

State Forest Indiana Bat Habitat Conservation Plan



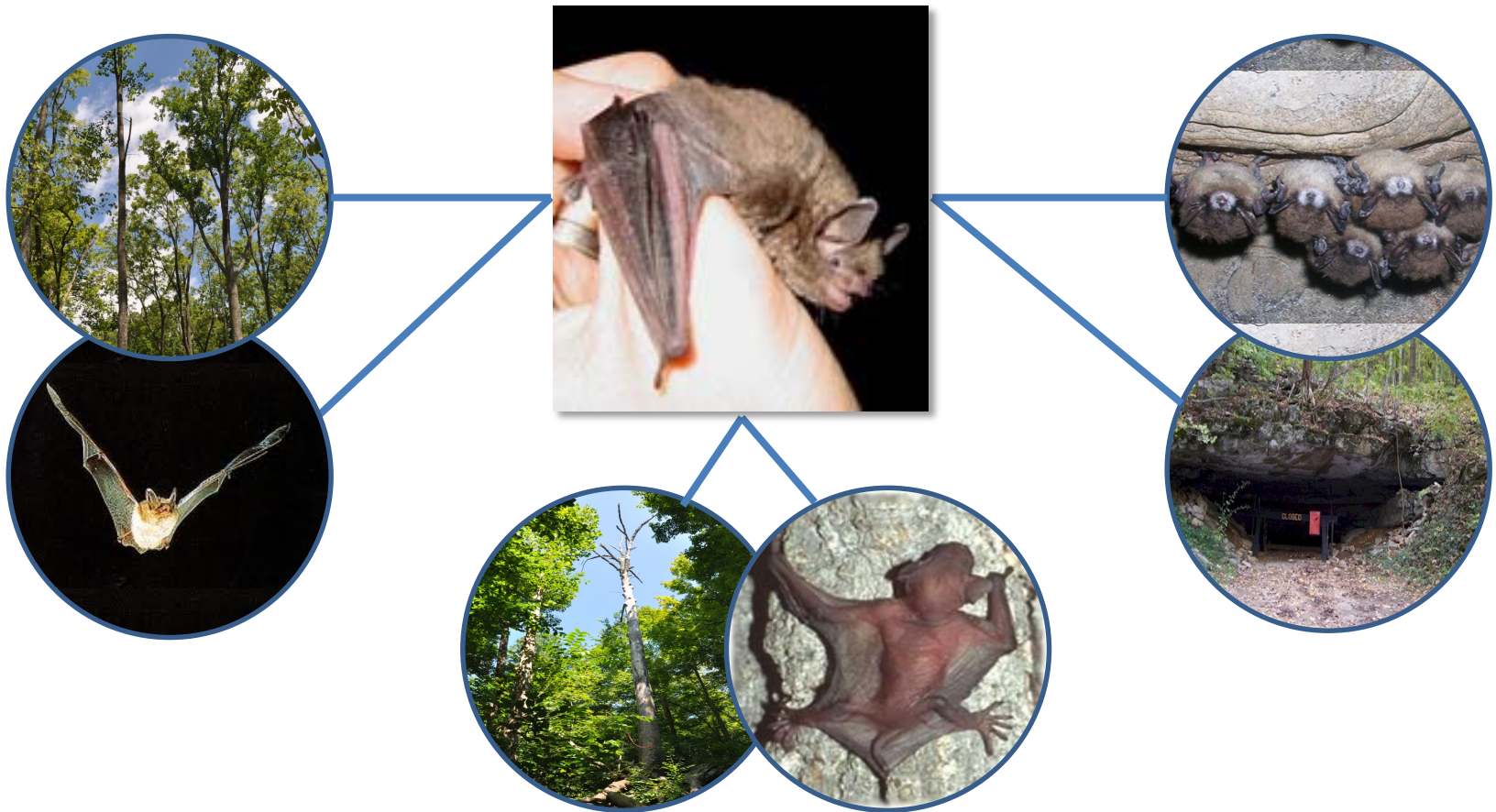
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Indiana DNR – Division of Forestry



Getting to know the Indiana Bat...





