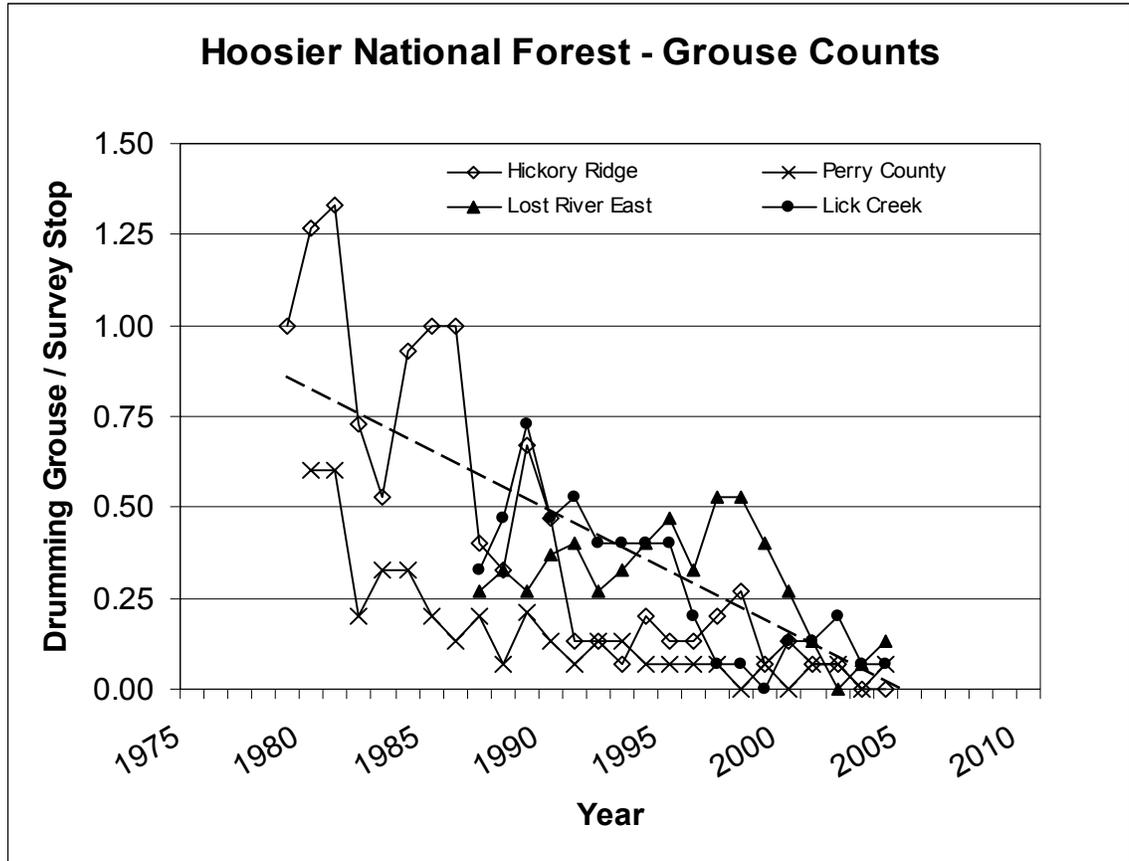


Figure 7. Grouse counts on routes on or near NFS land.

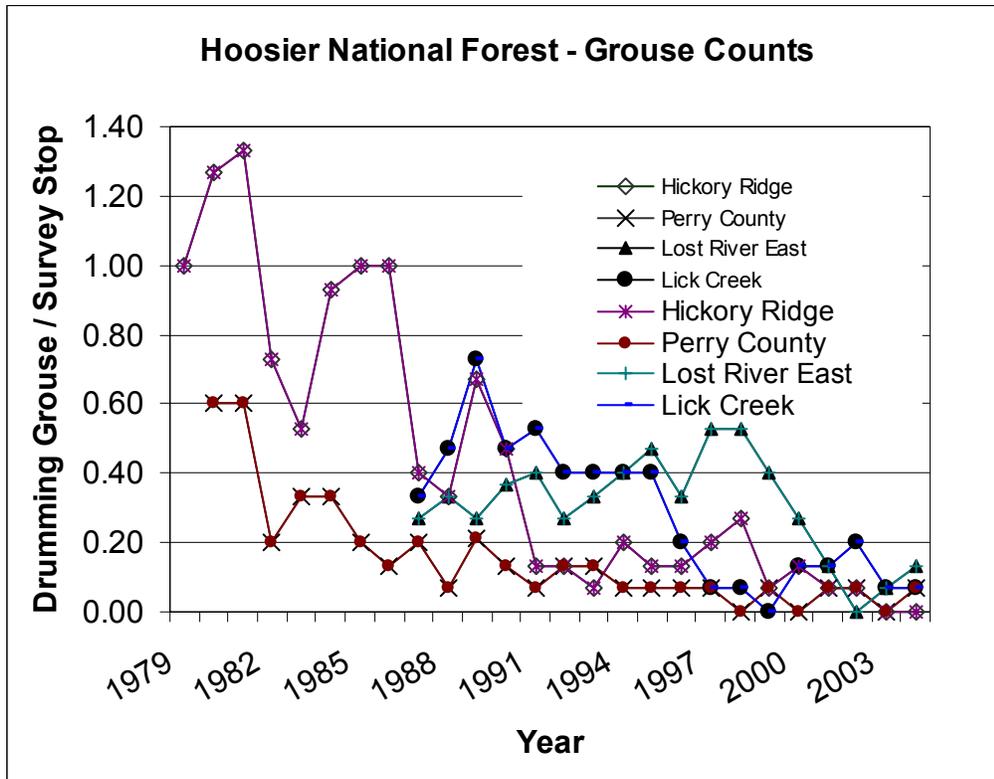
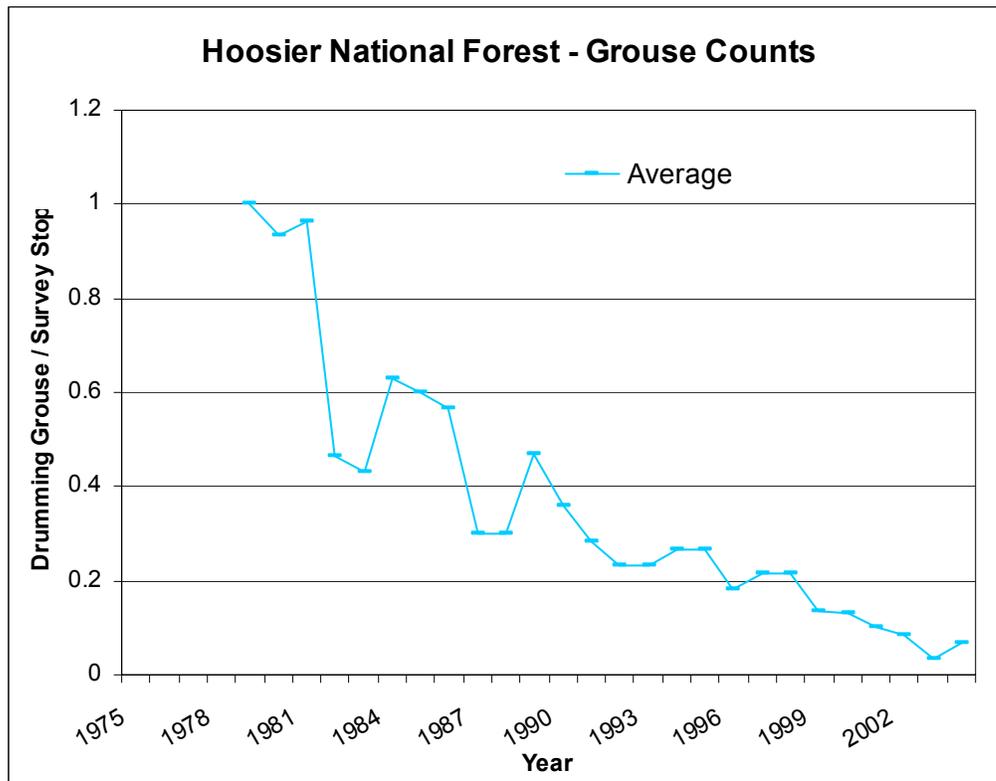


Figure 8. Grouse counts on the Hoosier National Forest, 1975-2005.



Wild Turkey Population Indices

Methodology: Beginning in 1987, Indiana Division of Fish and Wildlife biologists have annually conducted wild turkey breeding population surveys on the Forest, that is, counts of gobbling males. Biologists annually survey five routes on the Forest: Hickory Ridge (Brown, Jackson, and Monroe counties), Oriole-St. Croix (Perry County), Lost River East (Lawrence and Orange Counties), Lost River West (Martin and Orange counties), and Lick Creek (Orange County).

Each survey route consists of 15 stops along previously identified routes where biologists listen in the early morning to detect gobbling males. This survey is conducted in conjunction with the annual activity center survey for ruffed grouse. The number of gobbling turkeys heard per survey stop ranged from 0.73 along the Lost River - West survey route to 1.07 gobbling turkeys per survey stop along the Oriole – St. Croix route. The five-year mean breeding turkey index (2000 to 2004) along these routes is 0.81 gobbling turkeys heard per survey stop.

Results: The spring 2005 harvest of Indiana’s wild turkeys within the eight main counties which include portions of the Forest contributed over 20 percent (2,304) of the State’s total harvest of wild turkeys (11,159). The current level of harvest suggests that Indiana’s wild turkey population is now approaching the capacity

which can be supported by available habitat. It should be expected that breeding indices and harvest will begin to fluctuate around long term means as populations stabilize with the occupancy of available habitats (Figure 8).

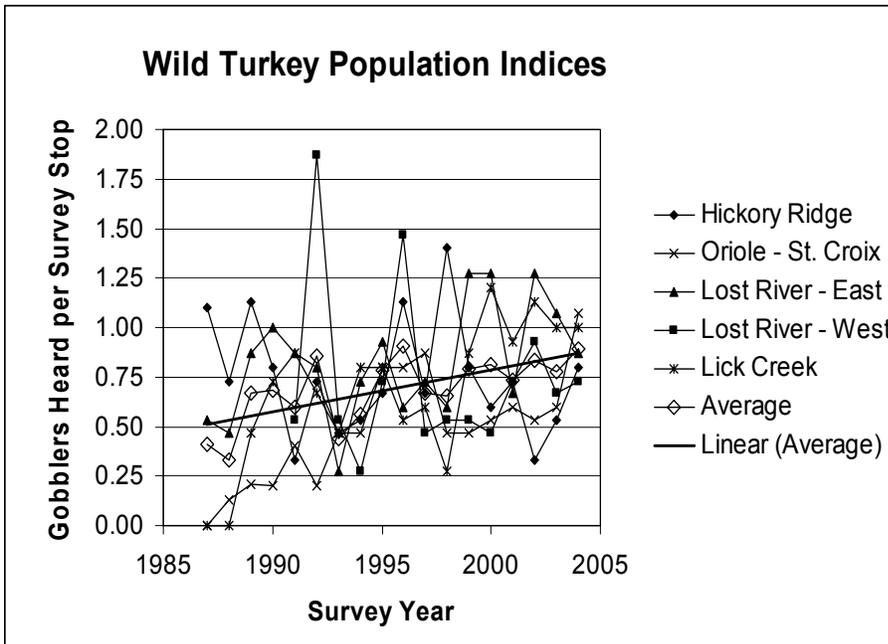


TABLE 12. INDIANA TURKEY HARVEST

Year	Regular season dates	Season length (days)	No. of counties	Permits sold*	Est. no. of hunters**	Reported harvest	Hunter success
1973	4/25-4/29	5	11	625	503	27	5%
1974	4/24-4/28	5	11	665	496	26	5%
1975	4/29-5/5	7	11	722	501	15	3%
1976	4/29-5/5	7	13	666	500	32	6%
1977	4/28-5/5	8	16	668	520	46	9%
1978	4/26-5/7	12	18	852	619	33	5%
1979	4/25-5/6	12	19	932	860	48	6%
1980	4/23-5/4	12	17	706	670	54	8%
1981	4/22-5/3	12	18	922	814	90	11%
1982	4/21-5/2	12	18	1,125	696	73	11%
1983	4/20-5/1	12	18	1,218	984	93	10%
1984	4/25-5/6	12	18	1,320	1,205	104	9%
1985	4/24-5/5	12	25	1,882	1,302	255	20%
1986	4/23-5/4	12	25	2,523	1,648	293	18%
1987	4/22-5/6	15	33	3,348	2,619	741	28%
1988	4/27-5/11	15	33	10,894	4,677	905	19%
1989	4/26-5/10	15	39	11,442	6,068	1,359	22%
1990	4/25-5/9	15	39	14,379	7,860	1,505	19%
1991	4/24-5/8	15	43	16,387	9,643	2,318	24%
1992	4/22-5/6	15	43	18,735	13,110	2,531	19%
1993	4/28-5/16	19	48	21,078	15,673	3,500	22%
1994	4/27-5/15	19	48	23,357	18,622	3,741	20%
1995	4/26-5/14	19	52	28,858	20,861	4,706	23%
1996	4/24-5/12	19	52	28,733	21,442	4,859	23%
1997	4/23-5/11	19	74	43,979	33,474	5,790	17%
1998	4/22-5/10	19	74	32,889	22,876	6,384	28%
1999	4/22-5/10	19	74	32,889	22,876	6,384	28%
2000	4/26-5/14	19	74	40,801	28,615	7,822	27%
2001	4/25-5/13	19	74	43,815	36,103	9,975	28%
2002	4/24-5/12	19	90	44,333	37,919	10,575	28%
2003	4/23-5/11	19	90	48,857	42,328	10,366	24%
2004	4/21-5/9	19	90	50,839	46,267	10,765	23%
2005	4/27-5/15	19	92	50,839	50,206	11,500	23%

