Environmental Assessment
Forest Openings Maintenance

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

Brownstown and Tell City Ranger Districts

Hoosier National Forest

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Abstract: This environmental assessment addresses the proposal to maintain forest openings by mowing and burning.

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Preface

The Hoosier National Forest completed a comprehensive land management planning effort with the publishing of the Hoosier National Forest Land and Resource Management Plan (Forest Plan) in 1991. During this effort we made a concerted effort to seek out public involvement. With the public's help we identified issues and alternative approaches to managing the Hoosier National Forest. An environmental impact statement (EIS) was prepared in conjunction with the Forest Plan to document the analysis. The EIS was developed in accordance with the National Environmental Policy Act (NEPA) and the Council on Environmental Quality implementing regulations for NEPA.

The approval of the Record of Decision for the final EIS on April 8, 1991, represents the first level of decision making related to land and resource management planning. This decision determined the desired future condition of the Hoosier National Forest and established the guidance under which future projects would be implemented.

The second, and final, level of decision making focuses on the analysis and implementation of management practices and projects designed to achieve the goals and objectives of the Forest Plan. This involves site-specific analysis to meet the requirements of NEPA and specific on-site resource needs.

The environmental assessment (EA) for the proposed Forest Openings Maintenance documents the site-specific analysis for project implementation occurring at the second level of decision making. This EA was initiated as a result of environmental analysis of the proposed project in accordance with NEPA procedures. These procedures afforded interested and affected parties the opportunity to participate. This report was prepared outlining the alternatives for carrying out the project, noting any needed mitigation measures, and predicting the relevant environmental consequences. The decision maker may now consider the results of this analysis in making an informed decision.

Notice of this project and requests for comments were sent to approximately 360 interested parties on March 20, 1998. James E. Denoncour signed for Kenneth G. Day Forest Supervisor a decision memo on July 22, 1998 to maintain 952 openings (approximately 3, 138 acres) by bush-hogging and removal of small trees along opening edges. With the assistance of our partners (Quail Unlimited, National Wild Turkey Federation, and the Department of Natural Resources Division of Fish and Wildlife) we maintained approximately 300 acres of openings. However, Kenneth G. Day decided to withdraw that decision on September 21, 1998. He did this to be consistent with the August 27, 1998 Seventh Circuit Court of Appeals ruling and do an environmental assessment (EA) and make a new decision.

We usually do not do environmental assessments for routine projects like this one. We usually categorically exclude such routine projects from documentation in an environmental impact statement (EIS) or environmental assessment (EA). We often document such projects with a decision memo. The Seventh Circuit Court of Appeals in Chicago, Illinois on August 27, 1998 in Rhodes v. Johnson (No. 97-3687, slip op.) held that the USDA Forest Service Environmental Policy and Procedures Handbook is binding on the USDA Forest Service. The court interpreted the Handbook as demanding "that the presence of an extraordinary circumstance requires the Forest Service to prepare an environmental assessment." The court's ruling is different from how the Forest Service had interpreted this section. Therefore, until the Handbook is revised, we are required do an EA whenever one of the following conditions exist: steep slopes, highly erosive soils, threatened and endangered species or their critical habitat, flood plains, wetlands, municipal watersheds, wilderness, wilderness study

areas, National Recreation Areas, inventoried roadless areas, Research Natural Areas, Native American religious or cultural sites, archaeological sites, historic properties, or historic areas.

Purpose and Need for Action

Introduction

Our primary responsibility is to provide healthy ecosystems for Americans, present and future. While doing this, we sustain the vitality and diversity of the Hoosier National Forest in perpetuity and provide many benefits. This environmental assessment displays the direct, indirect, and cumulative effects of the proposed action and a no action alternative.

Forest openings provide habitat or habitat components for plants and animals which require or are benefitted by early successional stages of vegetation. Maintaining vegetation also allows for associated recreation activities such as wildlife viewing and hunting.

This proposal implements the USDA Forest Service natural resource agenda. It addresses sustainable forest ecosystem management in the areas of ecosystem health and community partnerships. Specifically this proposal would help sustain biologically diverse forest ecosystems by providing habitat for early successional species. It would sustain disturbance associated habitats where natural disturbance regimes have been altered or interrupted by development and land use patterns. It would provide quality recreational opportunities which in turn promote environmentally sensitive economic development and jobs based on forest resources. It would do so in an area with important wildland-urban interface concerns and high recreational demand. This project would promote and strengthen collaborative partnerships between federal and state agencies, local citizens, and wildlife conservation groups.

Purpose of the Proposed Action

The purpose of this proposal is to maintain early seral vegetative conditions in forest openings. Forest openings require periodic maintenance to reset succession so they continue to provide habitats dominated by grasses, forbs, shrubs, and young trees. This proposal is consistent with the Hoosier National Forest Land and Resource Management Plan (Forest Plan) guidance for Management Areas 2.4, 2.8, 6.4, 7.1, and 8.2. Forest-wide guidance calls for forest openings to be "managed to provide early successional vegetation beneficial to some wildlife species, provide habitat for some rare native plant communities, add visual variety, and provide for associated recreation opportunities such as hunting, berry picking, and wildlife observation". "Forest openings may be established or designated on a variety of sites such as ridgetops, midslope benches, and valley bottoms to provide for different ecological requirements of native flora and fauna." (Forest Plan, p. 2-9 to 2-10).

Need for the Proposed Action

The predominant factors influencing composition and structure of native plant communities and associated wildlife communities (given site potential) are vegetative succession and disturbance. Disturbances of sufficient intensity to reset succession must occur frequently enough to prevent areas from advancing to mid or late seral stages and perpetuate early seral forest communities.

In the past both natural and human caused disturbances such as tornados, fire, and agriculture provided openings which became early seral forest. On the Hoosier National Forest abandoned farms and pastures provided for many species which depend on grass/forb, shrub, and young forest habitats during all or a portion of their life cycles. Species which depend on those habitats include rare species like the Regional Forester's Sensitive Species, Henslow's sparrow (*Ammodramus henslowii*) and important game species like wild turkey (*Meleagris gallapavo*) and bobwhite quail (*Colinus virginianus*).

Discontinuance of farming and grazing activities and limitations to logging have allowed forest succession to predominate over most of the Hoosier National Forest. This has caused declines in available habitat for opening and edge dependant species. Nearby private lands which are currently being farmed or pastured provide some open habitat. That habitat is of lesser quality than managed forest openings because it has very simplified vegetation structure and composition. These areas are either not utilized or poorly utilized by many species which thrive in early seral forest. Management of forest openings is designed to provide the types of edge and open habitats which are being lost from the Forest and are seldom found elsewhere in the surrounding landscapes.

Very little early-successional habitat has been created on the Forest within the last ten years. Tornados have created 200 to 300 acres of young forest which will pass into mid-seral stages in the next five to ten years. Removal of non-native pines sufficient to create young forest conditions has occurred on a total of 196 acres as part of the Eastside Restoration (58 acres), Red Pine Salvage (50 acres), and Snow Pine Salvage (88 acres) projects. The emphasis in the Forest Plan on continuous forest cover systems (uneven-aged silviculture), preservation and restoration is resulting in an increase in mid-successional habitats and a trend toward late-successional species. If open areas are not actively maintained the effect will be a reduction in the amount of early-successional habitat to less than one percent of Forest acres (about 1,300 acres). Less than half of those acres would be the type of grass/forb habitats which burning produces. That compares with a Forest Plan expected range of five to seven percent of Hoosier National Forest system lands in early-successional habitats (Forest Plan FEIS 2-15). This reduction will occur over the next five to 20 years through vegetative succession.

The need for management to provide early successional habitats has been recognized at larger scales as well. The Partners in Flight Interior Low Plateaus Bird Conservation Plan, which covers the region including the Hoosier National Forest, discusses habitat losses for early seral species. Species found on the Forest of high concern which use these habitats include Bewick's wren (*Thryomanes bewickii*), prairie warbler (*Dendroica discolor*), and blue-winged warbler (*Vermivora pinus*). These species all benefit from the habitats provided by maintained forest openings (Ford et al. 1998). (Note: Bewick's wren was last sighted on the Forest in 1995 and may no longer be breeding here.)

The listing of birds which are rare or declining supports the need to manage a variety of habitat types. Although there are many acres of open lands in Indiana, they are largely on simplified agricultural lands and pasture and therefore lack the complex vegetation structures and species compositions which favor many of the rare species listed below. For example, Henslow's sparrows are found in grassy areas or old fields and prefer a lot of standing dead vegetation. They abandon fields if they're mowed and won't utilize them if there is too much woody structure. Bachman's sparrow requires dense herbaceous cover interspersed with or bordered by, shrubs and trees. The maturing of the Hoosier National Forest has favored a number of woodland species and in some areas interior forest species. It has potentially adverse effects on a number of equally rare and equally important species associated with openings and young forest stands.

The Audubon Society's 1999 Watchlist for Indiana separates birds into three priority levels based on their scarcity and threats to their existence. Table 1 identifies which of these species are found on or near the Hoosier National Forest. Two lists were used to generate this table; the 1998 list of national watchlist species found in Indiana and the 1999 Audubon Watchlist - Indiana - 1st Edition. Of the 24 species listed, 17 are dependent on the types of habitats provided by maintained forest openings on this Forest. Twelve of these opening favored species breed on or near the Forest.

Table 1: Audubon Society Indiana Watchlist Species on or near the Hoosier National Forest (Muehter 1998, 1999; Castrale 1999b; Olson 1999c)

Species	Habitat	Comments
1. Cerulean warbler *Dendroica cerulea*	Woodlands, interior forest	High priority
2. Henslow's sparrow *Ammodramus henslowii*	Large fields, mostly grass/forb	High priority, needs areas 100 acres or more
3. Short-eared owl *Asio flammeus*	Large grassy areas	Wintering bird
4. Bell's vireo *Vireo bellii*	Old fields, old pastures, near water	High priority, generally breeds north of the forest
5. Prairie warbler *Dendroica discolor*	Brushy old fields	High priority
6. Prothonotary warbler *Protonotaria citrea*	Swamps, bottomlands, riparian woodlands	
7. Golden-winged warbler *Vermivora chrysoptera*	Old overgrown fields near bogs, swamps, and marshes	Generally breeds north of the forest
8. Chuck-wills-widow *Caprimulgus carolinensis*	Open woods, forest edge	
9. Red-headed woodpecker, *Melamerpes erythrocephalus*	Savannas, woodlands with open understories, edges	
10. Worm-eating warbler *Helmitheros vermivorus*	Dense woodlands with brush or windfall trees	High priority
11. Wood thrush *Hylocichla mustelina*	Woodlands	
12. Bobolink *Dolichonyx oryzivorus*	Grassy areas, weedy, dry, upland fields	Generally breeds north of the forest
13. Kentucky warbler *Oporornis formosus*	Dense woodlands	High priority
14. Dickcissel *Spiza americana*	Meadows, pastures, grasslands	High priority
15. Black-billed cuckoo *Coccyzus erythropthalmus*	Old fields, shrubby areas	
16. Yellow-billed cuckoo *Coccyzus americanus*	Old fields, shrubby areas	High priority
17. Whip-poor-will *Caprimulgus vociferus*	Open woods, underbrush, brushy openings	High priority

18. Chimney Swift *Chaetura pelagica*	Buildings, hollow snags	High priority
19. Willow flycatcher *Empidonax traillii*	Riparian or wet openings with willows	
20. Sedge Wren *Cistothorus platensis*	Damp, sedge meadows, wet areas	
21. Blue-winged warbler *Vermithora pinus*	Partially wooded hillsides, brushy clearings	High priority
22. Louisiana waterthrush *Seirurus motacilla*	Wooded perennial stream courses	High priority
23. Bachman's sparrow *Aimophila aestivalis*	Old fields, shrub/grass/forb openings	High priority, may be extirpated
24. Field sparrow *Spizella pusilla*	Old fields, shrub/grass/forb openings	High priority

*****Habitat descriptions are from *The Birds of Indiana* by Mumford and Keller (1984) and from discussions with local bird experts (Castrale 1999b, Olson 1999c).