Prohibited Acts – *Section 9 of ESA (1973)*

“Take”: harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect or to attempt to engage in these activities. **Harm** includes habitat destruction/modification that kills or injures listed species.

“Incidental Take”: Take that results from, but is not the purpose of, carrying out an otherwise lawful activity.

Take is prohibited on Federal, State, and private lands.

State Forest Bat Habitat Conservation: The ESA & “Take”



Example #1: Felling a tree being used as a roost by Indiana bats during the summer

- Dead or injured bats observed
- Direct take (e.g., mortality, injury)



Example #2: Clearing forest where an Indiana bat maternity colony roosted

- “Harm”: habitat destruction/degradation
- Likelihood of injury or death due to loss of maternity habitat
- “Harm” can occur even when the species isn’t present during the activity



Example #3: Timber harvesting during summer; *roost trees avoided*

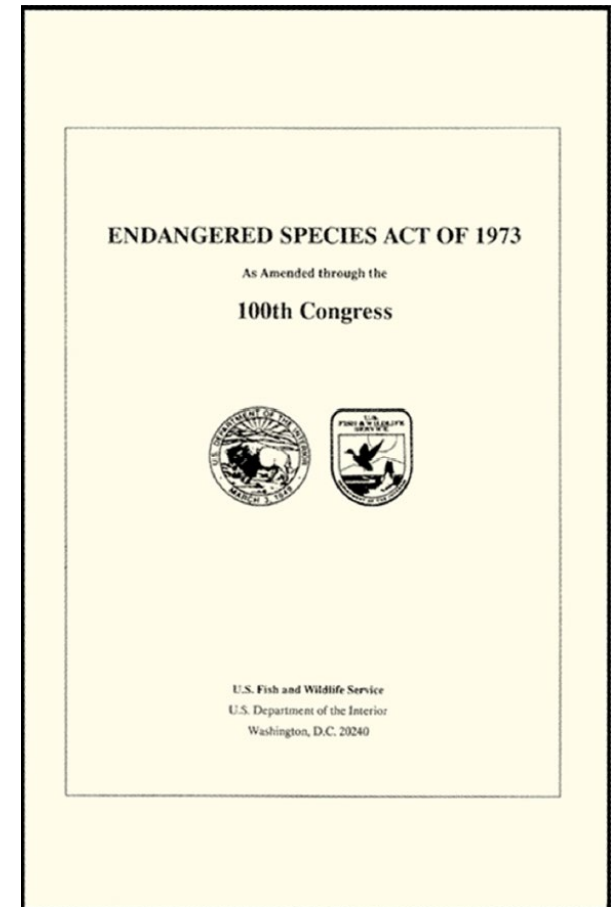
- Potential for “**harassment**”
- Significant disruption of normal behavior patterns such as breeding, feeding, and sheltering
- Take can occur without direct mortality or injury





Solutions for Complying with ESA

1. Avoid incidental take of federally listed species
2. Apply for an **Incidental Take Permit** from USFWS
 - Habitat Conservation Plan (& NEPA document)
 - Non-federal landowners
 - Authorized in Section 10 of ESA




State Forest Bat Habitat Conservation: The ESA & “Take”



USFWS-BFO Forest Management Guidelines

- Forest management guidelines developed by Indiana’s USFWS office in Bloomington
- Originally developed for federal properties & development projects
- Include seasonal harvest & prescribed burning restrictions



U.S. Fish & Wildlife Service

BFO Forest Management Guidelines for Avoiding Incidental Take* of Indiana Bats within the State of Indiana

These guidelines were developed by the Bloomington Field Office (BFO) of the U.S. Fish and Wildlife Service (FWS) to conserve the federally endangered Indiana bat (*Myotis sodalis*) and its summer/fall habitat within the State of Indiana. Adherence to these guidelines will avoid incidental take of Indiana bats and result in forest habitat that is suitable for the species’ use, but may not represent optimal habitat. Maintaining or creating optimal Indiana bat maternal habitat typically would require more intensive management practices than provided here. This is a working document and periodically will be revised as new data warrant.