TABLE 13. 2003 AND 2004 TURKEY HUNTER SUCCESS
(in Perry and Crawford Counties)

County	2003 Reported Harvest	Percent of Harvest	2004 Reported Harvest	% of Harvest	Difference from prior year	Percent change
Crawford	320	3.1	306	2.8	-14	-4
Perry	373	3.6	401	3.7	28	8

Literature Cited

Indiana Department of Natural Resources, Division of Fish and Wildlife. Wildlife Diversity Section Annual Report: September 2003 – August 2004. Available Online at: <http://www.state.in.us/dnr/fishwild/endangered>. Accessed on August 10, 2005.

Monitor Fish Populations in Selected Waters

Methodology: Through a Memorandum of Understanding (MOU), the Indiana Department of Natural Resources (IDNR) manages the fish populations within designated selected waters within the Forest. The IDNR surveyed Saddle [Lake?] in FY 2005; the analysis is being written. In FY 2004 and 2005, the IDNR continued stocking selected waters based on previously completed surveys.

Relevant laws and regulations: 36 CFR 219.11, 36 CFR 219.12, 36 CFR 219.9, 36 CFR 219.27

Results: In 2004, Hoosier personnel surveyed Tipsaw Lake and Indian Lake for aquatic vegetation. Both lakes were 40 to 60 percent covered by aquatic vegetation. The target coverage for aquatic vegetation in a pond or lake environment is 25 percent. Shallow areas were 100 percent covered by aquatic vegetation. Twenty-seven acres of Tipsaw Lake were treated to reduce aquatic vegetation.

In 2005, Hoosier personnel inventoried selected and non-selected ponds for aquatic vegetation to determine the percent of coverage and maintenance needs. Of the 38 ponds surveyed, 73 percent needed maintenance of the dam and 58 percent had aquatic vegetation above coverage above 25 percent.

Forest Plan met: Yes, but many water bodies have appreciably more aquatic vegetation than stated as desired.

Recommendations: Continue to collaborate and support the IDNR in the monitoring of fish populations. Develop plans and viable methods to contain and control nuisance aquatic vegetation. Schedule ponds for maintenance needs.

Monitor Aquatic Species Populations

--in Lost River, Little Blue River, and the Anderson River watersheds

Methodology: The Hoosier aquatic ecologist and summer crew conducted extensive stream surveys for each stream within the Lost River, Little Blue River, and Anderson River watersheds. The objectives of these surveys were to:

- Classify each stream according to Rosgen analysis
- Collect water chemistry data, flow data, and substrate composition data for each stream
- Inventory fish, aquatic insect, and crayfish populations found in each stream with electro-fishing gear and sampling nets
- Document reptile and amphibian species presence
- Complete aquatic habitat assessments and calculate biotic indices based on fish and aquatic insect community data
- Compile data and summarize habitat quality information for each surveyed stream so that stream restoration and watershed improvement projects can be identified and prioritized

Relevant laws and regulations: 36 CFR 219.11, 36 CFR 219.19, 36 CFR 219.9, 36 CFR 219.27

Results: Data was collected to classify each stream according to Rosgen analysis. The crew collected chemical, physical, and biological data for each stream channel to meet all proposed objectives.

Forest Plan met: Yes

Recommendations: The effective management of watersheds depends on the amount and accuracy of available baseline information. This information can be used to identify potential stream habitat enhancement and restoration projects and to further prioritize work in watersheds. Continued support in monitoring and inventorying of aquatic ecosystems on the Forest is necessary to better manage its aquatic resources.

German Ridge Reptile and Amphibian Survey

Methodology: This study was conducted in the German Ridge area of the Forest—in Perry County. Forest types include oak-hickory, best developed on relatively xeric, west- and south-facing slopes, and beech-maple, best developed on relatively moist, east- and north-facing slopes. Nonnative stands of pine, including shortleaf, white, Virginia, and red are mixed in with native hardwoods. Many of the pine plantations are no longer monocultures but are instead mixed stands of pines and hardwoods.

Herpetofaunal surveys were conducted in 10 timber stands--five hardwood and five pine. To the extent possible, pine stands were paired with nearby mature, second-growth hardwood stands that occurred on slopes with similar aspects. Amphibians and reptiles were sampled in pure or mixed stands of shortleaf, white, Virginia, or red pine, all established between 1939 and 1966, and also in second-growth, mature hardwood stands dominated principally by oak and hickory.

Surveys were conducted using drift fences with single entry funnel traps (constructed from aluminum window screen) and coverboards (constructed of plywood and corrugated tin). Plywood coverboards were 1.22 meter long by 0.61 meter wide by 1.27 centimeter thick; corrugated tin coverboards were 0.66 meter wide and varied from 0.78–1.35 meter in length. Drift fences were constructed from aluminum flashing (50 centimeters tall), the bottom 10 centimeters of which were sunk into the ground. Vegetation and woody debris was removed prior to the emplacement of drift fences; vegetative regrowth was trimmed during sampling.

At each site, a three-arm drift fence array five meters was constructed from the midpoint at angles of 0°, 120°, and 240°. Each arm was 10 meters in length. We placed funnel traps against each side of each end of every drift fence. Coverboards were set in four rows offset from the centerpoint by 30m at angles of 0°, 90°, 180°, and 270°. Each row was comprised of five pairs of coverboards (one corrugated tin and one plywood) placed in an alternating pattern.

The arrays were installed in July and August 2003. Herpetofaunal sampling was conducted for six days in September 2003, one day in October 2003, and for 10 consecutive days each in early May, early June, late August/early September, and early October 2004. During each sampling period, we checked funnel traps daily and coverboards every other day. After marking, animals were released on the opposite side of the fence. We inspected coverboards by quickly lifting one end off the ground. Captured herpetofauna were marked and released back under the board.

Results: A total of 569 individuals of 31 species of amphibians and reptiles were recorded, including the rough green snake (*Opheodrys aestivus*), listed as a species of special concern in Indiana. While a greater number of amphibians and reptiles were captured from hardwood stands (338) than from pine stands (231), we found no significant difference ($P > 0.2$) in species diversity (H') between the two stand types. Significant differences in abundance between stand types were, however, detected for three snake species: Midwestern worm snake, *Carphophis amoenus* ($X^2_{(df=1)} = 24.80$, $P < 0.0001$), northern ringneck snake, *Diadophis punctatus* ($X^2_{(df=1)} = 4.45$, $P = 0.035$), and Western earth snake, *Virginia valeriae* ($X^2_{(df=1)} = 8.96$, $P = 0.003$). All three species were more abundant in hardwood stands. Overall, the most common species captured included the American toad (*Bufo americanus*), Midwestern worm snake, and northern slimy salamander (*Plethodon glutinosus*). An additional 362 individuals, of a minimum of eight other vertebrate

species (predominately mammals), were also recorded.

TABLE 14. NUMBER OF SPECIES AND INDIVIDUALS—
2003 – 2004 German Ridge reptile and amphibian survey
(exclusive of recaptures)

Species Group	Stand Type	No. of species	N
Salamanders	Hardwood	6	48
	Pine	6	52
Anurans	Hardwood	8	88
	Pine	6	85
Lizards	Hardwood	4	48
	Pine	4	27
Snakes	Hardwood	9	153
	Pine	10	67

White-tailed Deer Population Monitoring

Methodology: Through a system of hunt check stations, the Indiana Division of Fish and Wildlife monitors the legal harvest of white-tailed deer during hunt seasons throughout Indiana. Biologists periodically staff these check stations during hunt seasons to assess the sex and age distributions of deer in the harvest. Harvest data, along with hunt effort, deer-vehicle collision data, and deer damage complaints, may be used both to gauge the efficacy of harvest seasons and bag limits and to formulate new regulations to achieve deer population objectives.

The Hoosier lies within the area of the state traditionally noted for comparatively substantial deer harvests. Cropland, timber, and pasture interspersed on both public and private land provide the habitats that may account for the numbers of deer harvested within the eight main counties that include National Forest System (NFS) land: Brown, Crawford, Jackson, Martin, Monroe, Orange, and Perry (Table 15, Figure 11).

Observations: In the last 5 years, the statewide harvest of juvenile deer has remained relatively constant, resulting in approximately 20 percent of the harvest, evenly split between males and females (Fig. 10). However, the harvest of adult males in the harvest has consistently outpaced the harvest of adult females (Fig. 10).

Seasons and bag limits have been liberalized to achieve stable deer numbers. This strategy includes those counties with NFS land; the State now allows some additional harvest of antlerless deer in all these counties to reduce the breeding herd.

TABLE 15. WHITE-TAILED DEER HARVESTED
(within the eight main counties that include the Hoosier)

Year	Brown	Crawford	Jackson	Lawrence	Martin	Monroe	Orange	Perry
1989	1691	1842	1266	697	734	701	1194	1964
1990	2236	1897	1323	938	842	957	1393	2105
1991	1943	2113	1664	1010	1213	1094	1662	2160
1992	2005	2130	1381	996	1067	1053	1805	2464
1993	1827	2205	1809	1366	1181	1085	1886	2588
1994	2299	2385	1939	1485	1434	1440	2127	2870
1995	1895	2059	2053	1553	1356	1396	1919	2929
1996	1878	2392	2082	1792	1342	1633	2120	2987
1997	1546	1817	1851	1751	1159	1372	1828	2191
1998	896	1399	1659	1739	981	1518	1805	1970
1999	1046	1069	1686	1592	982	1672	2011	1360
2000	836	1315	1847	1449	996	1368	1936	1386
2001	918	1474	2164	1658	1037	1514	1978	1826
2002	1017	1425	2362	1302	1545	1514	2061	1950
2003	1562	1386	2272	1554	1525	1421	2007	1896
2004	1837	1761	2491	1950	1779	1623	2532	2016

Fig. 10. Total legal deer harvest within the eight main Indiana counties that include NFS land .