Within the Central Hardwood Region, early successional forest species which are declining include Neotropical migratory songbirds such as the Henslow's sparrow, and game species such as ruffed grouse (*Bonasa umbellus*), and American woodcock (*Scolopax minor*). Region-wide assessments recommend managing early successional communities in regenerating forest, glades, barrens, savannas, and old fields to provide for the needs of forest birds associated with these types (Thompson and Dessecker 1997).

The Breeding Bird Survey (BBS) shows that 38 percent of early-successional (scrub/shrub) breeding bird populations in Indiana declined significantly from 1966 to 1996. This compares to 17 percent of mature forest breeding birds showing significant declines during the same period. Additionally significant declines in woodcock and an 80 percent decline in ruffed grouse populations have been documented (Banker 1999)

Forest openings also provide important habitat for small mammals, particularly rabbits, which are favored prey for bobcats (*Lynx rufus*), a Forest Species of Concern (Castrale 1999b).

Proposed Action

The Hoosier National Forest proposes maintaining 958 openings over the next five years on the Brownstown and Tell City Ranger Districts. The total acreage of the openings to be maintained is approximately 3,335 acres. These areas would be maintained through bushogging (mowing) and/or burning. Mowing would occur on 894 openings covering 2,311 acres. Sixty-four openings covering 1,024 acres would be burned. Openings scheduled for burning could be mowed in lieu of that treatment if operational or budget considerations were prohibitive. Trees greater than three inches in diameter at breast height (DBH) would not be removed by either of these treatments.

Openings maintenance provides habitat or habitat components for plants and animals which require or are benefitted by early successional stages of vegetation. Also, maintaining openings allows for associated recreation activities such as wildlife viewing and hunting. During mowing only part of each opening is treated at a time. Generally, about one-half to two-thirds of the acreage in each opening is treated. The rest of the acreage is left to provide shrubby habitat for wildlife associated with early seral forest, shrub communities, and forest edges.

Burning would occur in some of the openings which are five acres or larger. These openings are predominantly grass/forb communities with some shrubs and small trees present. Burning is a cost effective method for maintaining these larger openings and favors grasses and forbs over woody species. Openings treated by burning have fewer woody stems than mowed openings. They provide habitat for grassland, old-field, and prairie species and for species that use forest edges with these types. See maps of the proposed action in Appendix C.

Decision to be Made

The decision to be made is whether to maintain all or some portion of these forest openings through mowing and burning.

Forest Plan Background

The Forest Plan was adopted to meet the requirements of the National Forest Management Act (NFMA) of 1976. The activities in this proposal would occur within Management Areas 2.4, 2.8, 6.4, 7.1, and 8.2. They are consistent with guidance for forest openings management within each of those areas (Forest Plan 2-9, 2-28, 2-32, 2-42, 2-45, and 2-53).

The effects of maintaining forest openings were thoroughly analyzed in the Draft and Final Environmental Impact Statements, and Hoosier National Forest Land and Resource Management Plan Amendment (U.S. Department of Agriculture Forest Service 1990, 1991a, 1991b). This analysis is tiered to both EIS's and to the Forest Plan. This proposal is well within the size and scope of those analyses. The Forest Plan estimates that about 4,000 acres of forest openings will be maintained (U.S. Department of Agriculture Forest Service 1991b). This proposal to maintain 3,335 acres of forest openings is smaller for reasons discussed elsewhere in this document.

Management of forest openings was a subject of appeals of the Hoosier National Forest Land and Resource Management Plan Amendment. The Chief of the Forest Service upheld the practice in denying those appeals (Wilcox 1994).

The expected annual level of maintenance over the next five years is approximately the same as maintenance programs historically completed under categorically excluded decisions and under a decision notice based on a 1992 environmental assessment on the Hoosier National Forest (U.S. Department of Agriculture Forest Service 1992, 1993a, 1993b, 1995a, 1995b, 1996, 1997). Several people appealed District Ranger Bruce Slover's Decision Notice of September 3, 1992. Both the Forest Supervisor and the Regional Forester reviewed and affirmed the decision (Voytas 1993, Marita 1993).

Other Related Projects

This proposal covers all of the designated forest openings on the Hoosier National Forest. Similar habitats are maintained along utility corridors which occupy approximately 638 acres on the Forest. Burning to restore native warm season grasses has occurred on approximately 1,300 acres of which about 50 percent are in an open condition.

Other Projects in the Area

Forest openings are dispersed over much of the Hoosier National Forest, in management areas where the greatest disturbance is allowed, and outside large blocks of contiguous interior forest. Projects likely to occur near openings include timber harvest, trail construction, wetlands restoration, and prescribed burning.

Recent projects have included salvage logging of tornado and snowstorm damaged hardwoods and pines on the Pleasant Run Unit of the Brownstown Ranger District and on the Tell City Ranger District; and construction of several trails, the Oriole East Trail on the Tell City Ranger District and the Hickory Ridge Trail on the Brownstown Ranger District. Maintenance of utility corridors on the Forest is periodic and ongoing.

Issues Related to the Proposed Action

An interdisciplinary team reviewed comments from interested parties including cooperators and other members of the public. Scoping for this project included soliciting information and comments from Hoosier National Forest personnel, the IDNR Division of Fish and Wildlife, IDNR Division of Nature Preserves, conservation groups, and other interested members of the public. Approximately 360 parties received scoping documents describing the proposed action. Twenty responses were received.

Six issues were identified through an interdisciplinary review of the proposed action and comments received:

1. Management Efficiency: One person felt the proposal was an efficient and effective way to provide habitat for early seral species. Another thought it was a complete waste of time and money. (Comment G-3, page A-3)

2. Prescribed Burning: One person objected to the use of fire as a tool to maintain early seral, edge and open habitats. (Comment G-14, page A-6)

3. Protection of Karst Features: Several openings are near karst features such as caves or rises. (Comment G-15, page A-6)

4. Providing Late Successional Habitat: One person felt that any emphasis on early succession habitat was wrong and wondered what was being done to provide for late successional species. (Comment P-1, page A-7)

5. Forest Fragmentation: Several respondents were concerned that forest openings might fragment blocks of forest and lessen habitat quality for species which benefit from interior forest habitats. (Comment P-2, page A-8)

6. Soil Protection and Erosion: There was a concern that operating equipment to treat openings might lead to soil compaction or erosion. (Comment S-1, page A-12)

These comments and concerns are addressed specifically in the Environmental Effects section of this document and in the comment response in Appendix A.

Alternatives

Process used to develop alternatives

The Proposed Action was designed to be compatible with Forest Plan direction following several years of consultation with state and federal agencies, wildlife conservation groups, and interested members of the public. Additional alternatives, including a no action alternative, were generated based on comments received through public scoping.

Alternative A (Proposed Action)

Alternative A (Proposed Action) is explained in detail in the purpose and need section of this environmental assessment.

Alternative B (Mowing Only)

This alternative would treat the openings in the proposed action through mowing only. One person particularly objected to the use of fire to maintain early successional habitats. This alternative would resolve that issue.

Alternative C (No Action)

This alternative would not carry out the proposed forest openings maintenance. No mowing or burning of existing forest openings would occur. The existing openings would gradually revert to closed canopy forest. This alternative would result in the loss of 3,335 acres of early seral, grassland, and edge habitat and increase mid-seral woodland habitat by the same number of acres over time. Most areas would enter mid-seral stages within twenty to thirty years. Habitat suitability for early seral plants and animals would begin to diminish immediately. This alternative would address the issues of management efficiency, providing late-successional habitat, and forest fragmentation.

Alternatives considered but not fully developed

A wide range of alternatives from 2,000 to 5,000 acres was considered and analyzed in the DEIS and FEIS for the Forest Plan. The decision on the forest plan included managing openings; this analysis is tiered to that analysis (see EA preface).

Alternative D (Maintain All Openings)

One comment recommended maintaining all existing openings in the forest. There were an estimated 3,000 to 3,500 areas which have been managed as openings in the past. Those openings covered 7,000 to 8,000 acres. (Not all these areas were in an open condition at once.) This alternative was not fully developed because many openings in various stages of succession exist in management areas where the Forest Plan does not permit their maintenance. Most of these are over grown to the point where they are blending with the surrounding forest and no longer provide the type of habitats which are the purpose of this proposal. Some formerly maintained openings are located in portions of the Forest where the management emphasis is now on providing interior or late successional woodland habitats. Others have been dropped from proposals because they are inefficient to manage or have access problems. For these reasons it is undesirable to maintain all former openings.

Alternative E (Maintain All Openings Except Pleasant Run)

Another recommendation was to maintain all the openings in the proposal except those in the Pleasant Run Unit of the Brownstown Ranger District. Several large blocks of relatively contiguous forest exist in the Pleasant Run Unit. The respondent felt that elimination of all openings in this purchase unit would improve the quality of those blocks and further buffer existing interior forest from fragmentation effects.

There are 264 openings covering 813 acres within this unit. They range in size from 1 acre to 20 acres. Two exceptions, Maines Pond area and the Harris tract are 72 acres and 30 acres respectively. These are located in areas dominated by open private lands. The remainder of the openings on the Pleasant Run Unit are located around the edges of the public ownership and outside large blocks of contiguous forest. If this proposal were implemented 2,522 acres in 694 openings would be maintained on the remainder of the forest.

The alternative to maintain all openings except those on the Pleasant Run Unit is a subset of the Proposed Action Alternative and its environmental effects are displayed in analysis of the Proposed Action and No Action Alternatives. The decision maker has the option of selecting a portion of any analyzed alternative or blending alternatives, so the recommendation to drop the Pleasant Run openings was not separately analyzed.

Alternative F (Edge Maintenance with Heavy Equipment)

The March 20, 1998 proposal included edge maintenance and piling of brush with heavy equipment such as bulldozers. That portion of the proposal was not fully carried forward into our proposed action because the heritage survey workload it created would not permit timely completion of the analysis and project design.

Alternative G (Maintain Only Large Openings)

One person suggested an alternative where small openings would not be maintained. (The commentator did not define "small". For the purposes of this analysis we used less than 5 acres.) This would result in maintaining an estimated 123 openings covering about 1,515 acres. The alternative suggested above and its effects are a subset of the alternatives analyzed and could be selected by a decision maker based on this analysis.

Environmental Effects

Management Efficiency

This issue is about the benefits derived from the proposed action or alternatives in relation to the effort or costs required to implement it. Respondents who do not believe the action to be beneficial expressed conviction that the proposal was a waste of time and money. People who value the benefits provided by the proposed action felt that the proposal represented improved management efficiency when compared with past forest openings management or with other options for accomplishing it.

The affected environment for the management efficiency issue is the Hoosier National Forest's annual budget of $3 to $4 million per year. Management efficiency can be evaluated in terms of the demand on the Forest's budget to accomplish the proposed maintenance or achieve desired conditions through other alternatives.

The cost for implementing burns includes fireline construction at about $5 per acre and burning cost of about $25 per acre. (Costs vary with size and complexity of the burn, these are estimated averages). Costs for mowing are $90 to $100 per acre.

Effects of the proposed action (Alternative A): The proposed action offers the following benefits in terms of management efficiency.

1. Most of the work is accomplished by collaborative partnerships with wildlife conservation groups and the Indiana Department of Natural Resources, Division of Fish and Wildlife. These cooperators provide either funds or labor to accomplish mowing and put in firelines for burning. Hoosier National Forest staff do the planning and administration and implement the prescribed burns. Because of this the Hoosier National Forest budget pays only about twenty-five percent of the total cost for planning and implementing this management activity.

2. The proposed action is more efficient than past forest openings maintenance because there are fewer but larger openings. The average size has increased from about 1.2 acres to about 3 acres per opening. These openings are also aggregated over less of the forest than in the past. Because of this less movement of equipment and personnel is required to accomplish treatments. This reduces the cost-per-acre.

3. The use of fire on more acres of openings than in the past increases efficiency because it costs less to burn openings than to use other treatment methods. Also, the cost per acre for burning openings will be less than in the past because small dispersed openings have been eliminated from the burning prescription. Only openings five acres or larger would be burned. Burning large openings costs less per acre because of reduced fireline construction and personnel movement costs for each acre accomplished.