For forest parcels or stands managed in accordance with these guidelines, the BFO typically will provide concurrence letters to managers needing Section 7 clearance (i.e., an informal consultation will suffice) and an incidental take permit/Habitat Conservation Plan (HCP) will not be required on state-owned or privately owned lands with known Indiana bat occurrences because the risk of taking one or more Indiana bats will be discountable or insignificant. However, if any aspects of these management guidelines cannot be followed or conflict with other land management goals or directives, then forest managers are strongly encouraged to contact the BFO to discuss alternative processes available to federal and non-federal land managers under the Endangered Species Act of 1973 (ESA). [NOTE: Take of federally listed species is prohibited by Section 9 of the ESA regardless of whether the taking occurs on federal, state, or privately owned lands].

FOREST MANAGEMENT GUIDELINES

1. At least 60% canopy cover (on a stand-by-stand basis, depending on size of stands) shall be maintained after any timber harvest activities.
2. Shagbark hickory (*Carya ovata*) or shellbark hickory (*C. laciniosa*) trees shall not be harvested or manipulated during timber stand improvement (TSI) activities, unless the combined density of these species exceeds 16 trees/acre. If present, at least 16 live shagbark and shellbark hickory (combined) >11” dbh must be maintained per acre.
3. Standing snags shall not be felled/removed, except where they pose a serious human safety hazard (a tree with <10% live canopy should be considered a snag). Snags that have no remaining bark and no visible cracks, splits, or hollows may be felled as well as any snags leaning more than 45° from vertical.

* **Incidental take** – Take that results from, but is not the purpose of, carrying out an otherwise lawful activity.
“Take” - To harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct; may include significant habitat modification or degradation if it kills or injures wildlife by significantly impairing essential behavioral patterns including breeding, feeding, or sheltering.
“Harass” - To intentionally or negligently, through act or omission, create the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavior patterns such as breeding, feeding, and sheltering (defined by FWS regulation; NOAA Fisheries has not defined harass by regulation).
“Harm” - To perform an act that kills or injures wildlife; may include significant habitat modification or degradation when it kills or injures wildlife by significantly impairing essential behavioral patterns including breeding, feeding, or sheltering.

U.S. Fish & Wildlife Service - Indiana (812) 334-4261 Revised 12/19/11



So, What's Wrong With Seasonal Harvest Restrictions?

- Harvesting restricted to when bats not present in forest
- Harvesting impacts to soil and water are reduced during drier portions of the year
- Working on saturated soils increases risk of compaction, rutting, churning/mixing, loss in soil productivity
- Winter-only harvesting significantly increases management costs
- Additional costs for pre- and post-harvest mitigation activities, reduced sale bids (-5-10%), road construction, rock reinforcement, etc.

State Forest Bat Habitat Conservation: HCP Timeline



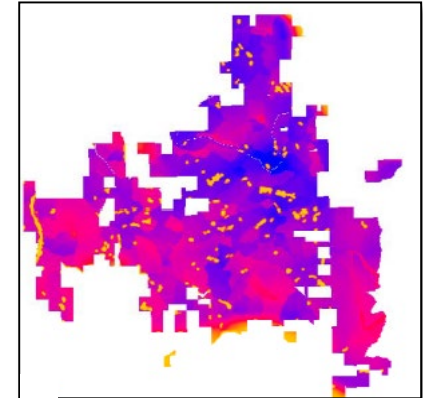
Indiana Bat HCP Timeline

- **2003:** Initial work begins on HCP and NEPA document
- **2007-08:** First draft of HCP/EIS submitted/reviewed
- **2010:** Forestry starts on second version of HCP
- **2011:** Increased investment in Indiana bat research on State Forests
 - Habitat suitability modeling (Purdue)
 - Radio-telemetry, roost ecology (ISU & BSU)
 - Intensive foraging studies using acoustic detectors (BSU)
- **2014:** Take estimation modeling; CFI data essential
- **2015:** Northern long-eared bat listed, 4(d) rule issued
- **2016:** Scoping announcement; public comments received
- **2016-2017:** Draft of HCP (2nd version) completed, 1st review