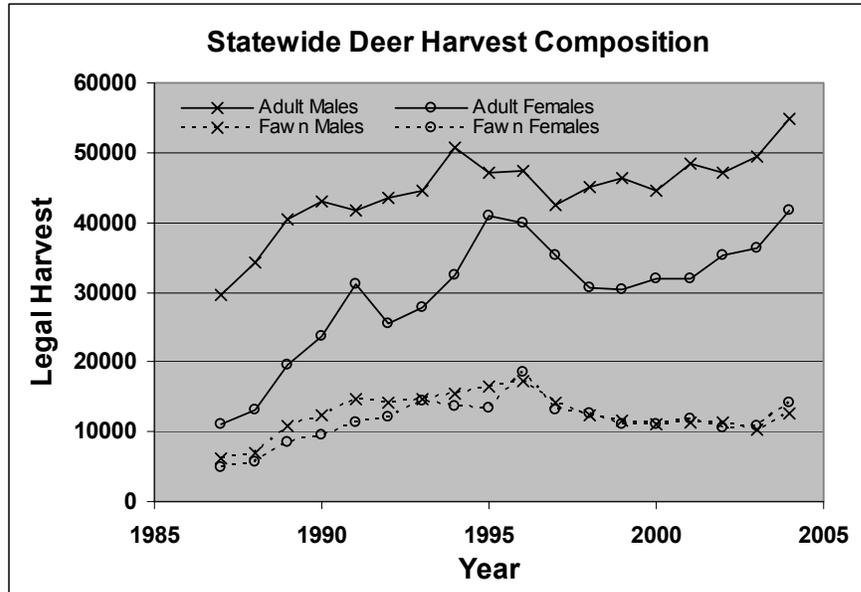
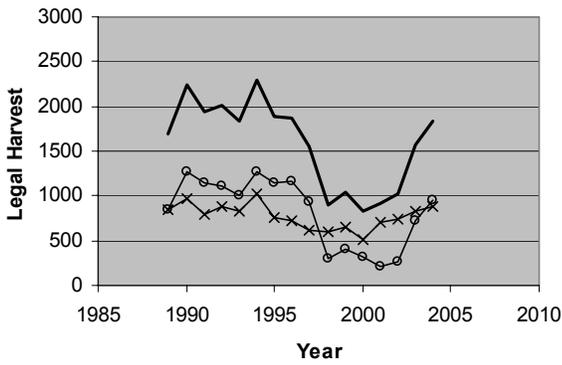
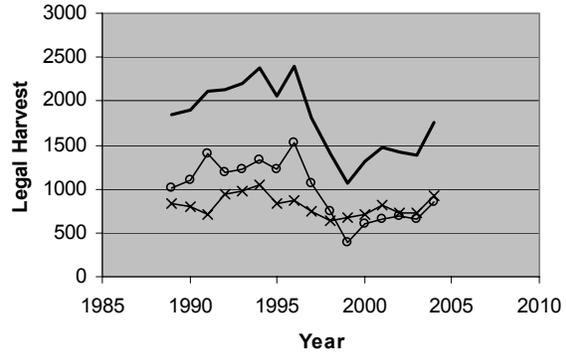


Fig. 11. Harvest of white-tailed deer in the counties encompassing the Hoosier National Forest, 1989-2004.

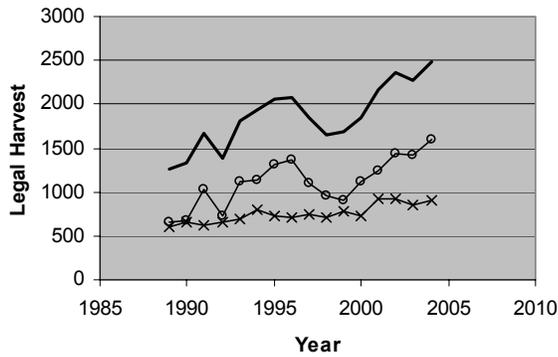
Deer Harvest - Brown County



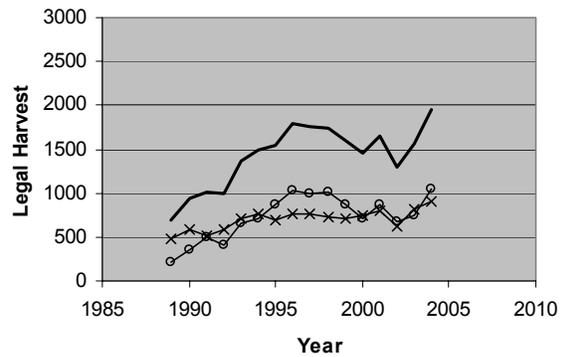
Deer Harvest - Crawford County



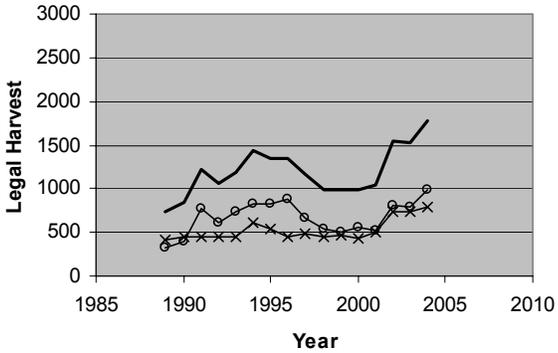
Deer Harvest - Jackson County



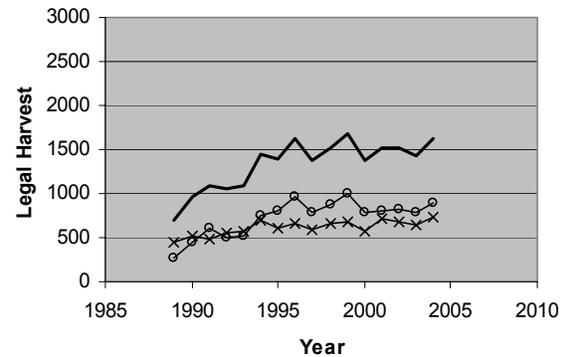
Deer Harvest - Lawrence County



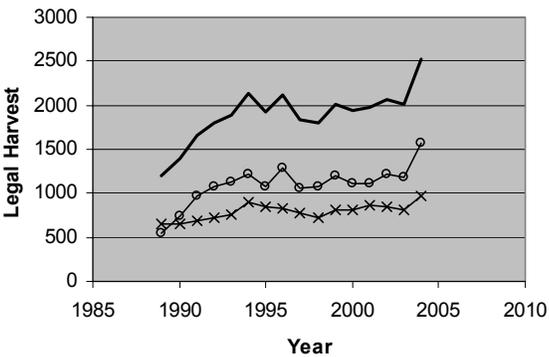
Deer Harvest - Martin County



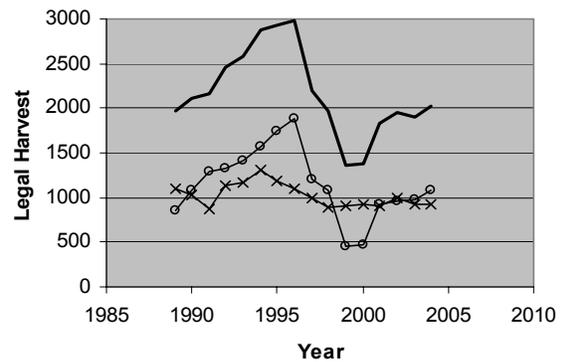
Deer Harvest - Monroe County



Deer Harvest - Orange County



Deer Harvest - Perry County

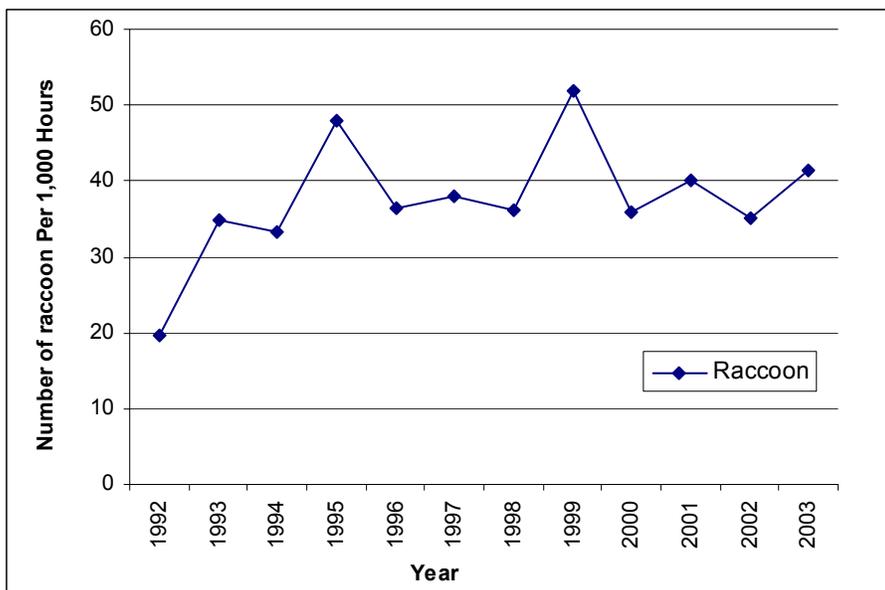


Raccoon Roadside Survey

TABLE 16. NUMBER OF RACCOONS OBSERVED BY INDIANA BOWHUNTERS
for every 1000 hours hunted stratified into fur districts from 1992 to 2000
(southern districts only)

Year	Southwest District	Southcentral District	Southeast District	Total
1992	22	12	10	44
1993	37	16	20	73
1994	30	23	25	78
1995	33	22	27	82
1996	31	20	36	87
1997	33	20	32	87
1998	41	19	31	91
1999	50	36	44	130
2000	29	25	27	81
2001	39	21	33	93
2002	46	29	23	96

Figure 12. Number of raccoons observed per 1,000 hunter hours (Statewide).



Bobcat Survey

This State-wide survey is conducted annually under the direction of a research biologist for the Indiana Division of Fish and Wildlife. In contrast to river otter reintroductions, bobcats in Indiana were not reintroduced but have instead probably persisted in the State as remnant populations.

Ten bobcats were captured from November 2003 until April 2004. Four individuals that had been previously outfitted with radio transmitters were recaptured. Six new captures were fitted with radio transmitters. Each bobcat fitted with a radio transmitter was located approximately three times per week through August 2004 to obtain information on survival, home range, and movement patterns.

Since the bobcat surveys began in 1998, 36 bobcats have been captured, 31 cats have been radioed and monitored for an average of 1 ½ years, and 11 radioed bobcats have died. Preliminary results of data collected from this study suggest a high annual survival rate for bobcats, especially for established resident adults (IDNR 2004).

Literature Cited

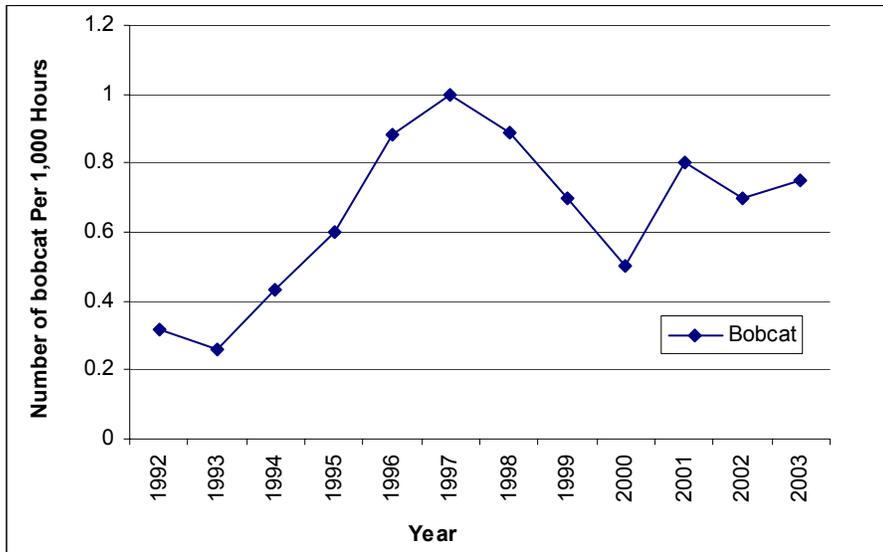
Indiana Department of Natural Resources, Division of Fish and Wildlife. Wildlife Diversity Section Annual Report: September 2003 – August 2004. Available Online at: <http://www.state.in.us/dnr/fishwild/endangered>. Accessed on August 10, 2005.

TABLE 17. NUMBER OF BOBCAT OBSERVED BY INDIANA BOWHUNTERS

(Number for every 1000 hours hunted stratified into fur districts from 1992 to 2002 (southern fur districts only).

Year	Southwest District	Southcentral District	Southeast District	Total
1992	0.4	0.5	0.0	0.9
1993	0.2	0.3	0.0	0.5
1994	0.2	0.4	0.3	0.9
1995	0.7	0.1	0.2	1.0
1996	0.5	0.2	0.2	0.9
1997	0.4	0.9	0.9	2.2
1998	1.0	0.2	0.5	0.8
1999	0.7	1.0	0.4	1.2
2000	0.0	0.8	0.8	1.6
2001	0.4	0.6	1.1	2.1
2002	0.9	0.3	0.3	1.5

Figure 13. Number of bobcats observed by Indiana bowhunters for every 1000 hours hunted stratified into fur districts from 1992 to 2003 (Statewide).