4. This planning effort is also more efficient because this proposal covers five years worth of maintenance. Previous decisions had only covered one or two years of work.

Cumulative effects of the proposed action (Alternative A): The total cost of implementing a program of 250 acres of burning and 500 acres of mowing per year (the expected program under the proposed action) is about $62,000 per year. This is about 1.8 percent of the Forest's annual budget. The savings from the above efficiency measures and contributions of labor are about $46,500 per year.

Effects of the mowing only alternative (Alternative B): The overall cost per acre to maintain the openings would increase because mowing costs more than burning. The difference in cost is about $65 per acre. The level of benefits would be reduced because a mix of burning and mowing treatments creates greater habitat diversity than mowing alone.

Cumulative effects of the mowing only alternative (Alternative B): The cumulative effect is an annual cost increase of about $16,000 (the difference between mowing and burning costs on a projected 250 acres per year). There would be a savings of about $4,000 per year from the Hoosier National Forest budget because mowing is accomplished by others while Hoosier staff implement the burns.

Effects of the no action alternative (Alternative C): The management efficiency of the No Action Alternative cannot be evaluated because there would be no cost or effort and there would also be no benefit to early successional plants and animals.

Cumulative effects of the no action alternative (Alternative C): The amount of money spent implementing prescribed burns on openings would be available for other uses. This is about $4,000 per year.

Use of Prescribed Fire

This issue is about the use of fire (as opposed to other tools) to maintain early successional habitats. The affected environment is lands which are managed by prescribed burning as on the Hoosier National Forest and within surrounding landscapes. The use of prescribed fire addresses concerns regarding effects of disturbance patterns on forest ecosystem health as outlined in the natural resource agenda.

Effects of the proposed action (Alternative A): Under this alternative 1,024 acres would be burned at least once in the next five years. This alternative would produce the greatest range of habitat conditions since burning favors grass/forb communities while mowing develops communities with a greater component of small trees and shrubs. Under this alternative mowing could occur on all openings including those which are burned. Mowing would likely occur in burn areas which are seed collection areas or when other considerations preclude burning in a timely manner.

Cumulative effects of the proposed action (Alternative A): Prescribed fire has been used to maintain or enhance early successional grass/forb communities as part of a warm-season grasses restoration project on the Forest. A portion of the open land treated during this restoration is not part of the forest openings proposal. Cumulatively about 1,800 acres of early successional habitat on the Forest will have been treated by burning over an eight year period beginning in 1997. This represents 0.92 percent of the Hoosier National Forest system lands (1,800/196,102 = 0.0092).

Prescribed burning is used for other purposes such as fuel hazard reduction or enhancing habitat for threatened, endangered, or sensitive plant and animal species on the Forest. Since the Forest Plan was signed in 1991 approximately 12,000 acres have been burned. Only about 5 percent of these acres were in forest openings. Projected annual burn programs on the Forest for the next 10 years are about 1,500 acres per year. About a third (500 acres) of the projected burning would be second or third burns on areas prescribed for multiple burn treatments. These figures includes burning which would occur in forest openings.

Burning occurs on other public lands and private lands in the counties affected by this proposal. An estimated 5,000 to 10,000 acres of forest land are burned each year by public agencies and private organizations to restore forest ecosystems. Many more acres, mostly on agricultural lands, are burned for a variety of purposes. Very little of this burning occurs in early seral forest.

Effects of the mowing only alternative (Alternative B): Under this alternative no openings would be burned. Existing openings identified for treatment in the proposed action would be maintained in early-successional condition by mowing. The range of early seral habitat conditions would narrow because burning favors herbaceous communities while mowing creates and maintains mixed grass/forb/shrub communities. The 1,024 acres which would have been burned under the proposed action will move toward the later type.

Cumulative effects of the mowing only alternative (Alternative B): The cumulative effects will be the same as for the proposed action except for the qualitative differences in habitats provided discussed above. The total area burned on the Forest over that period would be reduced by 1,042 acres. Recent burning to restore warm season grasses has affected 600-700 acres of early successional, open lands on the Forest. Those areas would remain open for ten to fifteen years, then gradually revert to canopied forest. The net cumulative effect of these activities would be less than 0.5 percent of the forest maintained in early-successional grass/forb communities of the type which burning produces.

Cumulative impact is the impact on the environment which results from the incremental impact of the action when added to past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions (40 CFR 1508.7). The mowing only alternative would have no cumulative effects to prescribed fire as there is no incremental impact.

Effects of the no action alternative (Alternative C): Under this alternative no openings would be burned. Existing openings would gradually revert to mid-seral, mixed-hardwood forest. Habitats for early seral wildlife and plants would be lost from the Forest over time. There would continue to be some edge habitat adjacent to other ownerships.

Cumulative effects of the no action alternative (Alternative C): Cumulative impact is the impact on the environment which results from the incremental impact of the action when added to past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions (40 CFR 1508.7). The no action alternative would have no cumulative effects to prescribed fire as there is no incremental impact.

Protection of Karst Features

This issue regards protection of the karst system and individual karst features such as caves, sinkholes, and rises. These features can be found over much of the Hoosier National Forest where limestone geology has favored their creation. Some openings have karst features within them or nearby. The primary concern is that management activities will increase sediment delivered to swallow-holes and sinkholes.

The affected environment is the portion of the karst system which is hydrologically connected to features on or near openings.

Effects of the proposed action (Alternative A): The vegetation maintained in these openings provides effective protection against increases in sediment. Since these communities already exist maintaining them will not change current sedimentation rates.

Cumulative effects of the proposed action (Alternative A): The area of consideration for cumulative effects includes those lands that occur in the karst region or that have karst features. Activities that have occurred in the past on National Forest System land includes timber harvesting, site preparation, planting of new stands, trail construction and maintenance, prescribed fire activities, and forest openings maintenance. On private land, past practices have included conversion of woodlands to agricultural crop production, livestock grazing, timber cutting, and abandonment of farm practices leading to fields in various stages of open condition. Private land was also sold to the United States during establishment of the Hoosier National Forest. Past agricultural practices on many of these lands led to excessive erosion which resulted in abandonment of farming practices.

On the lands acquired by the USDA Forest Service, subsequent forest practices did not result in any appreciable impacts to the watershed or contribute to accelerated rates of erosion (Merchant 1999a). Any activities which occurred used mitigating measures for any soil and water disturbing activities.

Anticipated future USDA Forest Service activities that need to be considered in cumulative effects include prescribed fire, trail construction and maintenance, firewood sales, house log sales, timber sales, and emergency salvage. These agency activities would employ mitigating measures to minimize the impacts of these activities. No appreciable impacts to the watershed are expected and the activities would not contribute to accelerated rates of erosion. On private land, timber harvests, agricultural crop production, and livestock grazing are occurring. In recent years, because of federal government programs, conservation practices have been applied to more than 80 percent of the agricultural land (Lish 1999). This has resulted in greatly reduced sedimentation rates.

It is reasonably foreseeable that some forest activities would occur on land in karst region. Because of the use of mitigating measures, USDA Forest Service activities would yield minimal effects. Cumulative effects on the karst features from future openings maintenance activities in the karst region would not be appreciable.

Many of these sites are old farm fields and the establishment of grasses, forbs, shrubs, and young trees has reduced sediment levels from relatively high levels produced during field cultivation to background levels which existed prior to agricultural development. Lands on which forest vegetation is maintained produce approximately 0.15 tons (Thurow et al. 1975) of sediment per acre per year. Actively farmed lands produce 0.78 tons (Thurow et al. 1975) per acre per year. The cumulative effect of maintaining 3,335 acres in a type which produces less sediment than nearby active farm fields or pastures is an annual sediment reduction of

2,101 tons. This is added to the continuing sediment reduction which has occurred as the old farm fields and pastures which constitute the Forest have been revegetated.

Use of mitigation measures in the proposed action will result in minimal effects on karst features. These effects, when added to the effects of past and current practices on public and private lands, and the anticipated practices associated with future activities, would result in no adverse cumulative effects to the karst resources.

Effects of the mowing only alternative (Alternative B): Because this alternative maintains vegetation cover similar to the proposed action the effects are the same as those for the proposed action discussed above.

Cumulative effects of the mowing only alternative (Alternative B): The cumulative effects are also the same as the proposed action.

Effects of the no action alternative (Alternative C): The effects of the no action alternative are essentially the same as those for the proposed action for this issue. Although the structure and composition of the vegetation would gradually change with no maintenance this alternative would still maintain vegetation around karst features. The sediment rates would not increase without some form of disturbance which removes vegetative cover.

Cumulative effects of the no action alternative (Alternative C): Cumulative impact is the impact on the environment which results from the incremental impact of the action when added to past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions (40 CFR 1508.7). The no action alternative would have no cumulative effects to karst systems as there is no incremental impact.

Providing Late-Successional Habitat

Some people prefer late-successional forests to early-successional forests. The wildlife community associated with late-successional forest is different than in early-successional forest. Some species require late-successional habitat during all or a portion of their life-cycles The openings proposed for maintenance would develop toward late-successional vegetation if they remain undisturbed. They could be accelerated toward late-successional conditions through silvicultural techniques. This proposal is for the introduction of human-caused disturbances (mowing and burning) to keep these areas in early seral vegetation. There is clearly a trade-off between providing these very different habitat types. At a landscape level, these trade-offs were analyzed in the DEIS and FEIS for the Forest Plan (U.S. Department of Agriculture Forest Service 1990 and 1991). The size of this proposal and the types of treatments are within the scope of those analyses which display the effects of managing these openings.

The affected environment is the Hoosier National Forest System (NFS) lands (196,102 acres as of September 30, 1998) and the surrounding landscapes. Based on a Combined Data System (CDS) inventory of 187,610 acres we estimated the current condition of the 196,102 acres of NFS lands. Currently, on the Forest, we estimate there are approximately 5,000 acres of early-successional habitats (2.58 percent of the Forest, .0258 x 196,102 .5,000). These are found in maintained forest openings, utility corridors, and forest stands less than 10 years old. The Forest Plan projected that between five and seven percent of the National Forest System lands would be in early-successional habitats (9,800 to 13,720 acres). Most of the Forest, about 177,000 acres (90.35 percent) is in mid-successional stages of vegetative development. Those stands are shifting toward late-seral species due to lack of disturbance. This is evidenced by understory regeneration layers increasingly dominated by beech and maple. Without intense disturbance those areas will gradually become late-successional stands. Late-successional species currently dominate about 12,000 acres (6.17 percent) on the forest. About 2,000 acres (0.90 percent) are non-forest such as lakes, streams, and roads (Weber 1999).

It is estimated that on the average the land classification in the nine counties in Indiana with National Forest System lands is about 59 percent forested land, 20 percent cropland, 18 percent pasture/grassland, two percent urban, and one percent water (Berta et al. 1999). These figures include National Forest System lands. The landscape is mostly a checkerboard of open farmland and forested land. Within the national forest boundary are more large blocks of forested land.

Effects of the proposed action (Alternative A): The proposed action would maintain 3,335 acres in early successional habitat types. Those acres would not provide habitat for some late successional species or would provide only a portion of the habitat used by late successional wildlife. Some species commonly associated with late successional forests use early seral forest types for foraging or other activities.

Cumulative effects of the proposed action (Alternative A): Activities which can either decrease late successional habitat or accelerate its development occur on the Forest and surrounding lands. Application of uneven-aged silvicultural techniques favors a shift from intolerant, early-successional types like oak toward late-successional forest dominated by beech and maple. Where timber harvest can occur (about 1/3 of the Forest) this is the dominant prescription. Most of the forest is off-limits to disturbances which reset succession. Therefore the cumulative effect of management on the Hoosier National Forest is a shift toward late seral vegetation. This proposal would counter that shift on 3,335 acres or about 1.7 percent of the National Forest

System lands (3,335/196,102 = .0017). If this proposal is implemented the Hoosier National Forest will provide about 189,000 acres (96.52 percent of the Forest, .9652 x 196,102 .189,000) of mid or late-successional forest types. (Mid-successional forests develop toward late-successional forests if no disturbance occurs.) Approximately 12,000 acres (6.17 percent of the Forest) are currently in late seral types. Since the openings proposed for management already exist the proportion of the Forest in each seral stage would not change from the existing condition as a result of this management activity.