State Forest Research & Inventories: *Bringing HCP Issues Into Focus*

- Potentially suitable maternity habitat on State Forest; harvest scenarios¹
- Indiana bats tolerant of State Forest timber harvesting methods relative to roosting² and foraging³ habitat.
Benefits, too?
- Continuous Forest Inventories



¹Pauli, B.P. 2014. PhD Dissertation, Purdue Univ.; Pauli et al. 2015. *Ecosphere* 6(4)
²Bergeson, S.F. et al. 2018. *Forest Ecology and Management* 427:305-316
³Nolder, A.D. 2016. MS Thesis, Indiana Univ. of Pennsylvania; Caldwell, K.L. 2015. MS Thesis, Ball State Univ.; Titus, K.L. 2018. MS Thesis, Ball State Univ.



HCP Components – Program and Coverage

- Covered Species: Indiana Bat
- Coverage area: State Forests, Forest Recreation Areas, Nature Preserves
- Program Description
 - 20 year term
 - **Goals:** sustainable, maintain oak-hickory, improve habitat diversity, minimize soil impacts, maximize program flexibility
 - ***Worst-case scenario modeled to over-estimate impacts***
- Covered activities: timber harvesting, Rx fire, timber stand improvement, facility construction/maintenance

HCP Components – Conservation Program

- Avoidance & Minimization Measures
 - All State Forest property
 - Known maternity colony areas & roosts
 - Hibernacula



HCP Components – Take Estimation

- How to estimate potential ‘take’ when affected bats are rarely (or ever?) found?
- Probability-based modeling
 - Bat research and forest inventories essential
 - Likelihood of bats using trees/snags?
 - Likelihood bats encountered during covered activities?
 - Likelihood & quantification of take?
 - Seasonal take estimates
 - Activity- and gender-specific estimates





HCP Conservation Program – Mitigation

- Based on take *plus* future reproduction lost
- USFWS's *Resource Equivalency Analysis Model* used to calculate mitigation acreage
- Two options: 1) protect current habitat or 2) restore/create habitat
 - Roosting and foraging habitat
 - Must be in existing maternity colony area
 - Optimal habitat maintained 'in perpetuity' through conservation easement or similar agreement
- Additional conservation measure: Indiana bat habitat management assistance for private landowners

HCP Conservation Program – Monitoring

- Adaptive management approach for HCP implementation
- Take Limit Compliance
- Impact minimization effectiveness
- Mitigation effectiveness



Updateable Variables Used in Indiana Bat Take Estimation Model

(Partial listing,
as of 9/18/2018)