River Otter Survey

This State-wide survey is conducted annually under the direction of a research biologist for the Indiana Division of Fish and Wildlife. This survey was initiated in the winter of 2002 and is conducted annually. This survey, in addition to anecdotal records of occurrence, was initiated to systematically assess the distribution of otters in Indiana.

The Indiana River Otter Restoration Program released 303 otters into six watersheds in the state from 1995 to 1999. To date, 58 of these animals are known to have died. Incidental trapping resulted in 29 deaths, and an additional 18 were road kills. The standardized bridge and stream surveys were begun in 2000 to collect unbiased data on Indiana river otter populations throughout the State. Although 22 counties were surveyed during 2003-2004, conclusive evidence of otters was found at only 9 of 467 points visited (IDNR 2004). None of these points fall within the boundaries of the Forest.

Figure 14. Distribution of River Otters in Indiana.
 Post-Release Records of River Otters in Indiana



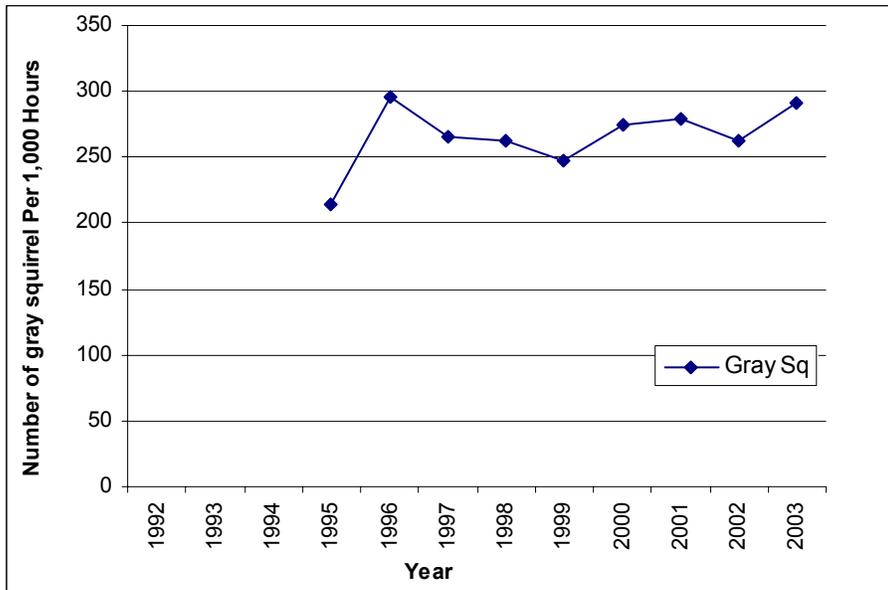
Gray Squirrels

TABLE 18. NUMBER OF GRAY SQUIRRELS

(Number observed by Indiana bowhunters for every 1000 hunt hours stratified into fur districts from 1992 to 2000 (southern districts only).

Year	Southwest District	Southcentral District	Southeast District	Total
1995	280	379	214	883
1996	194	703	296	1193
1997	286	584	262	1132
1998	238	623	271	1132
1999	208	659	248	1115
2000	181	678	274	1153
2001	188	806	279	1173
2002	220	809	263	1292
2003	247	773	291	1311

Figure 15. Number of gray squirrels observed by Indiana bowhunters for every 1000 hunt hours (Statewide).



PROTECT OUR CULTURAL RESOURCES

Project Reviews

Project reviews to ensure mitigation and protection measures are correctly applied for ground-disturbing activities

Legal/Regulations Reference: Antiquities Act of 1906; National Historic Preservation Act of 1966 as amended; Executive Order 11593; Archaeological Resources Protection Act of 1979 as amended; 36 CFR 219, 296, and 800.

Methodology: New resource damage does not occur and vandalism does not increase; that , activities are to avoid deterioration and collapse of significant buildings, and the Forest is to take steps to ensure rockshelters are not actively looted or inadvertently damaged by recreation users. The Forest is also to take steps to protect sites through public education, signing, and law enforcement activities.

Acceptable Criteria:

- Project areas inspected for the presence of historic and prehistoric properties prior to project implementation.
- Significant and potentially significant properties protected.
- Mitigation measures designed and followed during project implementation.

Discovery of unrecorded resources brought to the attention of the forest archaeologist.

Wildlife Opening Burns 2004

We monitored this project after the prescribed fire. The archaeologist determined that mitigation measures had been followed for the three sites located within the project (12 J 354, 12 J 105, 12 Cr 459)

Fuels Reduction 2004

The Forest monitored this project after the prescribed fire. The archaeologist determined that mitigation measures had been followed for the five sites located within the project (12 Lr 492, 12 Lr 493, 12 Lr 132, 12 J 346, 12 J 348).

For the gravestones at 12 Lr 132, the Forest created a 10-20 meter buffer area with a leaf blower. We cleared a line 1-meter wide of combustible material and wrapped the stones with fire shelters. A snag located 20 meters from the gravestones burned hot. Had it fallen over, the buffer would not have been adequate and the gravestones would have been damaged. The archaeologist recommends that we increase the buffer zones to at least the height of the surrounding trees.

Rickenbaugh House Drainage Tile Trench

We monitored this project during excavation of a trench along the east side of the house to facilitate better water drainage. The contractor dug a trench in the drainage swale dug by Ronnie Roark a few years earlier. The archaeologist observed no artifacts or features.

Hemlock Cliffs Trail Reroute

During project implementation, the trail crew found an unidentified metal tool approximately 12 to 24 inches below the surface. An outdoor recreation planner brought this tool to the archaeologist July 22, 2004 and indicated his crew had found it in an unusual zone of sand. The crew flagged the area in the field.

The archaeologist visited the location and noted the distinct zone of sand evidenced in the upslope profile of the trail. The location is a very steep slope. The archaeologist believes the metal artifact, which may be a small shovel or a tool used with an iron stove, was located on the top of the cliff and was displaced along with residuum of the sandstone cliffs. The artifact was clearly not in-situ.

MTR Trail Trench

MTR dug an unauthorized trench to drain water away from their special use permitted trail. The archaeologist monitored the trail to determine whether the trench disturbed heritage resources but observed no artifacts in the trench or the backdirt piles.

Farther up the trail, the archaeologist recorded a prehistoric lithic scatter in the old roadbed. She gave it site number 12 Lr 1075.

The archaeologist recommends that the Recreation Program Manager work with MTR to rehabilitate the area (that is, create a turnpike in the bottom for drainage) and

clarify what is allowed through their permit and what is not allowed. Continued unauthorized earth-disturbing activity should result in termination of the permit.

Bye Property Soil Erosion Control

The Forest monitored the road to determine the extent of cultural materials on the surface of the road and the extent of existing site 12 Or 0753 in preparation of a soil reclamation project.

We monitored the road that runs north from the house. We visually surveyed the road and shovel-tested each side of the road. Visual survey of the road resulted in the discovery of 12 Or 0759. This site consists of an isolated projectile point base that does not require protection. The project will disturb no sites.

Goosetown Blowdown

The forest silviculturist notified the archaeologist that employees had found a previously unrecorded rockshelter. The archaeologist investigated the rockshelter for evidence of human occupation and recorded it as site 12 Pe 1343. We excluded the rockshelter and added a 20-meter activity exclusion zone. The site is potentially eligible to the National Register of Historic Places, and the archaeologist recommends further study.

Heritage Resource Protection Action Plan

As a result of the archaeological resource damage reported in the 2003 monitoring report, the Forest developed a Heritage Resource Protection Action Plan. This strategy included 13 action items and addressed all of our audiences—internal, contractors, permittees, partners, and government agencies. We executed many of the items on the plan, including an all-employee workshop to educate employees and promote archaeological site protection and appreciation.

Monitor National Register-listed Sites

Monitor National Register sites and several potentially significant sites to ensure resource protection Forest-wide

Results 2005: The following 12 sites were monitored this fiscal year: 12 Pe 100 Rockhouse Hollow, 12 Or 1 Cox's Woods, 12 Pe 784 Rickenbaugh House, 12 Cr 110 Potts Creek Rockshelter, 12 Lr 492, 12 Lr 493, 12 Lr 132, 12 J 346, 12 J 348, 12 J 354, 12 J 105, and 12 Cr 459.

Rockhouse Hollow

The forest silviculturist informed the forest archaeologist that, due to the July storm, trees had fallen in and around the rockshelter. The archaeologist monitored this site, listed on the National Register of Historic Places, to assess damage. The winds had blown over a large tree located on the talus slope. The root wad was vertical, and the disturbed soil included a black midden containing numerous artifacts. The wind had also blown over other trees further down the slope.

After consultation with the forest silviculturist and recreation program manager, we agreed the best thing to do was cut the tree and hope the root wad returned to its previous location. The fire crew cut the root wad, and it fell back into place.

Forest Plan Met? Yes

Recommendations: Forest employees informed the archaeologist of an unrecorded rockshelter and an isolated historic artifact found during project implementation. The benefits of last year's Heritage Resource Workshop are apparent. The archaeologist recommends continuing to provide internal employee education and support regarding heritage resources.

Because of the Fuels Reduction 2004 project, the archaeologist recommends increasing the buffer zones around sites requiring protection from prescribed fire to at least the height of the surrounding trees.

The archaeologist recommends continuing to work with permit holders to ensure compliance regarding unauthorized digging and the protection of archaeological resources. The archaeologist further recommends revoking permits when the permit holders are repeatedly not in compliance. The archaeologist also recommends refining mitigation measures if possible and continuing to monitor projects to ensure mitigation measures are working.

At the end of fiscal year 2004, the archaeologist recommended placing an interpretive sign at Cox's Woods. The Forest accomplished this. She also recommended placing a sign at Wesley Chapel Gulf. This has not yet been done.

The archaeologist recommends continuing to monitor significant and potentially significant sites throughout the Forest to ensure their protection. She also recommends continuing to work with law enforcement in areas of high use or repeat vandalism.

Provide for a Visually Pleasing Landscape

Visual Quality Objectives [36 CFR 219.21]

Monitor Project Design and Execution

--to ensure visual quality objectives (VQO's) are met

Legal/Regulation Reference: 36 CFR 219.21 (f), *Forest Plan* (p.2-15 to 2-16)

Methodology: Inspect projects that affect landform, water, vegetation, and structures; furthermore, compare effects to *Forest Plan* criteria. Projects that potentially affect

the VQO's include soil and water improvements, wildlife opening maintenance, prescribed burns, trail maintenance, trail construction, and recreation construction.

Acceptable Criteria: Meet the VQO's stated in the *Forest Plan*.

Results:

Recreation Facilities Projects

During 2004 and 2005, the Forest constructed three new toilet buildings (SSTs) and one new showerhouse. The new SSTs are located at the Mano Point Boat Ramp, the Saddle Lake Campground, and the Tipsaw Lake Recreation Area at a site between the Jackpine and Dogwood Camp Loops. The SSTs are all neutral colors and blend in well with the surrounding vegetation and scenery, with the exception of the SST at the Mano Point Boat Ramp. It was necessary to move the location of the Mano Point SST across the parking lot from the original location because of flooding. The original SST was closer to the forest vegetation and blended well; the new SST stands out in the open. The new showerhouse is located in Jackpine Camp Loop and consists of colors and construction that are compatible with the surroundings and it blends in well with the surrounding forest vegetation. The projects met the assigned VQO's with the exception of the new SST at Mano Point. That facility would be more in line with the modification VQO than retention, because it visually dominates the original characteristic landscape. However, the colors of the building are neutral and compatible with the natural surroundings.

Goosetown Salvage Sale

The Goosetown Salvage Sale was implemented during the spring and summer of 2005. The purpose of the sale was to salvage logs from a natural blowdown storm. This storm changed the visuals of the area. A 200 to 300-foot section of the German Ridge Trail was used for skidding. The operation is now closed, and it is

evident there was a logging operation. The sale areas adjacent to the trail area are more open, and more light will filter onto the trail. The trail tread has been returned to its former condition, and tree stumps and logs have been strategically placed where skid roads intersect the trail to block them. This project met the assigned VQOs as it repeats the form, lines, colors, and textures which are found in the characteristic surrounding landscape. The visual character of the landscape was changed by the storm that caused the blowdown.