Effects of the mowing only alternative (Alternative B): The effects of the mowing alternative on late-successional habitat are identical to those for the proposed action as the same number of acres would be maintained in early-successional condition.

Cumulative effects of the mowing only alternative (Alternative B): The cumulative effects of the mowing alternative on late-successional habitat are also identical to those for the proposed action as the same number of acres would be maintained in early-successional condition.

Effects of the no action alternative (Alternative C): If no action is taken the 3,335 acres proposed for maintenance will develop gradually toward late successional vegetation types. They will enter mid-seral stages over the next five to 20 years depending on the current vegetation type and condition. Mid-seral vegetation for these areas would be either oak or mixed hardwood forest. Mid-seral vegetation would be expected to dominate for a period of 100 to 300 years during which the late seral species like beech and maple would develop as understory or intermediate components. Late successional vegetation would begin to dominate some sites within 100 years and all sites by 300 years unless some other disturbance occurred.

Cumulative effects of the no action alternative (Alternative C): If no action is taken all acres on the Hoosier National Forest (except for non-forest and utility corridors) will provide mid and late-successional vegetation types within twenty years. Over the next 300 years those acres will gradually become dominated by late-seral vegetation.

Forest Fragmentation

Some people are concerned that forest openings fragment habitats for species which are benefitted by interior forest habitats. They are concerned that effects of fragmentation such as increased parasitism and predation will be detrimental to populations of interior forest species. The affected environment is existing or potential blocks of interior forest on National Forest System lands.

It is a basic ecological fact that we cannot manage for all species on every acre of forest. The Forest Plan allocated some areas of the forest to be managed for species requiring forest interior conditions and other areas to be managed for species which don't require interior conditions. Thus, it is not our goal to manage for forest interior species in the areas where we are proposing to maintain existing openings. Rather, we intend to manage for the wide variety of species, including many Neotropical migratory birds, which use grassy and shrubby areas. Other portions of the Forest are being managed for conditions which favor interior species.

This proposed openings maintenance tiers to the Forest Plan and associated documents, which analyzed the effects of openings maintenance on forest interior species and the potential to fragment the forest. These effects

are examined in the Forest Plan Final Environmental Impact Statement (FEIS, U.S. Department of Agriculture Forest Service 1991a) on pages 9-32 to 9-34, 9-44 to 9-46, and 9-60 to 9-64 and Forest Plan Draft Environmental Impact Statement (DEIS, U.S. Department of Agriculture Forest Service 1990) on pages 4-42 to 4-47. As a result of these analyses, the Forest Plan allocates greater than 50 percent of the Forest to management areas emphasizing closed-canopied forest.

Effects of the proposed action (Alternative A): Mowing and burning these openings would keep them from becoming closed- canopied forest. The 3,335 acres would remain in an open condition. These areas are already open so there would be no change in the number of acres of closed-canopied forest.

It is important to note the difference between closed-canopied forest and interior (unfragmented) forest. The forest openings in this proposal do not contribute to fragmentation because they are predominantly located in landscapes with little potential to provide unfragmented habitats. That potential is limited because of the prevalence of agriculture and residential development on nearby private lands. Areas with the potential to provide unfragmented forest were placed in management areas emphasizing closed-canopied forest by the Forest Plan decision.

Cumulative effects of the proposed action (Alternative A): Because of their location in already fragmented areas these openings do not contribute to cumulative fragmentation effects. If they were allowed to become closed-canopied forest the landscapes in which they are situated would still have many open areas on private lands and the effects of fragmentation would still be prevalent. (See discussion in Appendix A.) This is also discussed in more detail in the Habitat Fragmentation - Southern Tier National Forests report (U.S. Department of Agriculture Forest Service 1995c).

Effects of the mowing only alternative (Alternative B): The effects of the mowing alternative on fragmentation are identical to those for the proposed action as the same number of acres would be maintained in open, early-successional condition.

Cumulative effects of the mowing only alternative (Alternative B): The cumulative effects of the mowing alternative on fragmentation are also identical to those for the proposed action as the same number of acres would be maintained in open, early-successional condition.

Effects of the no action alternative (Alternative C): If no action is taken the 3,335 acres in the proposed action would revert to closed-canopied forest. Fragmentation of interior forest would not be reduced because of the overwhelming effects of open agricultural and residential lands nearby.

There would be an adverse effect of no action on area dependent opening species which are currently utilizing these managed openings. A specific example is Henslow's sparrow, a rare bird on the Regional Forester's Sensitive Species list, which has been utilizing several of the openings proposed for management. This species requires areas dominated by grasses and forbs and favors old-field habitats. Encroachment by woody species rapidly decreases the suitability of areas for this sparrow which requires large openings. If these areas remain untreated the sparrows are likely to abandon them after only a few years. In essence, the opening becomes fragmented by woody encroachment. Since Henslow's sparrows are found on only a few sites on the forest, these openings are quite important to the species distribution.

Cumulative effects of the no action alternative (Alternative C): Since there would be no reduction of interior forest fragmentation there is no cumulative effect of no action on interior forests. The cumulative effect of allowing forest openings to grow over would be to reduce the distribution of early-successional species on the Forest and force those species to use lesser-quality, open, agricultural and residential lands in the surrounding counties.

Soil Compaction or Erosion

The proposed action originally included the use of heavy equipment such as bulldozers to maintain opening edges and create brush piles for habitat. This caused some concern for potential soil compaction and erosion. The proposal has been modified and no longer includes this activity. Tractors would still be used to install some firelines and for mowing. Soil compaction and erosion are localized effects so the affected environment is the forest openings proposed for management.

Effects of the proposed action (Alternative A): Use of equipment is restricted to dry conditions. This mitigates potential soil compaction so these effects do not occur. Mowing openings would not expose bare mineral soil so soil erosion would not occur. Some firelines are installed using a rototiller which exposes bare mineral soil, however because the soil is in a rough, loosened condition most of the rain hitting the surface infiltrates with very little runoff. In addition the alignment of the firelines also mitigates any erosion that may occur. Approximately 18 miles of fireline covering 13 acres would need to be constructed for the entire program.

Cumulative effects of the proposed action (Alternative A): The area of consideration for cumulative effects includes the nine counties with National Forest System land in Indiana: Brown, Crawford, Dubois, Jackson, Lawrence, Martin, Monroe, Orange, and Perry. These counties have 2,249,300 acres of land. It is estimated that on average the land classification in the nine Indiana counties with National Forest System land is about 59 percent forested land, 20 percent cropland, 18 percent pasture and other farmland, two percent urban, and one percent water (Berta et al. 1999). The landscape is mostly a checker board of open farm land and forested land with single-family residence development along the roads. Forested land has been stable over the last 20 years because most development has occurred on cropland and some cropland has been reverting to forested land. Within the national forest boundary there are more larger blocks of forested land.

USDA Forest Service administers 196,102 acres of land in Indiana. Most of the National Forest System land is forested. About 1.5 percent of this is developed with roads or campgrounds. About 3 percent is in early-successional, open, or non-forest conditions. Activities in these counties that have occurred in the past on NFS land includes timber harvesting, site preparation, and planting of new stands. On private land, past practices have included conversion of woodlands to agricultural crop production, livestock grazing, timber cutting, and abandonment of farm practices leading to fields in various stages of open condition. Private land was also sold to the United States during establishment of the Hoosier National Forest. Past agricultural practices on many of these current NFS lands led to excessive erosion which resulted in abandonment of farming practices.

Present and anticipated future USDA Forest Service activities that need to be considered in cumulative effects include firewood sales, house log sales, and timber sales. Harvest in the last 2 years has disturbed about 1,000 acres of NFS lands. Several National Forest salvage sales, in the Pleasant Run Unit, recently closed after 700 acres of forest disturbed by tornados and a snowstorm have been harvested. On private land, timber harvests, agricultural crop production, and livestock grazing are occurring. We estimate that most private forest land is

harvested every 20 years. Therefore in an average year 32 percent of the landscape is disturbed (two percent is harvested, and 30 percent is cultivated). Some development of infrastructure would occur on private land. Most of this development would be adjacent to existing urban areas.

The disturbance associated with the proposed fireline construction covering 13 acres would effect about 0.00058 percent of the landscape over a five year period (13/2,249,300 = .0000058). The annual disturbance would be 0.00012 percent of the landscape. This effect is very small.

"Cumulative impact is the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions" (40 CFR 1508.7). Considering the above, the cumulative impacts on soil compaction of the proposed action when combined with past, present, and reasonably foreseeable future actions, are small.

Use of mitigation measures in the proposed action will result in minimal effects on soil and water. These effects, when added to the effects of past and current practices on public and private lands, and the anticipated practices associated with future activities, would result in no adverse cumulative effects to the soil resources.

Effects of the mowing only alternative (Alternative B): Because of the mitigation measures employed the effects of this alternative are essentially the same as those for the proposed action. Since no firelines would be built the very small effects from fireline construction discussed above would be eliminated.

Cumulative effects of the mowing only alternative (Alternative B): The cumulative effects are also essentially the same as the proposed action. Since no firelines would be built the very small cumulative effects from fireline construction discussed above would be eliminated.

Effects of the no action alternative (Alternative C): Since no activity would occur there would be no soil compaction or erosion.

Cumulative effects of the no action alternative (Alternative C): Since there are no effects there are no cumulative effects on the soil resource.

Heritage Resources

A number of openings have cultural resource sites within them or nearby. All significant heritage resources must be protected.

Effects of the proposed action (Alternative A): The only ground disturbing activity proposed is installation of firelines. This has the potential to disturb heritage sites. Burning has the potential to impact above ground structures with cultural significance. There would be no impacts to heritage resources because all openings prescribed for burning will have been surveyed; significant sites identified; and the areas containing those sites excluded from treatment.

Cumulative effects of the proposed action (Alternative A): Because the proposed action has been designed to avoid significant heritage sites there would be no cumulative effects from implementing it.

Effects of the mowing only alternative (Alternative B): There would be no ground disturbing activity so there would be no effect on heritage resources.

Cumulative effects of the mowing only alternative (Alternative B): Because no ground disturbing activity would occur there would be no cumulative effects on cultural resources.

Effects of the no action alternative (Alternative C): Because no potentially disturbing activities would occur there would be no effect on heritage resources.

Cumulative effects of the no action alternative (Alternative C): Because no activity would occur there would be no cumulative effects on cultural resources.

Threatened and Endangered Species

Effects of the proposed action: The Hoosier National Forest entered into formal consultation with the USDI Fish and Wildlife Service under Section 7 of the Endangered Species Act during forest planning. The USDI Fish and Wildlife Service has identified two Federally listed species as having part of their range on the Hoosier National Forest (Hoosier National Forest 1995). These species are the endangered Indiana bat (*Myotis sodalis)* and the threatened bald eagle (*Haliaeetus leucocephalus*). Additionally, we recently received information of the occurrence of the endangered fanshell mussel (*Cyprogenia stegaria)* within the boundary of the Hoosier National Forest and of the endangered gray bat (*Myotis grisescens)* near the boundary of the Hoosier National Forest.

There are no known federally threatened or endangered species in the project areas. There is no critical habitat for these species in the project areas.

A biological evaluation of the proposed action concluded that "the five-year, Forest-wide openings maintenance project will have insignificant (cannot meaningfully be measured) and discountable (unlikely to occur) effects to federally endangered or threatened species. Combined with past, present, and reasonably foreseeable future activities in the area, there is no appreciable cumulative effect. There will be no effect on Indiana bat, bald eagle, fanshell, and gray bat" This evaluation also concluded that the proposed activities presented no risk of "take" for these species (Olson 1999a).

Cumulative effects of the proposed action: Since there are no effects, there are no cumulative effects on threatened or endangered species.

Effects of the mowing only alternative: Since the same openings would be maintained, the effects are the same as the proposed action. There will be no effect on threatened or endangered species.