Model Inputs	Update Frequency	Information Source
Forest Acres in Indiana	Annually	US Forest Service FIA
Statewide Indiana bat population	Biennially	USFWS/DNR hibernacula survey
System-wide species-specific snag levels	Annually	State Forest Continuous Forest Inventory (CFI)
System-wide snag levels, by decay class	Annually	State Forest CFI
System-wide loose-bark hickory levels	Annually	State Forest CFI
System-wide white oak levels	Annually	State Forest CFI
Loose-bark hickory harvest rate	Annually	State Forest harvest records
White oak harvest rate	Annually	State Forest harvest records
Number of males/occupied roost (summer)	Inconsistently available	When telemetry/roosting surveys done
Number of females/occupied maternity roost	Inconsistently available	When telemetry/roosting surveys done; known roost exit counts
Number of males/occupied roost (swarming)	Inconsistently available	When telemetry/roosting surveys done
Number of females/occupied roost (swarming)	Inconsistently available	When telemetry/roosting surveys done
Hibernacula population estimates	Biennially for most	USFWS/DNR hibernacula survey
Percent forest in hibernacula buffer areas	Annually	DoF reclassified GIS layer from National Agricultural Statistic Survey
Acres of timber harvest	Annually	State Forest records
Acres of prescribed fire	Annually	State Forest records
Acres of timber stand improvement (involving tree felling)	Annually	State Forest records
Acres of new road construction	Annually	State Forest records
Acres of road maintenance involving tree felling	Annually	State Forest records
Acres of new trail construction	Annually	State Forest records
Acres of trail maintenance (involving tree felling)	Annually	State Forest records
Acres of tree clearing (not roads or trails)	Annually	State Forest records
Acres of state forest added/lost - summer habitat only	Typically annually	State Forest records
Acres of state forest added/lost - summer & swarming/staging habitat	Typically annually	State Forest records

HCP Conservation Program – Monitoring

- Adaptive management approach for HCP implementation
- Take Limit Compliance
- Impact minimization effectiveness
- Mitigation effectiveness





NEPA and the Incidental Take Permit Application

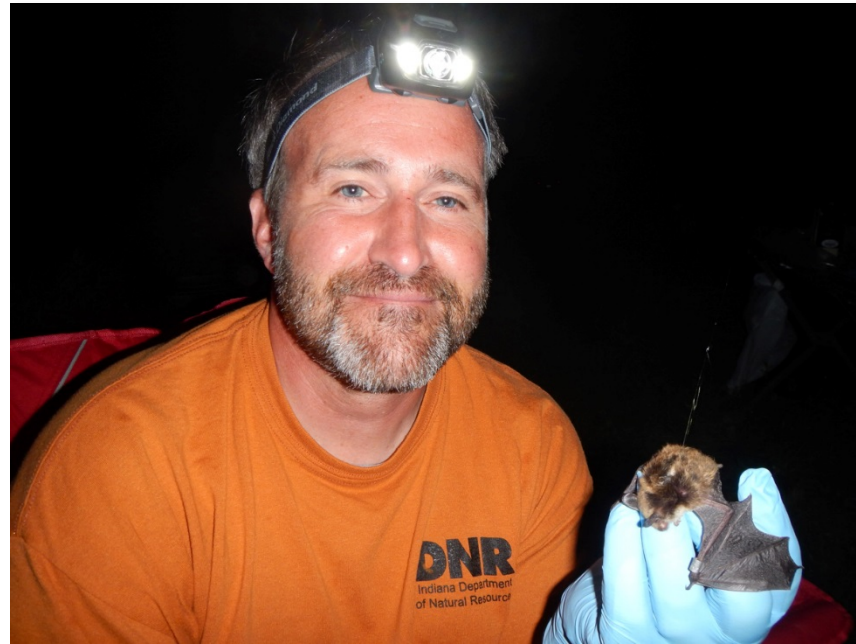
- National Environmental Policy Act
- Required for ITP
- Define and analyze environmental effects from Federal agency action (e.g., incidental take permit)
 - Ecological considerations
 - Human environment
- Direct, indirect, and cumulative effects
- Environmental Impact Statement; Environmental Assessment



Forestry's HCP: Upcoming Events

- Fall 2018
 - USFWS-IN: Complete HCP/EA technical review & updates
 - USFWS-RO: Complete HCP/EA administrative review
 - DNR-Forestry: Updates & revisions
- Winter 2018-2019
 - USFWS-DOI: final draft review
 - Notice of Availability published in Federal Register
 - Public Comment period (30 days)
 - Final changes to HCP & EA
- Spring/Summer 2019
 - USFWS: Develop/finalize documents; **ITP by summer 2019?**

Questions?



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