Trail Maintenance

In FY 2005, the Forest completed trail maintenance on Youngs Creek Trail, Birdseye Trail, and Oriole West Trail. The maintenance consisted of placing gravel on wet, muddy sections of the Youngs Creek Trail north and south of County Road 550 S. In addition, a dozer operator installed drainage structures on the trail where the gravel was placed and opened the trail west of where the gravel was placed. The work on Birdseye Trail and Oriole West Trail consisted of a dozer operator installing drainage structures and opening up the trails after damage by winds. The Youngs Creek Trail gravel placement and dozer work blends in well with the trail, as the dozer smoothed out any rough spots in the gravel, and the trail tread looks like natural surface. The drainage structures will be evident to forest visitors but will eventually blend in with the trail and look like a natural occurrence. The maintenance work was required because degradation of the trails was occurring. The project met the assigned VQOs.

Burn Project

In April 2005, the Forest completed an 870-acre burn on Mogan Ridge burn—in the Mogan Ridge East Trail area. Initially, the burned area was noticeable from the trail. Over the summer, vegetation has grown in, and the burned area blends into the natural setting now. This project met the assigned VQO's

Forest Plan met on all projects?: Yes, but see note under Recreation Projects above.

Recommendations: Continue to follow VQO principles on all projects and coordinate with the forest VQO coordinator.

Provide for Recreation in Harmony with Natural Communities

Wilderness Management [36 CFR 219.18]

Monitor Wilderness Resources According to Wilderness Implementation Schedule (WIS).

Legal or Regulation Reference: 36 CFR 219.18, Forest Service Manual (FSM) 2320, FSH 2309.19 R9 Supplement 1, Forest Plan (pp 2-36 through 2-39).

Methodology: Visual observation per the WIS monitoring schedule.

Acceptable Criteria: Monitoring standards as developed for the Charles C. Deam Wilderness (see WIS and the information below). The Forest has been using additional monitoring techniques since the development of the WIS. New technology in wilderness management has provided additional monitoring techniques.

Results: In 2004, a two-person seasonal Wilderness Ranger crew monitored designated and nondesignated campsites in the Charles C. Deam Wilderness. The crew filled out an inventory form for each campsite with baseline information, including site number, date, distance to system trail and water, type of vegetation, whether or not the site is well screened, number of sites within 200 feet, number of trees with exposed roots, number of felled or scarred trees, broken or cut branches, camp area, bare ground, number of discernable or well-worn social trails, vegetation loss, site recommendations and comments, actions taken at the site, and amount of time spent on the survey. The crew also photographed each site and marked its location with a GPS unit.

In 2005, the Forest completed many recommended actions that were included the 2004 survey. The two-person wilderness ranger crew also used infrared trail counters to monitor social conditions on the trails.

The two-person wilderness ranger crew, along with the seasonal trail crew and permanent employees, collected trash along the trail and monitored trail tread conditions.

Campsite Impact and Inventory

The Forest monitored 81 active campsites. Twenty-four of these campsites are designated sites (30%), and 57 campsites are nondesignated sites (70%). Of the active campsites monitored, only 32 (40%) campsites are greater than 100 feet from water. Fifty-five campsites (68%) are greater than 100 feet from trails. The crew assigned each campsites a condition rating based on ecological conditions of the

campsite. This rating is based on a 1 to 5 scale with one being the best condition and five being the worst condition. Designated sites had an average rating of 3.4, while nondesignated sites had an average rating of 2.9. The Forest will continue to make improvements to campsites based on the monitoring completed. We will repeat the monitoring in approximately five years to determine if conditions are improving.

Trail Social Encounters

The crews collected trail sensor data to monitor trail use on several trails. However, some problems with sensitivity settings, strong storms in June and July, tampering from visitors, low batteries, and the 17-year cicada emergence made only some of the readings reliable. Only results from Terrill Ridge/Sycamore Loop, Grubb Ridge (north and south side of Tower Ridge road), Hays, and Peninsula were reliable.

TABLE 19. COUNTER RESULTS

Trail Name	Terrill Ridge/Sycamore Loop	Grubb Ridge (north side)	Grubb Ridge (south side)	Hays	Peninsula
Number of days	32	32	29	15	16
Average number of people per day	43.9	32.8	11.4	4.9	60
Total number of people	1406	1051	332	79	960

Trails in the Charles C. Deam Wilderness were patrolled by a wilderness ranger, a fee demo ranger, two seasonal wilderness rangers, and the Forest’s wilderness manager. We documented social encounters on 92 days during FY 2004 and FY 2005 and observed a total of 244 hikers and 486 horse riders during the 92 days.

TABLE 20. WILDERNESS USERS OBSERVED

Trail	Days Patrolled	Hikers Observed	Horse Riders Observed
Axsom Branch	13	39	56
Grubb Ridge	23	74	157
Peninsula Trail	14	47	28
Terrill Ridge	8	39	27
Hayes Trail	7	5	2
Sycamore Trail	6	18	0
Cope Hollow	18	1	192
Martin Hollow	11	0	13
Lake Patrol	3	8	11
Tower Trailhead	10	13	0
TOTAL	113	244	486

Trail Social Impact

The amount of garbage on or along the trails and in campsites was minimal. However, garbage at trailheads and off-trail areas has a social impact to wilderness visitors as much as garbage along trails. Garbage continues to be a problem at the Hickory Ridge Fire Tower. Most garbage is a result of Friday and Saturday night parties by local residents. We have made law enforcement officers aware of the problem, and they have been working with local authorities to develop a solution.

Monitoring campsite conditions provided the wilderness rangers an opportunity to clean fire rings in all the campsites within the wilderness. Overall, conditions were not too bad. The crews collected garbage from many of the fire rings, but litter was not prevalent around the sites.

A significant amount of garbage washes onto the shore of Monroe Lake where it meets the Charles C. Deam Wilderness. Every May, the Hoosier sponsors Take Pride in America, a day for people to complete volunteer work projects on the Forest. A popular project has been cleaning the shoreline in the wilderness. This annual clean up prevents large amounts of garbage from accumulating.

Trail Tread Condition

Problem erosion units were not inventoried, as identified in the Charles. C. Deam Wilderness monitoring plan. The Forest identified muddy areas or areas draining poorly and took corrective action on several sections of trail.

A three-person trail crew worked in the wilderness in 2004 and 2005. The crews spent the first month of the summer working on trail re-routes and re-construction

projects. In 2004, the Peninsula Trail had a 1/3 of a mile turnpike installed to eliminate a long muddy area. In 2005, the crews constructed a 1.2 mile re-route on the Cope Hollow Trail. The trail crews spent the remainder of the summer cleaning and replacing water bars, making improvements on short muddy areas, and clearing downed trees from the trail.

Access Trail and Impact

The Forest collected minimal trash at Hayes, Blackwell, and Grubb Ridge Trailheads. As stated above, the Forest picked up garbage at the Hickory Ridge Fire Tower, especially alcohol containers, on Saturday and Sunday mornings.

Information and education is listed in the Wilderness Implementation Schedule as an issue and concern (Appendix B), but there is no corresponding category in the Forest Monitoring Plan. There appears to be a lack of awareness of why the Charles C. Deam Wilderness is unique and why management direction in the Wilderness is different. The Forest conducted information and education efforts in 2004 and 2005:

- The Forest provided weekly Leave No Trace demonstrations at Maumee and Ransburg Boy Scout Camps. Approximately 565 Boy Scouts attended these programs.
- The Forest provided Leave No Trace demonstrations to individual Boy Scout troops during the year. We presented three programs to approximately 50 Boy Scouts.
- A volunteer staffed Brooks Cabin every Sunday during the summer and fall. The volunteer provided wilderness information to approximately 270 people.
- The Forest provided four lectures concerning wilderness management on the Hoosier at Indiana University and Ball State University. Approximately 100 people attended the two lectures.
- The Forest made presentations at Midwest Trail Rides regarding the use of Forest trails and wilderness management. Approximately 450 attended these presentations.

Forest Plan Met? Yes

Recommendations: Improve Monitoring Program for Deam Wilderness and review Wilderness Implementation Schedule for possible changes.

1. Continue to make improvements to nondesignated campsites.
2. Expand wilderness education program.
3. Collect trail encounter information on a more consistent basis. The Forest has created trail encounter forms for forest personnel to complete while patrolling the Deam Wilderness.
4. Improve trail condition inventory and survey information.

Recreation Facilities [36 CFR 219.21c]

Monitor public feedback to trailhead, campground, sign, and restroom designs and function, including accessibility.

Legal or Regulation Reference: 36 CFR 219.21(c), FSM 2300, Forest Plan (pages 2-17 and 2-18)

Methodology: Public feedback was obtained from phone-ins, letters, Congressional inquiries, Hoosier National Forest *How Are We Doing?* survey cards, concessionaire customer response forms, e-mails to the Forest website, scoping responses for project proposals, personal contacts at Forest offices and in the field, and results of the National Visitor Use Monitoring project. We also occasionally find comments on bulletin boards, in notes left on vehicle windshields, or in the form of graffiti.

Acceptable Criteria: There is no standard regarding this type of public feedback, but we evaluate each comment and take action, if warranted.

Results: Thirty-one *How Are We Doing?* cards were returned during this monitoring period. In addition, front-line personnel fielded routine questions by phone, e-mail, and letters, but they referred 29 issues of a more complicated nature to the recreation program manager. The campground concessionaire provided 207 customer response forms. The Forest also received the results of the National Visitor Use Monitoring Project, which included sections on customer satisfaction and perceptions of crowding (USDA Forest Service 2004).

A review of all of the above contacts indicates the vast majority of comments were positive. Most people seemed to be satisfied with the condition of the facilities and service provided by Forest Service and concessionaire staff. Several suggestions were made that were excellent ideas. For example, someone suggested a handrail at the steps at the Springs Valley toilet for safety reasons. We installed one, and in result received many "thank you's." There were also suggestions for things such as more shower facilities, better lighting at boat ramps, clothes hooks by sinks, soap dishes, and better dog enforcement on beaches. The Forest received complaints regarding issues such as long waits at the Hardin Ridge gatehouse, not being able to pick a campsite, bugs in the restrooms, lighting problems at the restrooms, difficulty in finding water to fill RV tanks, weeds in Tipsaw Lake, and water temperature problems in showers. All input was evaluated and action taken accordingly. For example, we modified the approach road at the Hardin Ridge gatehouse to allow more efficient traffic flow and cut down on waiting time, and an Integrated Pest Management program is implemented annually for weed control at Tipsaw Lake.

The NVUM report determined which facilities visitors use the most and ranked them as follows (descending order): boat launches, Forest roads, developed campgrounds, Forest trails, and developed fishing sites.

In reviewing past monitoring reports, no trends are evident other than the public continues to be satisfied but does voice occasional complaints and suggestions. This year, as in past years, these complaints and suggestions have been reviewed and action taken if warranted and possible.

TABLE 21. SATISFACTION OF RECREATION VISITORS AT DEVELOPED DAY USE SITES
(Hoosier National Forest)

ITEM	Poor	Fair	Average	Good	Very Good	Average Rating*	Mean Importance**	N obs
Restroom cleanliness	0.0	3.4	0.0	46.7	49.9	4.4	4.5	14
Developed facility condition	0.0	0.0	54.0	42.3	3.8	3.5	3.9	19
Condition of environment	0.0	0.0	2.3	37.2	60.5	4.6	4.6	20
Employee helpfulness	2.6	0.0	0.0	34.0	63.4	4.6	4.8	15
Interpretive display	0.0	3.7	1.1	54.4	40.8	4.3	4.8	11
Parking availability	0.0	0.0	1.4	31.6	66.9	4.7	4.8	19
Parking lot condition	0.0	2.3	3.3	36.9	57.4	4.5	3.7	20
Rec. info. available	0.0	2.4	6.1	62.7	28.8	4.2	4.4	17
Road condition	2.4	0.0	3.7	65.5	28.5	4.2	4.3	17
Feeling of safety	0.0	2.3	25.8	59.6	12.3	3.8	4.4	18
Scenery	0.0	2.3	0.4	63.7	33.6	4.3	4.8	20
Signage adequacy	2.3	0.0	3.4	65.1	29.1	4.2	4.0	18
Trail condition	0.0	0.0	17.9	36.1	45.9	4.3	3.5	11
Value for fee paid	2.7	0.0	0.0	61.8	35.6	4.3	4.9	11

*Scale is: Poor = 1, Fair = 2, Average = 3, Good = 4, Very Good = 5

** Scale is: 1= not important, 2= somewhat important, 3=moderately important, 4= important, 5 = very important

N obs means the number of visitors who responded to this item.