Cumulative effects of the mowing only alternative: Since the same openings would be maintained, the cumulative effects are the same as the proposed action. There will be no cumulative effect on threatened or endangered species.

Effects of the no action alternative: Since no action would be taken, there will be no effect on threatened or endangered species.

Cumulative effects of the no action alternative: Since no action would be taken, there will be no cumulative effect on threatened or endangered species.

Management Indicator Species

Effects of the proposed activities and the no action alternative are discussed in detail in Appendix D of this document. Table 2 below presents a summary of those effects.

Table 2: Summary of Effects on Management Indicator Species

Species	Proposed Action	Mowing Only	No Action
Wood duck (*Aix sponsa*)	No effect	No effect	No effect
American woodcock (*Scolopax minor*)	Positive	Positive	Negative
Wild turkey (*Meleagris gallopavo*)	Positive	Positive	Negative
Ruffed grouse (*Bonasa umbellus*)	Positive	Positive	Negative
Broad-winged hawk (*Buteo platypterus*)	Neutral to slightly positive	Neutral to slightly positive	No effect
Pileated woodpecker (*Dryocopus pileatus*)	Neutral to slightly negative	Neutral to slightly negative	Positive
Acadian flycatcher (*Empidonax virescens*)	Negative	Negative	Positive
Scarlet tanager (*Piranga olivacea*)	Positive	Positive	Positive
Louisiana waterthrush (*Seriurus motacilla*)	No effect	No effect	No effect
Wood thrush (*Hilocichla mustelina*)	No effect	No effect	No effect
Black-and-white warbler (*Mniotilta varia*)	Negative	Negative	Positive
Worm eating warbler (Helmitheros vermivorus)	Negative	Negative	Positive
Prairie warbler (*Dendroica discolor*)	Positive	Positive	Negative
Pine warbler (*Dendroica pinus*)	Negative	Negative	Negative
Yellow-breasted chat (*Icteria virens*)	Positive	Positive	Negative
Cliff plant associations	No effect	No effect	No effect
Barrens/glades	No effect	No effect	No effect
Raccoon (*Procyon lotor*)	No effect	No effect	No effect
Bobcat (*Felis rufus*)	Positive	Positive	Negative
Gray squirrel (*Sciurus carolinensis*)	No effect	No effect	No effect
Largemouth bass (*Micropterus salmoides*)	No effect	No effect	No effect
Smallmouth bass	No effect	No effect	No effect

(*Micropterus dolomieui*)			
Southern redbelly dace (*Phoxinus erythrogaster*)	No effect	No effect	No effect
Rock bass (*Ambloplites rupestris*)	No effect	No effect	No effect
Bluegill (*Lepomis macrochirus*)	No effect	No effect	No effect
Grass pickerel (*Esox americanus*)	No effect	No effect	No effect
Pugnose minnow (*Opsopoeodus emiliae*)	No effect	No effect	No effect
Redfin shiner (*Lythrurus umbratilis*)	No effect	No effect	No effect
Stream invertebrates	No effect	No effect	No effect
Cave invertebrates	No effect	No effect	No effect
Wetlands	No effect	No effect	No effect

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Appendix A

Public Comments from Scoping

USDA - Forest Service,
Tell City and Brownstown Ranger Districts,
Hoosier National Forest,
Brown, Crawford, Jackson, Lawrence, Martin, Monroe, Orange and Perry Counties

On March 20, 1998 a letter and maps requesting comments on a proposal to maintain 972 forest openings was sent to approximately 360 interested parties. This proposed action has been reduced to 958 openings. As of the close of the comment period, June 6, 1998, a total of 20 responses were received.

The ID team categorized each response received during the scoping process to identify specific comments, issues, and concerns. These comments were identified and sorted. Following each comment is a summary of how the comment was addressed in the analysis.

In the following pages, we group comments by issues. There is also a "general comments" heading which lists non-specific issue comments. "C" indicates a comment. "R" indicates the USDA Forest Service response. Direct quotes are within quotation marks. Paraphrased comments are without quotation marks. In parentheses we list the comment source code (response number - comment number). When we list several comment source codes the quote is from the first comment source code, however, the ID team believes the quote represents the additional comments.

The following lists those who responded during the public scoping process. A complete listing of the individuals contacted can be found in the project file.

Name	**Response #**
Larry Allen	1
Rhonda Baird, Indiana Forest Alliance	2
Paul Ash	3
Jim Bensman, Heartwood	4, 5
Denzil Brown	6
Mary Clinton	7
David A. Cooper	8
Gary Doxtater, IDNR Division of Fish and Wildlife	9

Comments and Responses

General Comments

G-1. General support 1-1, 6-1, 9-5, 14-1, and 19-1

C: "I am very glad to see that the Forest Service is proposing a five year plan to maintain forest openings"

C: "We applaud your dedication to manage the Hoosier National Forest in such a way to address the needs of all wildlife species."

R: The proposed action would manage forest openings to benefit early seral and edge - loving species as well as species which nest or den elsewhere but forage in open areas.

G-2. General opposition 7-1, 8-1, 16-1, and 20-3

C: `` . . . maintaining 3,341 acres of forest openings on the Hoosier National Forest. I am very much opposed to this idea." (Note: This respondent is commenting on the original proposed action of 3,341 acres. Differences in acres and number of openings reflect minor refinements of the proposal made in response to analysis and comments.)

C: "I am writing to voice my opinion against the forest openings project"

R: The Hoosier National Forest Land and Resource Management Plan (Forest Plan) (U.S. Department of Agriculture Forest Service 1991b) allows forest openings management in some management areas and prohibits it in Management Areas 5.1, 6.2, and 8.1. The Forest Plan projected that between five and seven percent of National Forest System lands would be early-successional habitats. If this proposal to maintain 3,335 acres is implemented and with the existing 925 acres of stands less than 10 years old and with about 700 acres of utility corridors; we estimate about 2.5 percent of the forest would be early-successional habitats (3335+925+700)/196,102 = .0253).

G-3. Management efficiency 1-2, 8-3, and 9-1

C: "This will be a more efficient and beneficial way to maintain openings"

C: "I see this as a waste of time, money, and resources"

R: Forest openings maintenance has historically been planned and implemented annually. In 1996 a decision covering 2 years worth of maintenance was written. Because the need for maintenance occurs annually on a portion of the openings, a program covering five years would be beneficial for planning efficiency. This type of work has occurred for many years on the Hoosier National Forest. This planning effort does not change the nature of the work or increase the level from what has historically been accomplished each year. It will however save time and effort. It will also provide more advance notice and operational flexibility for the Hoosier National Forest staff and wildlife habitat management cooperators.

G-4. Poor record keeping monitoring and accountability for the program. 10-10

C: " . . . forest openings program . . . had a very low level, laissez faire type of management, including poor monitoring and poor record keeping."

R: We agree. During the past three years (at least) Hoosier National Forest staff have been working to improve the records. This required consolidation of multiple records, often with conflicting information regarding opening size, condition, and location. In addition to working with computer records (Combined Data System), maps, wildlife folders, compartment folders, and openings maintenance sheets many forest openings were visited on the ground to determine their condition. As a result of this effort the records are in much better condition. The records on maps, in CDS, and in compartment folders agree with each other and accurately reflect conditions on the ground (Weber 1998).

G-5. Opposed to logging. 15-6 and 16-3

C: "I am opposed to any logging on the Hoosier National"

R: Consideration of logging on the Hoosier National Forest is beyond the scope of this analysis.

G-6. Maintain all former openings. 19-2

C: " . . . we feel a more ideal situation, from a wildlife management perspective, would be to maintain all of the former openings."

R: We do not propose to maintain all former openings for several reasons. The Hoosier National Forest Land and Resource Management Plan Amendment prohibits forest openings management in some areas where it had previously occurred (U.S. Department of Agriculture Forest Service 1991b). This is based on an ecologic strategy of maintaining large blocks of interior forest where possible and managing for opening or edge loving species on portions of the Forest where quality interior conditions can not be provided. (See fragmentation discussion below) Financial constraints and the availability of forest personnel for planning and implementation also limit the size of the program.

G-7. Extend comment period. 2-1 and 5-2

C: " I strongly urge / demand you extend the comment period so more Hoosiers can be informed."

R: The treatments prescribed "are routine, low-impact, silvicultural practices which have been applied on the Hoosier National Forest and elsewhere for many years. You and many other Heartwood members have commented on this type of project frequently." (Day 1998b) For these reasons, Forest Supervisor Ken Day determined that an extension of time was not necessary. All comments received, whether during or after the comment period have been reviewed for this analysis.

G-8. Broader outreach during scoping. 2-2

C: "I believe only about 700 people receive information about the projects. This is not representational."

R: During the forest planning process broad outreach was done to solicit comment from about 7,000 people regarding proposed management activities including forest openings management. Since that time the forest has contacted all individuals who commented on the Forest Plan as well as others who commented on individual projects in an effort to determine interest. Anyone who expressed a desire to receive information on openings management was mailed the scoping document for this proposal. A project description and Forest contact were included in the May 1998 Hoosier Quarterly which is sent to 489 people (U.S. Department of Agriculture Forest Service 1998). Specific scoping for this proposal was sent to approximately 360 people. A total of 20 responses were received.

G-9. Cumulative effects. 2-3 and 10-14

C: "The cumulative effects of these openings need to be considered."

R: The cumulative effects of management of forest openings and other forms of vegetation management were thoroughly analyzed in the environmental assessment and in the Forest Plan FEIS (U.S. Department of Agriculture Forest Service 1991a) and Forest Plan DEIS, (U.S. Department of Agriculture Forest Service 1990) (See e.g. FEIS p. 2-25 to 2-26, and 9-32 to 9-34; DEIS, p. 4-42 to 4-47). Cumulative effects of maintaining forest openings have also been analyzed at the project level for previous environmental analyses of proposed openings management (Jacquart and Stafford 1992, Jacquart 1996, Jacquart and Morgan 1996a). Cumulative effects for this proposed action are analyzed in the Biological Evaluation (Olson 1999a) and Forest Species of Concern Memo (Olson 1999b).

G-10. Use of categorical exclusion, existing extraordinary circumstances. Legal basis for use of CE. 4-1 Request for EIS. 10-12

C: "After reviewing the maps you sent for the proposal for 972 Forest Openings, one thing is clear, the decision cannot be categorically excluded due to the presence of extraordinary circumstances such as steep slopes."

C: "The scoping form indicates that this project will be categorically excluded. The Forest Service, however, indicates that the Forest Service NEPA Handbook is simply guidance and not legally enforceable. The Forest Service has prevailed on this in court. See *Southwest Center for Biological Diversity v. U.S. Forest Service*, 100 F. 3d 1443, 1450 (9th Cir, 1996). The Forest Service, however, is required to have legally enforceable NEPA procedures and they must promulgate categories of actions that can be Categorically Excluded. See 40 CFR § 1507.3 & 1508.4. Therefore, the Forest Service cannot Categorically Exclude anything because it does not have the required procedures."

C: "Furthermore, the CEQ Regulations require the NEPA procedures, including the CEs to be adopted 'after review by the Council for conformity with the Act and these regulations.' 40 CFR § 1507.3. Even if the Forest Service NEPA handbook is the required procedures, they have never been reviewed by the CEQ. Therefore, these categories are not valid and cannot be used. In fact, since the CEQ has never reviewed and approved the Forest Service NEPA Handbook, the Forest Service cannot legally take any action --- anywhere. If you disagree with this, please send us a copy of the CEQ's approval of the Forest Service Handbook."

R: We agree that we cannot use a categorical exclusion (CE) for this project. The Seventh Circuit Court of Appeals in Chicago, Illinois on August 27, 1998 in Rhodes v. Johnson (No. 97-3687, slip op.) held that the USDA Forest Service Environmental Policy and Procedures Handbook is binding on the USDA Forest Service. The court interpreted the Handbook as demanding "that the presence of an extraordinary circumstance requires the Forest Service to prepare an environmental assessment." We first attempted to use a CE for this project. Notice of this project and requests for comments were sent to approximately 360 interested parties on March 20, 1998. James E. Denoncour signed for Kenneth G. Day Forest Supervisor a decision memo on July 22, 1998 to maintain 952 openings (approximately 3, 138 acres) by bush-hogging and removal of small trees along opening edges. With the assistance of our partners (Quail Unlimited, National Wild Turkey Federation, and the Department of Natural Resources Division of Fish and Wildlife) we maintained approximately 300 acres of openings. However, Kenneth G. Day decided to withdraw that decision on September 21, 1998. He did this to be consistent with the August 27, 1998 Seventh Circuit Court of Appeals ruling and do an environmental assessment (EA) and make a new decision.

We believe that CEQ did review the NEPA Handbook. However documentation of that review is beyond the scope of this analysis.

C: " . . . request that the Forest Service initiate scoping for an EIS under NEPA requirements on the Forest Openings Program . . ."

R: The effects of maintaining forest openings were thoroughly analyzed in the environmental assessment and in the Draft and Final Environmental Impact Statements, Land and Resource Management Plan Amendment, Hoosier National Forest (U.S. Department of Agriculture Forest Service 1990, 1991a, 1991b). This analysis is tiered to both EIS's and to the Forest Plan. This proposal is well within the size and scope of those analyses.

The Forest Plan estimates that about 4,000 acres of forest openings will be maintained (U.S. Department of Agriculture Forest Service 1991b). This proposal to maintain 3,335 acres of forest openings is smaller for reasons discussed elsewhere in this document. The expected annual level of maintenance over the next five years is approximately the same as maintenance programs historically completed under categorically excluded decisions on the Hoosier National Forest (U.S. Department of Agriculture Forest Service 1993a, 1993b, 1995a, 1995b, 1996, 1997). District Ranger Bruce Slover's Decision Notice of September 3, 1992 was appealed. Both the Forest Supervisor and the Regional Forester reviewed and affirmed the decision (Voytas 1993, Marita 1993).

G-11. Need more site specific information 5-1

C: Your mailing does not provide us enough information on the proposal to maintain 972 forest openings over the next five years."

R: The initial mailing for scoping for this proposal included mapped opening locations and a description of the proposed management activity. Additional information was sent to those who had requested it in the past and has been available by contacts listed in the scoping letter (Day 1998a). Additional information was sent to this commentator in response to this request (Day 1998b).

G-12. No openings in Management Area 6.4. 10-1

C: " . . . we requested some years ago that 6.4 forest openings be allowed to return to their natural state in view of the major objective of M.A. 6.4 that " habitat is provided for plant and animal communities found in undisturbed, mature forests."

R: The Hoosier National Forest Land and Resource Management Plan provides for maintenance of existing forest openings. " Existing forest openings with value for wildlife, vegetation, or recreation may be maintained adjacent to roads required for existing access rights, or specially adapted trails which access rare species or communities. Currently maintained openings may be retained at Mogan Ridge, Lukes Knob, and Felknor Hollow." (U.S. Department of Agriculture Forest Service 1991b). This proposal is consistent with the guidance provided by the Forest Plan.

G-13. Adding openings from recent acquisitions. 10-4

C: " . . . it is cause for concern that recent acquisitions . . . in the Brownstown District have been included in the FOs program."

R: Acquired properties are reviewed by Hoosier National Forest staff to identify ecologic and recreational values each tract offers. Recent acquisitions have had large, existing openings dominated by grasses and forbs. These openings were recommended for addition to the program because they provide habitat for species (such as Henslow's sparrow) which require large open areas with that vegetation type. While portions of some recent acquisitions are recommended for maintenance as openings in this proposal many more areas are managed for other values.

G-14. Use of fire as a vegetation management tool. 10-6 and 16-4

C: "We object to the need for fire to assure maintenance of early successional, grasses, forbs, and shrubs . . ."

R: The 1991 Hoosier National Forest Land and Resource Management Plan provides for management of forest openings by "periodic treatments such as mowing, cutting, or prescribed burning." (U.S. Department of Agriculture Forest Service 1991b, See pages 2-10 and A-12) Prescribed burning is more effective in developing grass/forb dominated communities favored by some plant and animal species than mechanical methods. Prescribed fire is sometimes a more cost effective method of maintenance, particularly on large openings.

G-15. Protection of karst features. 11-5

C: This opening is situated in a large and significant karst valley which is a portion of the primary drainage area for the Orangeville Rise of the Lost River. We recommend this opening be dropped.

R: The vegetation being maintained in this opening is dense grasses and forbs and provides an excellent buffer against sedimentation which is a primary concern in karst drainage systems. That buffering function would not be improved by allowing succession to occur. This opening provides important habitat for area dependent grassland species as well as many other opening and edge loving species. It is potential habitat for Henslow's sparrows which have been located nearby (Castrale 1998). This opening is in Management Area 2.8 where openings management is permitted by the forest plan. Because this opening provides quality wildlife habitat and protects karst values it is recommended for continued maintenance.

G-16. Forest Plan consistency - adding new openings or enlarging existing ones in MA 2.4 and MA 6.4. 12-1, 2-2, 12-4, and 12-5

C: "There are several openings in M.A. 2.4 listed in the Mar. 1998 computer printout that do not appear on the Feb. 1995 printouts, which indicates that they are new openings. This is not permitted in M.A. 2.4."

C: " The MA 6.4 openings listed on the Mar. 1998 printouts that do not appear on the Feb. 1995 printouts . . . should be considered as new openings." (prohibited by the Forest Plan)

C: "A comparison of computer printouts also indicates that the acreage of several openings" (in MA 2.4) "has been increased significantly"

C: " . . . changes have been made in the forest opening configuration" (enlarged openings in MA 6.4) " that warrant explanations. "

R: During the course of the administrative review it was necessary to reconcile conflicting records. (See discussion on record keeping above.) Some openings in these management areas may not have appeared on some records but were listed on other records. Some openings had inaccurate acreage listings and/or had discrepancies in acreage listings between records for the same opening. Changes in the records reflect reconciliation of those differences only. No new openings were added on the ground. No openings were enlarged on the ground. A number of openings which had been previously maintained were dropped from the

program as a result of the administrative review. There are fewer openings in these management areas than there have been in the past.

G-17. Criteria for management as openings not met for some openings in MA 2.4. 12-3

C: "Forest openings may be maintained if they are "adjacent to roads required for existing access rights, or specifically adapted trails which access rare communities". Some MA 2.4 openings appear not to meet this criterion"

R: All openings proposed for maintenance, including examples presented by this commentator, have been reviewed and meet this criterion.

G-18. Designate wilderness. 18-2

C: ". . . designation of all roadless areas 160 acres or larger as Wilderness , so as to maintain sanctuary units for all life "

R: Designation of "roadless" areas as Wilderness is beyond the scope of this analysis.

Plant and Animal Effects

P-1. Providing late-successional habitat. 2-4

C: "When will you worry about providing "late successional" habitat for wildlife?"

R: The Forest Service is required to maintain populations of all native species within the planning area. The openings program provides habitat for many species which require open land during some part of their life cycle. Maintained forest openings account for only about 1.7 percent of the Hoosier National Forest landbase (3335/196,102 = .017). Most of the forest is managed for habitat for late successional species. Younger vegetation may be present in those areas, but it is allowed to succeed toward mature forest. Further discussion of effects of the proposed action on late-successional habitat is in the environmental effects section of this document.

P-2. Fragmentation of interior forest. 2-5, 3-1, 7-2, 10-9, and 13-1
Cowbirds, NTMB's, predation, parasitism, edge effects. 15-1, 20-1, and 20-2
General habitat for plants, wildlife (amphibians and reptiles) as preserves - no development. 18-1

C: "Many wildlife species suffer from the fragmentation"

C: "No further openings are needed. To the contrary, denser forest unattractive to parasitic cowbirds is needed"

C: " . . . within the core areas and the large tracts of forest it is important to minimize edge, early successional grass, and agricultural habitat"

C: "I favor efforts to secure proper habitat for plants, fish, and wildlife and urge that such habitats be managed as preserve sanctuary units with no development activities. Also to select proper areas . . . for all amphibians and reptiles."

R: It is important to note that we are not proposing to create openings, rather we propose to maintain already-existing openings. Most have existed for decades.

It is a basic ecological fact that we cannot manage for all species on every acre of forest. The Forest Plan allocated some areas of the forest to be managed for species requiring forest interior conditions and other areas to be managed for species which don't require interior conditions. Thus, it is not our goal to manage for forest interior species in the areas where we are proposing to maintain existing openings. Rather, we intend to manage for the wide variety of species, including many Neotropical migratory birds, which use grassy and shrubby areas. Other portions of the Forest are being managed for conditions which favor interior species.

This proposed openings maintenance tiers to the Forest Plan and associated documents, which analyzed the effects of openings maintenance on forest interior species and the potential to fragment the forest. These effects are examined in the Forest Plan FEIS (U.S. Department of Agriculture Forest Service 1991a) on pages 9-32 to 9-34, 9-44 to 9-46, and 9-60 to 9-64 and Forest Plan DEIS (U.S. Department of Agriculture Forest Service 1990) on pages 4-42 to 4-47. As a result of these analyses, the Regional Forester allocated greater than 50% of the Forest to management areas emphasizing closed-canopied forest (U.S. Department of Agriculture Forest Service 1991c).

Dr. Whitehead's research does indicate that some birds have lower reproductive success near edges due to cowbird parasitism and predation. However, there is no direct evidence of a population impact (Thompson, 1996). Further, there is strong evidence that the overall landscape pattern and composition (forest versus non-forest) is more important to the overall reproductive success of birds than any edge effects resulting from vegetation management practices within the forest (Thompson 1993, Robinson et al.1995).

It is important to consider this local research within the regional context. As Dr. Whitehead points out in a 1994 report (Whitehead *et al*. 1994) parasitism and predation rates in south-central Indiana "are dramatically lower" than those reported in southern Illinois. The recent Science article co-authored by Dr. Whitehead and referenced by the commentator (Robinson *et al*. 1995) states that "Extensive forests of the Missouri Ozarks, northern Wisconsin, and south-central Indiana have low levels of nest predation and parasitism and may provide the surplus of colonists necessary to maintain populations in fragmented forests in southern Wisconsin, Illinois, and northern Missouri."

P-3. More openings in areas with few - (dispersal balance). 1-3 and 12-6
Any opening should be around fringes, edges. 20-7

C: "The guiding principle should be to place them (forest openings) only in close proximity to extensive external edges"

C: "I do think in the future there should be openings constructed in areas where there are not many openings at this time. "

C: "The program doesn't seem to be balanced, some compartments have been pelleted with openings others have very few."

R: The Forest Plan allocated land into management areas which allow for the maintenance of forest openings. Review of that decision is beyond the scope of this proposal.

We note, however, that over the past few years, many openings have been dropped from the maintenance schedule. Often they were dropped because they represented the only open area in a large forested block, and a site-specific decision was made to maximize the forest interior in that particular area. Such a situation is unusual, however, since most of the management areas designated to allow opening maintenance have scattered federal ownership. Because of the open land on private lands within the area, stopping maintenance on a particular forest opening would have no effect on forest fragmentation.

P-4. Encouragement of high populations of deer, rabbits, and other open-land species a nuisance. 7-3 and 10-11.

C: "Populations of deer, rabbits, and other species that are adapted to the semi-open landscape you propose are already reaching nuisance proportions. Maintaining these openings would only exacerbate the problem"

R: Forest openings do attract deer, but it is doubtful they increase deer populations. The amount of food provided by the agricultural fields on private land interspersed among the National Forest System lands probably have a great deal more to do with the size of the deer population. Since openings also attract hunters in large numbers, it may be that they indirectly result in a decrease in local deer populations.

P-5. Direct mortality of animals from mowing. 8-2

C: "The bushogging makes the openings a death trap for many small animals that make there homes there."

R: Opening maintenance is timed to avoid the nesting season, the time when most small animals and birds are more susceptible to being killed by bushogging. Mowing occurs between July 1 and October 31, and edge maintenance occurs between July 1 and April 30. It is possible that a few small animals may be killed during operations; however if the areas are not bushogged they will grow up and will no longer provide a home for any of the animals which use openings.