Note: For items with less than 10 responses, the data was not reported

The National Visitor Use Monitoring Project, which shows above average ratings for almost all elements, confirmed a high level of customer satisfaction. The following tables summarize those results. The NVUM study also included visitors' perceptions of crowding and indicated very few visitors felt the Forest was crowded.

TABLE 22. SATISFACTION OF RECREATION VISITORS AT DEVELOPED OVERNIGHT SITES
(Hoosier National Forest)

ITEM	Poor	Fair	Ave- rage	Good	Very Good	Ave- rage Rating*	Mean Impor- tance**	N obs
Restroom cleanliness	0.8	0.6	26.5	24.8	47.2	4.2	4.6	30
Developed facility condition	9.9	0.0	0.3	12.6	77.2	4.5	4.2	31
Condition of environment	0.0	0.0	0.4	11.9	87.7	4.9	4.7	42
Employee helpfulness	0.0	0.0	11.2	2.4	86.4	4.8	4.2	23
Interpretive display	0.7	0.0	15.1	31.0	53.2	4.4	3.4	16
Parking availability	0.0	0.0	1.1	26.4	72.5	4.7	3.8	43
Parking lot condition	0.0	0.0	7.8	11.8	80.4	4.7	3.9	42
Rec. info. available	1.2	1.3	2.8	42.1	52.6	4.4	3.9	30
Road condition	0.3	0.4	8.6	19.3	71.5	4.6	4.1	38
Feeling of safety	0.0	0.0	0.4	25.7	73.9	4.7	4.6	43
Scenery	0.0	0.0	1.5	11.1	87.4	4.9	4.8	43
Signage adequacy	0.7	1.0	2.1	37.3	58.9	4.5	4.3	40
Trail condition	0.0	0.0	2.2	12.3	85.6	4.8	4.0	30
Value for fee paid	0.5	0.3	0.0	24.0	75.2	4.7	4.6	33

*Scale is: Poor = 1, Fair = 2, Average = 3, Good = 4, Very Good = 5

** Scale is: 1= not important, 2= somewhat important, 3=moderately important, 4= important, 5 = very important

N obs means the number of visitors who responded to this item.

Note: For items with less than 10 responses, the data was not reported

TABLE 23. SATISFACTION OF RECREATION VISITORS IN GENERAL FOREST AREAS
(Hoosier National Forest)

ITEM	Poor	Fair	Ave- rage	Good	Very Good	Ave rage Rating*	Mean Impor- tance**	N obs
Restroom cleanliness	.	.	.	.	.	.	4.9	4
Developed facility condition	.	.	.	.	.	.	.	6
Condition of environment	0.0	1.6	31.1	18.1	49.3	4.2	4.9	29
Employee helpfulness	0.0	0.0	0.0	9.6	90.4	4.9	4.9	13
Interpretive display	8.6	0.0	8.6	49.8	33.1	4.0	3.6	12
Parking availability	1.6	3.2	6.4	74.5	14.3	4.0	4.0	26
Parking lot condition	4.9	0.0	3.3	48.2	43.6	4.3	4.2	26
Rec. info. available	7.7	7.6	5.1	22.5	57.1	4.1	4.3	21
Road condition	1.7	1.7	6.7	44.8	45.1	4.3	4.5	22
Feeling of safety	1.6	1.6	3.1	41.4	52.3	4.4	4.6	27
Scenery	0.0	0.0	0.0	37.1	62.9	4.6	4.7	29
Signage adequacy	2.4	4.9	4.7	20.9	67.0	4.5	4.6	24
Trail condition	0.0	4.3	9.0	43.5	43.3	4.3	4.6	23
Value for fee paid	2.1	2.1	0.0	3.9	92.0	4.8	4.9	13

*Scale is: Poor = 1, Fair = 2, Average = 3, Good = 4, Very Good = 5

** Scale is: 1= not important, 2= somewhat important, 3=moderately important, 4= important, 5 = very important

N obs means the number of visitors who responded to this item.

Note: For items with less than 10 responses, the data was not reported.

TABLE 24. PERCEPTION OF CROWDING BY RECREATION VISITORS BY SITE TYPE
(percent site visits—Hoosier National Forest)

Crowding Rating	Developed Day Use	Over-night Use	General Forest Area	Wilderness
10 Overcrowded	0.0	0.0	0.0	0.0
9	0.0	0.4	1.1	0.0
8	0.0	6.6	2.3	3.6
7	0.0	0.3	2.3	3.6
6	24.5	9.4	1.1	7.3
5	28.5	19.1	1.1	7.3
4	3.2	9.6	3.5	3.6
3	6.4	11.0	5.9	6.1
2	27.4	20.2	4.7	42.2
1 Hardly anyone there	10.0	23.3	77.9	26.2

Forest Plan met: Partially. Due to scarce resources, the recreation program is not functioning at full level; even so, the public still indicates satisfaction. Most notably, there is a backlog regarding replacement or rehabilitation of aging facilities, non-accessible facilities, recreation area roads, and degraded trails. Progress has been made; for example, numerous accessible toilets have been installed across the Forest, the Hardin Ridge road was improved with better shoulders, additional segments of trails are rehabilitated every year, and some shower buildings are being replaced with larger facilities.

Recommendations: Continue the policy of reviewing all public input and taking action if warranted and possible. Continue to coordinate with engineering on all facility-related suggestions. Continue to strictly enforce concessionaire requirements, emphasize customer service, and work with the concessionaire on resolving problems and complaints. Continue to pursue capital investment funds and other resources to address the facility backlog situation. Complete the Forest Facility Master Plan by December 31, 2005.

References Cited

USDA Forest Service. 2004. National visitor use monitoring report for the Hoosier National Forest. Available online at <http://www.fs.fed.us/recreation/programs/nvum/>. Date accessed: July 27, 2005.

Trails [36 CFR 219.21(G)]

Set up and schedule trail use monitoring on selected trails. Evaluate the type and amount of use.

Legal or Regulation Reference: 36 CFR 219.21

Methodology: On multiple-use trails, we are able to estimate use by comparing the number of trail permits sold with field observations. *Estimation of horse and bike trail use for CY 2004* (Strout 2005) addresses the methodology.

The Hoosier installed trail counters at three locations in the Deam Wilderness during 2004, and the results are summarized in the Wilderness Management monitoring report in this document.

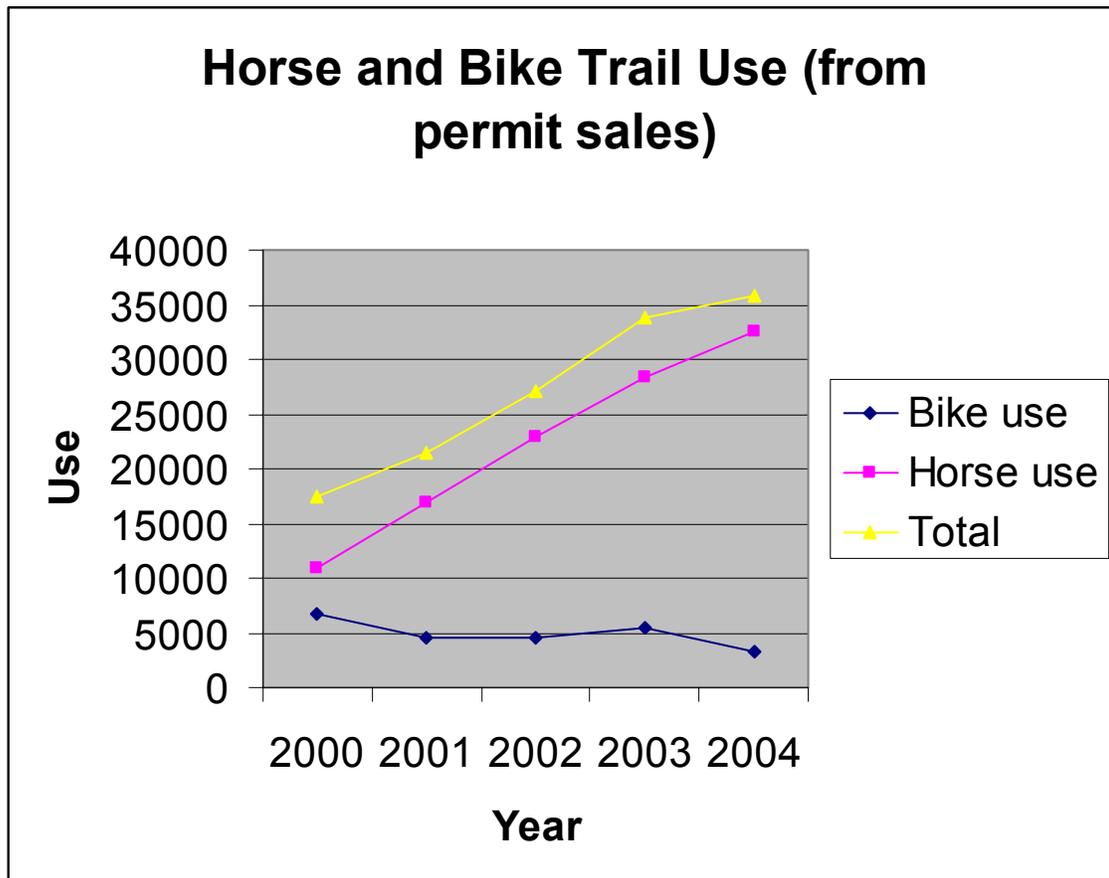
Two research efforts related to trails were completed in this monitoring period and yielded useful information regarding trail use. The National Visitor Use Monitoring (NVUM) program provided general information about trail use (USDA Forest Service 2004). A study by Virginia Tech investigated horse trail impacts to improve understanding of the relationship between various levels of horse trail use, management alternatives, and impacts (Aust 2005).

Acceptable Criteria: For trails in the Charles C. Deam Wilderness, acceptable use criteria is based on limits of acceptable change social indicators for trails (see Wilderness Management monitoring report in this document). For Forest-wide trails, we have no formal specific use criteria; however, we use the following general guideline: Use must be high enough to justify keeping the trail on the system, yet not so high that severe resource damage occurs or undue user conflict occurs. Site-specific conditions such as soil types, topography, weather, season, and use type influence use and impacts.

Results: Based on 2004 trail tag sales, it is estimated that about 3,230 bike riders and 32,630 horse riders used multiple-use trails that year. About 75 percent of this use likely occurred on the Pleasant Run Unit, based on permit sales. The NVUM report indicated that about 5 percent of forest visitors participated in horse riding. Taking into account the NVUM's + or- 15 percent confidence interval, the actual number of horse riders likely ranges from 27,540 to 37,260. This confirms the 2004 estimate of 32,630 riders. The NVUM report does not differentiate between mountain bike riding and road riding, which is not a trail activity. It is therefore difficult to draw conclusions about mountain bike riding from the NVUM report.

Trail use by horses has increased steadily over the past several years, but use by mountain bikes has fluctuated. The graph below summarizes trends regarding horse and bike use.

Figure 16. Horse and bike trail use estimated from permit sales, 2000-2004.



Hikers accounted for 22 percent of the users observed on multiple-use trails during 2004. This data is based only on multiple use trails, and additional hiking occurs on numerous hiking only trails. Hikers are not required to buy a permit, and therefore total numbers cannot be estimated using that methodology. The NVUM report indicates 35 percent of visitors participated in hiking or walking while visiting the forest. The NVUM report ranked hiking and walking as second for the primary activity of users and third as an overall activity.