P-6. Vegetative (habitat) diversity, wildlife diversity. 9-3

C: "Vegetative diversity" (created by managing openings) " provides for animal diversity. Animal diversity in the forest provides animal richness, thus a balanced ecosystem and satisfied forest visitors"

R: We agree. A diversity of landscape vegetation provides habitat for a great number of species which live in southern Indiana.

P-7. Consolidation, larger openings for grassland species. 9-4, 10-5, and 13-2

C: "There are listing of large openings. . . The public needs factual information as to the reason for the great size of these proposed openings."

C: "Increased focus toward large grassland openings for species such as the endangered Henslows sparrow, serve to consolidate the forest openings component."

C: "We recommend you consolidate openings onto fewer and larger tracks on the perimeters of contiguous forested tracts."

C: I have also seen studies that indicate that while increased diversity is often apparent there is no evidence that the success of species is in any way enhanced, and may even be harmed, by such activities."

R: Forest openings on the Hoosier National Forest are managed for a variety of conditions so that habitat for a variety of species is provided. Some wildlife species, such as Henslow's sparrow, require large open areas for breeding and foraging. In at least one large opening planned for maintenance there is current documentation of Henslow's sparrow. Concentrating open habitat on fewer, larger openings minimizes fragmentation of interior forest areas. Larger openings are also more efficient to manage.

Openings of less than one acre have little effect on overall populations of most forest interior species which are mainly controlled by forest age class distribution and total forest cover in the landscape (Thompson 1993 and Castrale 1999a). This accounts for many of the openings to be maintained. Most of the larger openings in the program are those which have remained open since their acquisition. Maintaining these sites can benefit area-dependant open land species which range in the Hoosier National Forest planning area, many of which have declining populations. See discussion in Purpose and Need section of this document.

P-8. No openings in riparian habitat. 10-2

C: "We are also critical of the . . . acres given to Forest Openings in riparian habitat"

R: We are not proposing to create openings, rather we propose to maintain openings which have existed for decades. To provide the full range of habitats likely to occur in southern Indiana, we maintain openings in both upland and bottomland situations.

P-9. Openings in special areas should be dropped. 11-1
No openings on Pleasant Run. Eliminate openings around Deam. 20-5 and 20-6

C: " Openings in compartments . . . around the Deam and along Deckard Ridge where reproductive success (for interior species of NTMB) is high should be eliminated.

C: Openings within the boundaries of special areas should be dropped from future planned maintenance and allowed to return to native forest conditions.

R: Certain special areas have been established for reasons other than forest interior habitats. Some species requiring open land areas are known to occur in special areas. Maintaining these openings will assure their continued existence on the Hoosier.

P-10. Field review openings near springs or alcoves prior to maintenance. 11-2

C: " . . . opening may be adjacent to a potential cliff or alcove. We recommend a field inspection prior to including this area in maintenance schedules to determine if there are any concerns."

R: Several of the openings listed by this commentator have already been reviewed and sensitive features were buffered from treatment. The other areas will be reviewed and any cliffs or alcoves will be buffered. Treatment of cliffs or alcoves does not occur as a part of openings management because they are to steep for equipment operation.

P-11. Openings in forest (old growth) core areas should be dropped. 11-3 and 20-4

C: "Maintaining openings within a designated forest core areas appears to be in conflict with the description provided for these areas in the current forest plan, future planned maintenance and allowed to return to native forest conditions."

R: No openings will be maintained within the designated forest core areas. These areas are listed in Appendix M of the Forest Plan (U.S. Department of Agriculture Forest Service 1991b).

P-12. Openings adjacent to cliffs with rare plants nearby should be dropped. 11-4

C: " This opening appears to be adjacent to cliffs on either side; *Dodecatheon frenchii* and *Oxydendron arboreum* are known to occur in the immediate vicinity. We suggest decreasing the size of this opening away from both sets of cliffs or dropping it altogether . . .."

R: The cliffs, habitat for French's shootingstar *(Dodecatheon frenchii)* are not part of the opening and are not proposed for any maintenance activity. The area containing sourwood *(Oxydendron arboreum)* was reviewed by a Forest Service botanist and her conclusion was that the plants have been thriving within this managed opening over the many years it has been maintained and would be harmed if the opening were allowed to succeed to a later seral stage. An interdisciplinary team recommends continued maintenance of this opening.

P-13. Openings in or adjacent to areas managed for closed canopy conditions. 11-6

C: Openings within or adjacent to an area (Sams Creek Drainage) managed for closed canopy conditions should be dropped from further maintenance.

R: The opportunity analysis for this area (OA 11 on Brownstown Ranger District) identified two areas in the Sam's Creek and Big Creek drainages for management of continuous forest. The "managed forest corridor" is designed to link interior forest tracts to high quality communities around the creeks (U.S. Department of Agriculture Forest Service 1993c). Within this corridor openings maintenance is "generally discouraged". Two of the openings mentioned in this comment are at least partially within the boundaries of this corridor and have now been dropped from the Forest Openings program.

The remaining openings listed in this comment are within the second area, a "forest buffer" This area is more fragmented by private ownership than the corridor. Forest openings within this buffer are on the periphery of closed canopy stands and can continue to be maintained based on criteria for ecologically sound management of the these areas (U.S. Department of Agriculture Forest Service 1993c).

P-14. Game management emphasis or visual management for humans at expense of other species, including endangered species. 15-2 and 15-4

C: "I am not opposed to hunting by any means, but I do not think that we should manage the relatively small amount of public, and therefore potentially protected, forest for use by humans in disregard of the needs of many species of flora and fauna, some of them endangered, that depend on the forest environment for their survival"

C: "I question the wisdom of managing for the aesthetic enjoyment of humans at the expense of forest inhabitants."

R: There may be young vegetation which provides habitat for early successional plant and animal species and opportunities for berry picking, wildlife observation, visually varied landscapes, and hunting on private land, but it is our goal to provide these opportunities on public land for all to enjoy. It is to be expected that our publics disagree on what constitutes the most aesthetically-pleasing landscape; large areas on the Forest provide closed-canopied forest for those who prefer an undisturbed landscape.

The Forest Service is required to maintain populations of all native species within the planning area. Rare species occur in a wide variety of habitats. The openings program provides habitat for many species which require early-successional vegetation or open land during some part of their life cycle.

Soil and Water Effects

S-1. Soil compaction; adverse effects from use of heavy equipment. 10-7

C: "Use of heavy equipment on Hoosier National Forest soils should be banned."

R: The proposed action has been modified to include mowing and burning only. The use of heavy equipment has been dropped from the proposal. A discussion of the effects of the proposed action on soils can be found in the environmental effects section of this analysis.

S-2 . Pretreatment monitoring to protect soils, operating equipment during wet conditions. 10-8

C: Monitoring of site conditions prior to forest openings maintenance is probably a sometime thing since we have never been able to trust the Forest Service to do it timber harvests . "

R: The opening maintenance administrator would limit operations when short wet periods or detrimental soil conditions occur.

S-3. Erosion and rutting on roads. 16-2

C: "I see old logging trails from a few months old to decades old , with all of them there is erosion from large wheel ruts."

R: There are many old woods roads and trails that were already in place when the property was acquired. Many of these old roads and trails will recover and not have active erosion once use has been stopped. There is also a program on the Forest to obliterate some roads or construct soil conservation measures to control the erosion. This soil and water restoration program is tied to funding so is an on-going activity. The old roads and trails used as access routes to the openings maintained have or will have water control structures constructed to prevent soil erosion during the openings maintenance program.

Visuals and Recreation Effects

V-1. Visuals - Want to see large trees on HNF. Desire for mature forest. 2-6 and 15-5

C: "When people go to the HNF they expect to see great mature trees"

C: The recovering forests of the Hoosier National Forest should be left alone to mature.

R: Most of the Hoosier National Forest is managed in ways which produce large mature trees. Forest openings comprise 1.7 percent of the Forest acres (3335/196,102 = .017). Some early-seral and edge habitat is needed to provide for species diversity.

V-2. Provide recreational opportunities, wildlife viewing, hunting. 9-2

C: " Forest openings managed for wildlife provide for enhanced wildlife viewing opportunities. . . . provide for enhanced sport hunting opportunities."

R. We agree. These are important recreational values which are provided by forest openings.

Appendix B - Mitigations Included in the Proposed Action

Mitigation Measure A - Equipment used for mowing would be restricted to slopes of 35 percent or less, and operated during dry conditions, to provide for safe operation and limit adverse effects on soil stability.

Mitigation Measure B - Mowing and burning would occur outside the spring/summer nesting season to protect ground nesting birds. Mowing would occur between July 1 and October 31, and burning would occur between October 1 and April 14.

Mitigation Measure C - Heritage sites located on or near openings would be avoided during treatment to protect cultural resources.

Mitigation Measure D - Vegetation cover will be maintained around caves, sinkholes, and swallowholes to prevent increases in sediment delivery to karst systems.

Mitigation Measure E - Only a portion of any large opening designed to support area dependent species would be mowed or burned in a given year. This will provide for maintenance while protecting the site from temporary abandonment by species affected by this type of disturbance.

Appendix C - Maps

Appendix D
Management Indicator Species
Effects of Proposed Forest Openings Maintenance

Introduction

The Forest Service is mandated under Code of federal Regulations (CFR) 200.3(b)(2) "to administer and manage lands . . . in accordance with . . . the National Forest Management Act (NFMA)". The NFMA does not mention Management Indicator Species (MIS) or monitoring wildlife populations. Direction for MIS is located in 36 CFR 219.19 which establishes the basis for managing and maintaining viable populations of existing native and desired non-native vertebrate species. It states that for planning purposes a viable population shall be regarded as one which has the estimated numbers and distribution of reproductive individuals to insure its continued existence is well distributed in the planning area. Specifically, 36 CFR 219.19(a)(6) states "population trends of the management indicator species will be monitored and relationships to habitat changes determined. This monitoring will be done in cooperation with state fish and wildlife agencies to the extent practicable."

The Forest Service Manual (FSM) provides further direction on MIS both in the Wildlife, Fish, and Sensitive Plant Habitat Management directives (FSM 2600) and the Planning Directives (FSM 1900). MIS are defined as "plant and animal species, communities, or special habitats selected for emphasis in planning in order to assess the effects of management activities on their populations and the populations of other species with similar habitat needs which they may represent" (FSM 2620.5). The FSM further states that species selected will be those that "best represent the issues, concerns, and opportunities to support the recovery of Federally-listed species, provide continued viability of sensitive species, and enhance management of wildlife and fish for commercial, recreational, scientific, subsistence, or aesthetic values or uses" (2621.1).

The Hoosier National Forest Land and Resource Management Plan (Forest Plan) integrates MIS into the planning process consistent with Forest Service Manual direction under Resource Integration Requirements (1922.15 items 10 and 11). The FSM states "10. Ensure that the set of management indicator species includes RPA and regional wildlife and fish indicators and represents all significant forest level wildlife and fish diversity and resource production issues, concerns, and opportunities." and "11. Ensure that management prescriptions will provide for the habitat capability to meet demand for management indicator species and provide access for recreational and commercial uses with minimal disturbance to species use of suitable habitats".

The manual further requires that plans "Ensure that the plan provides for the kinds, amounts, and distribution of habitat needed for the recovery of threatened and endangered species and needed to maintain viable, well-distributed populations of all existing native and desired non-native species" (FSM 1922.15(13)).

The Forest Plan forest-wide guidance for managing vegetation to provide diverse ecosystems states that "habitat objectives and capability for management indicator species (MIS) will be considered in Forest management as appropriate. MIS are monitored on the National Forest land to determine population trends and to evaluate effects of management activities on selected species" (Forest Plan p. 2-6).

Analysis of project level effects is used to determine an activity's contribution to meeting forest-wide objectives for providing for well distributed, viable populations. Management activity effects are examined in light of the existing habitat conditions, both within and outside the Forest, and documented population conditions or trends.