The VA Tech study revealed much helpful information related to best management practices for horse trails. While this study did not address trail use directly, the intensity of trail use was a factor in their recommendations. Table XX presents an excerpt from that study that recommends various levels of gravel treatment based on use:

TABLE 25. RECOMMENDED LEVELS OF GRAVEL TREATMENT BASED ON USE

Use Level	<u>Well designed Trails</u> < 13% grade >22° alignment Dry soils	<u>Poorly designed trails</u> >12% grade < 23° alignment Wet soils
Low Moderate High	Gravel generally not needed 2-3" recommended 4-5" recommended	2-3" where needed 4-5" recommended 6-7" recommended

Forest trail personnel conduct informal inspections at the beginning of each use season and after major storm events. In addition to conducting maintenance inspections, personnel also look for evidence of use such as hoofprints, compacted tread, and manure piles. From these observations, we conclude most trails are receiving enough use to justify keeping them open. Maintenance and reroutes have mitigated impacts on high use trails, and reports of user conflicts are infrequent. See the soils section of this document for technical information on the physical condition of trails.

Forest Plan met: Yes. Generally, forest trail use is within moderate levels, with some high use periods at some locations. The Hoosier has upgraded trail conditions in most areas where work was needed to sustain the levels of use and to provide environmental protection.

Recommendations: Continue using the trail permit program to determine use. As resources allow, install trail counters at high use areas or high impact areas. Continue to draw on the data from the NVUM and Virginia Tech studies to assist in management decisions regarding trail use. Consider a second phase to the Virginia Tech trail study to investigate user preferences. Continue the analysis underway to determine the implications of trail use from adjacent private horsecamps; complete this analysis in FY 2006. Consider closing the Ogala Trail and the river segment of the German Ridge Trail due to very low use.

References Cited

Aust, Michael W.; Marion, Jeffery L.; Kevin, Kyle. 2005. Research for the development of best management practices to minimize horse trail impacts on the Hoosier National Forest. Virginia Tech Department of Forestry, Blacksburg, VA. 80p.

Strout, Danna. 2004. Memo dated January 11, 2005 to Forest Supervisor, estimation of horse and bike trail use for CY 2004. 4p. On file with: Forest Supervisor, Hoosier National Forest, 811 Constitution Ave., Bedford, IN 47421.

USDA Forest Service. 2004. National visitor use monitoring report for the Hoosier National Forest. Available online at <http://www.fs.fed.us/recreation/programs/nvum/>. Date accessed: July 27, 2005.

Provide for a Useable Landbase

Report Land Status Changes

TABLE 26. LAND ADJUSTMENT BY COUNTY AND DISTRICT FOR FY 2004

County	District	Gross Area	Acres Not Nfs	Nfs Land	Acres Acquired In Fy 2004
Brown	Brownstown RD	36,304	17,922	18,382	20
Crawford	Tell City RD	114,659	90,376	24, 283	117
Dubois	Tell City RD	17,040	16,628	412	0
Jackson	Brownstown RD	52,032	28,829	23,203	69
Lawrence	Brownstown RD	67,704	51,564	16,140	140
Martin	Brownstown RD	50,624	41,074	9,550	0
Monroe	Brownstown RD	32,524	13,529	18,995	0
Orange	Brownstown RD & Tell City RD	133,765	102,454	31,311	282
Perry	Tell City RD	139,708	81,047	58,661	70
TOTAL		644,360	443,423	200,937	698

In FY 2005, the Forest acquired just over 389 acres through purchase. The Forest also had one Small Tract Act sale of 0.09 acre and a Small Tract Act authority exchange of 0.29 acre of non-Federal land for 0.22 acre of Federal land. The final deeded acreage at the end of FY 2005 is 201,236 acres.

Provide for Human and Community Development

Special Uses and Outstanding Rights

Methodology: The special uses team monitored rights-of-way (ROW) maintenance work on Hoosier Energy 100 foot-wide ROW for tower replacement near Paoli, and near French Lick (both in southern Indiana).

Results: No impacts were found on soil or water from maintenance work. The seeding and erosion control worked well.

Forest Plan Met: Yes.

Recommendations: Work with company to plan access for future power upgrades when new conductor wire is installed on new and taller structures to use the same width ROW.

Monitoring of Earth-disturbing Permit Activities

Methodology: The special uses team monitored earth-disturbing activity associated with new permit ROW for compliance with Forest Plan guidance in Appendix K and mitigation measures built into each permit. We also monitored for outstanding rights for working on segments of county roads.

Results:

1) No impacts were found on soil and water associated with the replacement of four towers and conductors on Hoosier Energy 100 foot wide ROW. A road in the ROW was maintained with waterbars and seeded after use.

2) No impacts were found on soil and water resources from use of the 600 feet of ROW access road. New cross drainage was constructed and posts were added to block access. The road access was closed to motorized use by burying posts on the access road on the south side of Orange County Road 600 South.

No impacts were found on soil and water resources due to powerline trenching and burying across NFS land in Monroe County to replace an existing aerial line with a buried line to the Hardin Ridge Recreation area and adjacent private home group west of the campground. They have restored the site for soil and water concerns.

Forest Plan Met: Yes.

Recommendations: Look for other ways to replace aerial lines with buried lines in “hard to access” line segments across the forest – especially in managed recreation areas and along county roads with large areas of contiguous NFS land.

Pesticide Use

Methodology: The special uses team monitored pesticide use by Jackson County REMC on ROW where the company had outstanding rights. Jackson Co. REMC used spot treatment with broadleaf herbicides to treat regrowth of trees in the ROW. Very small amounts of chemical were needed, and about one mile of ROW was treated. The company used Tordon K, Tahoe 3A, and Nu-film (surfactant) to treat encroaching tree species to maintain a grass and shrub ground cover. The objective was to determine if there had been damage to non-target organisms or soil and water.

Results: No impacts were found to soil and water or non-target organisms in the ROW on the Jackson County REMC powerline ROW.

Forest Plan Met: Yes

Recommendations: Unlike the areas with outstanding rights, such as those treated by Jackson County REMC, areas of ROW that are under permit from the Forest Service and that do not have outstanding rights (rights existing prior to acquisition as NFS land) do not presently permit herbicide use. Mechanical treatment, however, is far more damaging since many of the access routes are steep. Using herbicide treatment to maintain the ROW in a grass and brush mix of vegetation with no trees would be less damaging to the soil resource than mechanical treatments.

Monitor Special Uses for Compliance with Nondiscrimination

Legal or Regulation Reference: Civil Rights Act of 1964 Title VI prohibits discrimination on the basis of race, color, religion, sex, or national origin.

Methodology: Permittees are subject to pre-award nondiscrimination reviews anytime a permit involves public use. The permittee is also notified of the responsibility. Assurance statements (Form 1700-1) are signed by all new "direct service" providers. Permittees must agree to comply; otherwise, we do not issue the permit.

The Federally Assisted Program Manager visited with permittees at the start of the season to monitor compliance with Title VI by concessionaires who have recreation areas under contract and with trail permittees who have large programs.

Results: All permittees visited were in compliance, and no complaints were received.

Forest Plan Met: Yes

Recommendations: Continue to monitor recreation permittees and send reminders of compliance requirements to other permittees according to the schedule.

Air Quality [36 CFR 219.27(a)(12)]

Monitor prescribed burns for adequacy of smoke management practices per burning plans.

Methodology: Visually monitor smoke dispersal and record any comments or calls received.

Results: The Hoosier completed 15 prescribed burns for 2,637 acres in 2004 and 2005. Post-burn monitoring was completed on the burns to determine if objectives were met for ecological purposes. All burns were monitored for smoke management and were in compliance. One call was received on the Mogan Ridge East burn. The caller was not affected by smoke but wanted to be informed of all burn projects because of sensitivity to smoke. No complaints on smoke were received.

Forest Plan met: Yes

Recommendations: Continue to monitor future burns, and accompany each burn with an aggressive public outreach to ensure that people are aware of the plans to burn and know where to call if smoke is a problem.

Health and Safety

Monitor the effluent discharge at the Hardin Ridge Recreation area according to the National Pollution Discharge Elimination System (NPDES) permit requirements.

Legal or Regulation Reference: NPDES, State of Indiana, and Monroe County

Methodology: Licensed operator collects and tests as required by NPDES permit.

Acceptable Criteria: Pass NPDES requirements.

Results: All NPDES requirements were met.

Forest Plan met: Yes

Recommendations: During FY2006 continue working closely with concessionaire and monitor to meet NPDES permit requirements.

Check bacteria levels at public swimming beaches.

Legal or Regulation Reference: 36 CFR 219.21(c)

Methodology: Check five times each 30-day period and once each week for two weeks before beach is open to public, per state standards.

Acceptable Criteria: Meet state standards for bacteria.

Results: State standards were met during both years except on August 5, 2005. The beach was closed immediately for public use. State standards for bacteria were in compliance by August 11, 2005, and the beach was reopened for public use.

Forest Plan met: Yes

Recommendations: Continue testing to meet state standards.

Appendix A

HOOSIER THREATENED AND ENDANGERED SPECIES ACCOMPLISHMENTS AND ACTIVITIES

Although the following list of activities on the Hoosier related to T&E species is very clearly incomplete, it does suggest the continuing breadth of the efforts by the Forest to aid in a variety of ways in the protection and recovery of threatened and endangered species. Details are not provided here. The appendix includes—in order of appearance-- a general T&E section, a bald eagle section, a fanshell mussel section, a gray bat section, and an Indiana bat section. Each section is ordered by six areas of activities (to the extent appropriate for the section): Conservation and Cooperation; Education, Research, and Training; Forest Management; Land Acquisition; Law Enforcement; and Monitoring, Inventorying, and Surveying.

Additional acronyms used in this section:

USDI FWS = United States Department of Interior Fish and Wildlife Service

IDNR = Indiana Department of Natural Resources

SIU = Southern Illinois University

T&E = Threatened and Endangered

NEBWG = Northwest Eastern Bat Working Group

See the Programmatic Biological Assessment for Land and Resource Management Plan-Hoosier National Forest for general information about each species. Items under Activities Relating to Threatened and Endangered Species in General are usually not repeated for individual species.

Activities Related to Endangered and Threatened Species in General

Area 1: *Conservation and Cooperation*

1996

- Coordinated with USDI FWS concerning mist net survey of the bat community

2000

- Prepared programmatic Biological Assessment for effects on four species for continued implementation of *Forest Plan*
- Aided in completion of Regional Forester sensitive species list, including T&E species risk evaluations

2002

- Amended the *Forest Plan* to incorporate information from the Biological Opinion

2004

- Coordinated with USDI FWS in completing bat surveys for the Buzzard Roost project
- Initiated Formal Consultation for revision of the Hoosier National Forest Land and Resource Management Plan (*Forest Plan*)
- Prepared Draft Biological Assessment for effects on five species under implementation of the Proposed *Forest Plan*

2005

- Received list of T&E species in the planning area (the Forest)
- Several employees are members of NEBWG (Northwest Eastern Bat Working Group)
- Coordinating with USDI FWS to complete the Biological Opinion for revision of the *Forest Plan*

Area 2: Education, Research, and Training

2001

- Presented many school programs on T&E species
- Prepared interim report on endangered, threatened, and rare plant species on the Forest

2002

- Forest Supervisor participated in Endangered Species Act training
- Prepared education trunk information on bats
- Completed viability evaluation for E&T species in coordination with Purdue (gray bat, bald eagle, Indiana bat) and SIU (fanshell); full viability evaluation continued for Indiana bat—reviewed by biological viability experts throughout the Midwest

2004

- Presented programs to school groups on T&E species
- Employee attended Bat Conservation International training
- Forest Supervisor and District Ranger completed Counterpart Regulation Training
- Completed *The Hoosier-Shawnee Ecological Assessment*
- Completed the Hoosier's Cave and Karst Management Program
- Reconvened Species Viability Evaluation panels to review selected species, including the Indiana bat
- Developed Habitat Suitability Index model for the Indiana bat

2005

- Nominated 28 caves for significance
- High standard of professional knowledge expected of and demonstrated by Forest employees
- Indiana Karst Conservancy is surveying features, including presence of bat species
- Continuing to nominate caves on the Forest for significance
- Will present additional programs concerning bats, eagles, and other E&T species to local schools and organizations

Area 3: Forest Management

Previous to 2001

- Developed silviculture prescription for Buzzard Roost project to maintain or enhance habitat for Indiana bat

2004

- Developed silviculture prescription for German Ridge project to maintain or enhance habitat for Indiana bat
- Will continue projects to enhance and maintain habitat

Area 4: Land Acquisition

- Acquired 11,200 acres of land since 1991 with potential as E&T habitat
- Continuing land acquisition negotiations, focusing on karst features
- Forest will continue to work with willing sellers to acquire properties that provide important habitat for E&T species

Area 5: Law Enforcement

- Prosecution of E&T wildlife violations
- Continuing investigation and prosecution of wildlife violations
- Forest law enforcement officers will continue to work with county police, Indiana Highway Patrol officers, and IDNR agents to identify and prosecute E&T wildlife violations on NFS lands

Area 6: Monitoring, Inventorying and Surveying

1990

- Inventoried endangered, threatened, and rare plant species in the Tell City Ranger District

1991

- Inventoried endangered, threatened, and rare plant species in the Pleasant Run Unit

1996

- Inventoried rare plant and animal species in tornado blowdown area of the Brownstown District
- Inventoried endangered, threatened, and rare plant species on Tell City District
- Inventoried rare plant and animal species: tornado blowdown area of the Pleasant Run Unit

2000-2001

- Discovered eight new taxa of plants on the Forest

2004

- John Whittaker completed bat surveys in several barrens areas
- Completed Buzzard Roost project bat surveys

2005

- Continuing to monitor caves

Conservation Efforts for Bald Eagle

Area 1: *Conservation and Cooperation*

- Have actively cooperated with USDI FWS and IDNR for monitoring of bald eagles near Lake Monroe for at least a decade

1993

- Coordinated with USDI FWS and IDNR for monitoring bald eagles near Lake Monroe
- Initiated informal consultations with the USDI FWS to ensure protection of bald eagles on the Forest
- Issued closure order to protect the eagle winter night roost near John Grubb Ridge

1994

- Placed aluminum flashing baffle around nest tree in Terrill Ridge area

1998

- Continued coordination with the IDNR concerning bald eagles (fledging, etc.)

2000

- Continued coordination with IDNR concerning monitoring of bald eagles
- Gathered and shared information with USDI FWS in preparing Biological Assessment
- Are coordinating with IDNR on conducting winter counts at Lake Monroe and Patoka Lake Recording sightings of bald eagles

Area 2: *Education, Research and Training*

2000-2002

- Presented public education programs on eagles and other raptors to schools

2003-2004

- Conducted bald eagle nest hike at Becoming an Outdoor Woman program
- Continuing school programs
- Will continue to make presentations when requested

Area 5: *Law Enforcement*

1994

- Conducted weekend patrols to ensure compliance with the closure orders for the winter roost site near John Grubb Ridge
- Delineated a “no entry” zone of approximately ¼ mile around the nest on Terrill Ridge

Area 6: *Monitoring, Inventorying and Surveying*

1993 - 1994

- Initiated monitoring to assess effectiveness of closure orders to protect specific bald eagle sites
- Developed monitoring and data analysis methods to describe population trends throughout the Forest

2001

- Observed bald eagles incubating at nest on Forest, but no chicks fledged
- Completed restoration of riparian and wetland habitat along Lost River and Otter Creek, with eagles having since been observed at several locations
- Continuing to monitor eagles on the Forest with the IDNR; checking three or four potential nest sites annually

Conservation of Eastern Fanshell Mussel

Area 1: *Conservation and Cooperation*

2000

- Gathered and shared information with FWS in preparing Biological Assessment

Area 6: *Monitoring, Inventorying and Surveying*

1998 & 1999

- Mussel surveys

2001 & 2002

- Stream surveys (no fanshell found)

2005

- Continuing stream surveys

Conservation of Rough Pigtoe

2004-2005

- Became aware of rough pigtoe as a T&E species that might occur on the Forest
- Prepared measures for its protection during Forest Plan revision

Conservation of Gray Bat

Area 1: *Conservation and Cooperation*

2000

- Gathered and shared information with USDI FWS in preparation of Biological Assessment

2002

- Drafted four cave management plans
- Located seven new caves and relocated three caves that had poor location information

2004

- Approved four cave management plans
- John Whittaker and Virgil Brack completed a paper summarizing bat studies on the Forest

Area 2: *Education, Research, and Training*

2000

- Provided three programs to schools and organizations

2001

- Provided 10 programs to schools and organizations

2002

- Prepared education trunk of information on bats
- Provided 28 programs about bats to schools and organizations

2004

- Provided 14 programs about eagles to schools and organizations
- Provided 30 programs about bats to schools and organizations
- Relocated caves, recorded accurate GPS locations and completed inventories for caves (work performed by Indiana Karst Conservancy)
- Continuing to relocate caves, record accurate GPS locations and complete inventories for caves (work performed by Indiana Karst Conservancy)

Area 3: *Forest Management*

- The Forest continues to minimize smoke impacts to occupied caves from prescribed fires through prescribed burn plans.

Area 6: *Monitoring, Inventorying and Surveying*

2002

- Conducted bat surveys at three mine entrances including, South Gardner Kaolinite Mine
- Surveyed 17 caves with potential for Indiana bat, found no gray bats
- Surveyed 80 karst features inside the Forest boundary, no gray bats found

2004

- Conducted bat surveys at South Gardner Kaolinite Mine entrance
- Inventoried cave fauna

2005

- Continuing to monitor gray bats in cooperation with IDNR
- Winter bat hibernaculum study

Conservation of Indiana Bat

Area 1: *Conservation and Cooperation*

1999

- Provided input on the Indiana Bat Revised Draft Recovery Plan
-

2000

- Extensively gathered and shared information with USDI FWS in preparing Biological Assessment

2002

- Met with USDI FWS, to determine ideas for use of grant money for bat awareness
- Assisted in editing BCI conservation assessment
- Forest personnel communicated and disseminated Indiana bat information to discuss new research findings, habitat enhancements that work, and ways to deal with new bat issues with other national forests

2005

- Consulting with the USDI FWS, to identify and support Indiana bat research and gain a better understanding of the Indiana bat on the Forest and throughout its range
- Cooperating with the USDI FWS to implement an appended programmatic consultation approach
- Reporting any dead bat found on the Forest to the USDI FWS Bloomington Field Office and transporting it to that office on ice

Area 2: *Education, Research, and Training*

2000

- Provided three programs to schools and organizations

2001

- Provided four programs to schools and organizations
- Forest employees attended Indiana bat conference in Kentucky

2002

- Provided 28 programs to schools and organizations –

2005

- Providing educational programs concerning bats to schools, civic groups, organizations, and other government employees as requested
- Will conduct a radio telemetry study of Indiana bats on the Forest, or in a project area, to assess the movements and habitat use of bats relative to timber harvest as time and funding allow
- Will provide bat information and management suggestions to land managers, private landowners, and others as requested

Area 3: *Forest Management*

- Providing foraging habitat through the development of ponds and wetlands and maintenance of forest openings
- Continuing Forest standards and guidelines that prohibit disturbance
- Considering all occupied Indiana bat caves as smoke-sensitive areas for prescribed fires conducted between October and April
- Minimizing smoke drift in sensitive areas through burn plans, prescriptions, and mitigations

- Providing protection for potential Indiana bat maternity colony trees (snags ≥ 16 " DBH) during prescribed burns conducted from May to October
- Actively enhancing or maintaining habitat for bats and other species through such projects as ponds, wetland creation and maintenance, and forest openings maintenance
- Avoiding removal of snags as safety hazards during the Indiana bat reproductive season; if a snag must be cut during that time period (April 15 through September 15), when possible (as time and funding allow), the Forest will conduct evening bat exit surveys to determine if a tree is an active roost tree.
- Continuing to consider all occupied Indiana bat caves as smoke-sensitive areas for prescribed fires conducted between October and April
- Maintaining at least 60 percent canopy cover on a stand basis when conducting uneven-aged timber harvests and completing TSI within hardwood stands
- Prohibiting harvest and manipulation of shagbark or shellbark hickory during TSI activities; unless the density of trees of these two species combined exceeds 16 trees per acre
- Maintaining at least 16 live shagbark and shellbark hickory (combined) per acre, if they are currently present
- Prohibiting removal of snags for TSI purposes unless they pose safety hazards
- Unless specific trees are identified in the permit by the Forest Service to allow for the removal of specific trees, firewood cutting permits are to clearly state that standing dead trees may not be taken
- Maintaining a component of large, over-mature trees in harvest areas, by retaining at least three live trees per acre 20 inches DBH or larger from the following species: shagbark hickory, shellbark hickory, bitternut hickory, silver maple, green ash, white ash, eastern cottonwood, northern red oak, post oak, white oak, slippery elm, American elm, and black locust
- Maintaining an additional six live trees of the species in the previous condition
- Retaining 16 live trees per acre, including the largest specimens of the preferred species remaining in the stand, if there are no trees larger than 20 inches DBH

Area 6: *Monitoring, Inventorying and Surveying*

1990

- Survey of Indiana bat on Forest (Tyrell and Brack)

2001

- Hibernacula on the Forest surveyed

2002-2005

- Conducted bat survey in the barrens (performed by John Whittaker)

- Updating the spreadsheet showing amounts, acres, miles, trees, by activity category and sharing with USDI FWS for appending to the biological opinion, as needed
- Monitoring visitation and year round use
- Inventorying cave fauna
- Surveying features, including the presence of bats (performed by Indiana Karst Conservancy)
- Will pursue additional funding and partnership opportunities to complete needed inventory and monitoring work
- Will survey only real hibernacula on the Forest as part of Indiana bat census count
- Virgil Brack and John Whittaker are summarizing studies of bats on the Forest

Effects of Conservation Efforts

Over the years, the Hoosier National Forest has implemented a large number of activities related to threatened and endangered species. These activities have been in the areas of conservation and cooperation; education, research, and training; forest management; land acquisition; law enforcement; and monitoring, inventorying, and surveying. The Forest has undertaken many activities related to Indiana bat and bald eagle, but activities have also been directed at gray bat and fanshell mussel.

We manage the Forest in accordance with sound principles of ecosystem management. Sustaining natural forest communities is the foundation of the *Forest Plan*. Coordination with USDI FWS, other agencies and organizations, and individuals allows Forest Service and other landowner activities to complement each other.

Since implementation of the amended *Forest Plan* in 1991, bald eagles have been downlisted from endangered to threatened and have been proposed for delisting. Populations in Indiana and the region have increased. Gray bat populations across its range have increased 30 to 40 percent since the mid 1970's. The population of Indiana bat across its range has continued to decline, but habitat is being provided, and populations in Indiana may have increased.

Each year Forest programs provide information concerning threatened and endangered species to thousands of members of the public. These include schoolchildren, visitors, and members of organizations where information is presented. Several million people live within a day's drive of the Forest. Although it is difficult to determine if people's attitudes toward the threatened and endangered species have been changed or strengthened in response to information and education efforts, many people have been impressed by seeing eagles on or near

the Forest or by learning about bats saving millions of dollars in crop damage each year by consuming insects.

Research carried out on the Forest or funded by the Forest Service has resulted in many publications, master's theses, and other unpublished data regarding life history requirements, habitat needs, species' status and locations, and other information. This information has helped managers understand how listed species fit into local forest communities and what the effects of proposed actions might be. The work already accomplished and continuing research will help meet vital recovery objectives.

Coordination and cooperation with state agencies and other Federal agencies related to threatened and endangered species have occurred often, particularly for Indiana bat and bald eagle.

The Forest has acquired at least 11,200 acres of potential habitat since 1991. Any projects or land use changes proposed for these lands are now subject to the requirements of the National Environmental Policy Act, including a biological evaluation to determine potential effects on threatened and endangered species. This means that we will fully consider threatened and endangered species in any decisions regarding land use on these properties, considerations that might not have occurred when the lands were in private ownership.

Effective law enforcement continues to be a needed part of the protection and conservation of threatened and endangered species. Law enforcement efforts support recovery objectives for compliance with laws protecting these species.

Forest specialists have designed management activities on the forest to minimize soil movement from sites, thereby not adding to the sediment load of the East Fork of the White River, where fanshell mussel and rough pigtoe have been found in the main stem of the river in Martin and Lawrence Counties.