This document is an analysis of the effects of maintaining forest opening habitats on management indicator species for the Hoosier National Forest. Forest openings would be burned or mowed to maintain early seral vegetation. Post treatment openings are dominated by grasses, forbs, and shrubs with mowed openings retaining a higher percentage of shrubs and small trees. Effects are also discussed for a no action alternative. Effects on these species are indicative of those on other plants and animals utilizing similar habitats.

Species Effects

Wood duck (*Aix sponsa*) - This duck favors bodies of water with overhanging trees or brush and downed logs. It is often found in wetlands and marshes but will use any body of water. Wood duck nests in cavities in hardwood trees. These are not necessarily close to water, but are usually in bottomland areas. Breeding begins in early March. Ponds or perennial streams under forest canopy are required after eggs hatch, however. Acorns and grains provide most of the food for this species, but insects are frequently taken by young birds. Openings maintenance would not affect these habitats and so would not affect this species. No action would not effect this species either. Monitoring of wood duck production for Indiana indicates generally increasing populations with annual variability. Nesting success for this species was higher in Indiana than for the Mississippi Flyway as a whole (Hartman 1997, 1998a, 1998b).

American woodcock (*Scolopax minor)* - This bird nests in wet meadows and thickets but uses dry, upland, old-field habitats for courtship. Forest openings provide both nesting and courtship areas for this species. Woodcock have been observed nesting in maintained openings. Earthworms are their preferred food, although other invertebrates are also eaten. Opening maintenance would have a positive effect on this species. The no action alternative would allow openings to become unsuitable for this species through forest succession. The 11 year trend for this species is downward about five percent (Lehman 1998a).

Wild turkey (*Meleagris gallopavo*) - This species uses both heavily wooded areas and openings. It typically nests in upland hardwood forests, although pine plantations are occasionally used. They begin nesting in early April. Grains of grasses, acorns, and other plant material form most of their food, but many invertebrates are also taken. Open land is also required for foraging for insects. Maintained forest openings are heavily used by turkeys as nest sites and provide important bugging areas for turkey poults. Forest opening maintenance has a positive effect on this species. The no action alternative would have a negative effect on this species through habitat loss. Population trends for turkeys show continuing increases in Indiana (Backs 1998a).

Ruffed grouse (*Bonasa umbellus*) - This species is found in woods, woods borders, brushy areas, dense young forest, or openings. It breeds during April and May. These birds feed largely on insects during the summer, but fruits and other plant material is consumed throughout the year. Openings maintenance sustains these habitats and is favorable for ruffed grouse. The no action alternative would result in reduction of grouse habitat on the Forest and would have a negative effect on this species. The population trend for this species indicates significant declines since a peak in the 1970's. (Backs 1998b).

Broad-winged hawk (*Buteo platypterus)* - These hawks tend to nest in extensive woodlands or larger woodlots. It typically requires a large foraging area which includes forest, edges, and openland. This species takes primarily small mammals, reptiles, and insects as food. Openings maintenance is neutral or slightly beneficial

for this species. Nesting habitat is not limiting on the Forest and openings may provide some feeding areas for these hawks. The no action alternative would not affect this species. Populations of this bird have not shown significant changes since 1966 (Castrale et al. 1998).

Pileated woodpecker (*Dryocopus pileatus*) - This bird uses deep woods, woodlots, residential areas, and narrow bands of woods along stream courses. It is a cavity nesting species which requires large snags, and large woody debris on the forest floor. Nesting begins in early May. Insects and larvae provide most of this birds food. Forest openings do not provide habitat favored by this woodpecker. Most openings are in a matrix of woods and have some trees and snags that provide habitat of similar quality to residential areas or small woodlots. For these reasons opening maintenance has a neutral to slightly negative effect on this woodpecker. It is unlikely that suitable habitat is limiting populations of this species on the Forest, however the species is largely restricted to landscapes with high forest cover. The no action alternative would allow for development of forest canopies and favor this species. Populations have shown a significant annual increase since 1966 (Castrale et al. 1998).

Acadian flycatcher (*Empidonax virescens)* - This bird is found in heavily wooded areas with developed understories and on wooded streambanks within floodplains. This bird requires snags in the understory from which it forages for insects. Nests are located on slender branches of trees and shrubs, usually 10 to 20 feet above the ground. Nesting usually occurs during June. This bird eats insects taken primarily while in flight. Openings maintenance is unfavorable to this species as it prevents succession from creating the forest cover this bird requires. Nests near openings may be subject to increased nest predation and parasitism. (See discussion in Appendix A on fragmentation and these effects.) No action would allow succession and favor this species. Population trends for this species have not shown significant changes since 1966 (Castrale et al. 1998).

Scarlet tanager (*Piranga olivacea*) - This tanager nests in large, dry, upland forests and utilizes clearings and forest edges for foraging (Mumford and Keller 1984). Nests are found on horizontal branches often above openings during June. Insects and larvae provide most of this species food. These are gleaned from leaves and twigs. Openings maintenance would be favorable to this species as it would provide clearings and borders for foraging as long as large enough blocks of forest are also maintained. No action would reduce available clearings and edge habitat but would provide those large woodlands for this area sensitive bird. It is not clear that either habitat is limiting for this species in landscapes where openings are managed. This species has showed a significant annual increase in population since 1966 (Castrale et al. 1998).

Louisiana waterthrush (*Seriurus motacilla*) - This bird lives along small, usually perennial, woodland streams and is seldom found far from water. Nests are usually found in root tangles along stream banks from early May through mid June. This bird eats insects and other invertebrates taken from the edges of streams. Since this bird prefers wooded areas, maintaining openings immediately adjacent to streams would have a negative effect on this species. Stream buffers are used to mitigate this effect so maintenance, as prescribed, has no effect on this species. Nests near openings may be subject to increased nest predation and parasitism. (See discussion in Appendix A on fragmentation and these effects.) The no action would not alter streamside habitats so it would also have no effect on this species. This species populations have increased significantly since 1966 (Castrale et al. 1998).

Wood thrush (*Hilocichla mustelina*) - This bird prefers woodlands and will nest near clearings or buildings in wooded areas (Mumford and Keller 1984). It nests in deciduous forest understory trees about ten feet above the ground during June. It is found in both open and closed canopy forests. This species feeds on insects, and fruits and berries. Openings maintenance has a neutral effect on this species. The no action would also not effect this

species. Population trends indicate a significant decline in this species statewide since 1966. They are much more abundant in south-central Indiana landscapes dominated by forest, including the Hoosier National Forest, where forest openings have been managed for some time (Castrale et al. 1998).

Black-and-white warbler (*Mniotilta varia*) - This bird nests in both secondary and mature forests. It nests at the base of large trees among dense ground vegetation in May and early June. Insects and larvae provide most this species food. These are taken from the trunk and lower branches of large trees. Openings maintenance would have a negative effect on this species because it limits tree cover. Nests near openings may be subject to increased nest predation and parasitism. (See discussion in Appendix A on fragmentation and these effects.) The no action alternative would allow more tree cover to develop and would favor this species. While this species has been detected during Breeding Bird Surveys there is no reported significant population trend information (Castrale et al. 1998).

Worm eating warbler (*Helmitheros vermivorus*) - This warbler prefers dense woodlands with down timber or dense understory vegetation. Nests are near or on the ground in late May and early June. Insects and larvae provide most of this species food, and is taken mostly from the ground. Forest openings are unfavorable habitat for this species. Nests near openings may be subject to increased nest predation and parasitism. (See discussion in Appendix A on fragmentation and these effects.) The no action alternative would allow more tree cover to develop and would favor this species. Survey information has not shown a significant population trend for this species (Castrale et al. 1998).

Prairie warbler (*Dendroica discolor*) - This bird nests in overgrown, old-field habitats. It is found in somewhat open brushy areas with many shrubs and saplings. Nests average about seven to eight feet above the ground in shrubs and small trees. Breeding takes place from May to July. Insects and larvae provide most of this species food. Forest openings maintenance provides such habitats and is favorable to this species. The no action would result in habitat loss through succession and would negatively affect this species. Significant changes in populations have not been detected since 1966. The greatest concentrations of this species are in southern Indiana, including the Hoosier National Forest (Castrale et al. 1998).

Pine warbler (*Dendroica pinus*) - This warbler prefers to nest in pine plantations, usually of shortleaf, more rarely in white pine. Most nests are well above the ground from May to July. Insects and larvae provide most of this species food. Forest openings maintenance is unfavorable for this species since it prefers standing pine forests. No action is also unfavorable since existing openings would succeed to native hardwoods rather than non-native pines. While this species has been detected during Breeding Bird Surveys there is no reported significant population trend information (Castrale et al. 1998).

Yellow-breasted chat (*Icteria virens)* - This bird prefers thickets, briar patches, and somewhat open grassy area with many shrubs and saplings. Nests are near the ground, frequently in blackberry brambles form May to July. Insects and larvae provide most of this species food. Openings maintenance provides favorable habitat and has a positive effect on this species. No action would result in loss of habitat through forest succession. Population monitoring for this species indicates a significant annual decline since 1966 (Castrale et al. 1998).

Cliff plant associations - These plant communities include a number of vascular and non-vascular plants which occur on sandstone cliffs. They may be moist or dry, or have species characteristic of both depending on their height and aspect. Opening maintenance is not proposed for any cliffs. There will be no effect on cliff plant associations for either the action or no action alternatives. Monitoring of these associations on the Forest indicates they are healthy and have not been disturbed (U.S. Department of Agriculture Forest Service 1998).

Barrens/glades - Barrens and glades are grass dominated plant communities with some degree of tree canopy, typically dry site oaks. Glades have large amounts of exposed bedrock. Both communities are dominated by prairie herbs. Opening maintenance is not proposed for any barrens or glades. There will be no effect on barrens or glades for either the action or no action alternatives. Restoration efforts are improving the health and vigor of barrens and glades on the Forest. Monitoring indicates healthy and diverse vegetative conditions in these communities following treatments (Olson 1997).

Raccoon (*Procyon lotor*) - This species is a habitat generalist although it prefers to forage near water. It uses most terrestrial habitats and generally needs streams or ponds. Raccoons travel along hedgerows and waterways. Dens are typically in large hollow trees. Young are born in April and May. Raccoons are omnivorous. Openings maintenance would have a neutral effect on this species as landscapes around openings provide many den sites. The no action alternative would also have no effect. Population indices for raccoons show increased populations since the 1970's with relative stability in recent years (Lehman 1998b).

Bobcat (*Felis rufus)* - Bobcats may be found in a variety of habitats including forests and open lands. They often forage along roads and openings. They are nocturnal predators. Dens are usually in crevices in rock. Young are born in late spring. Forest openings support a variety of small mammals, particularly rabbits, which are important prey for bobcats. Maintaining openings would have a positive effect on this species. No action would reduce the prey base and foraging habitat and have a negative effect on this species. Although populations remain low, numbers of this species are apparently increasing with sightings tripling since 1992 (Lehman and Weaver 1998).

Gray squirrel (*Sciurus carolinensis*) - This species utilizes overmature or declining trees with hollows for den sites. It prefers mature deciduous forest, often with scattered brushy or open areas. This species may nest in cavities or build nests of twig and leaves in treetops. Litters of young are produced from February through October. It eats mostly plant material. Openings maintenance would have a neutral effect on gray squirrels since sufficient mature forest exists nearby. The no action alternative would allow for forest succession and would provide mature forest, for this species. Populations of this species are stable with some year to year fluctuation (Lehman and Weaver 1998). It is unlikely that habitat is limiting.

Largemouth bass (*Micropterus salmoides*) - The largemouth bass has been stocked in most ponds and lakes on the Hoosier National Forest, and can sometimes be found in deep pools or backwaters of medium to larger streams. Spawning occurs during May and June. It feeds on insects, crustaceans, and smaller fish. The work involved in opening maintenance includes mowing and prescribed fire. The riparian vegetative cover is protected during all openings work, which in turn protects aquatic habitats from potential effects such as sedimentation or increased sunlight. For this reason, aquatic habitat would not be affected, nor would this species. In addition, the no action alternative would have no affect on this species.

Smallmouth bass (*Micropterus dolomieui*) - The smallmouth is found in clear, gravel bottomed streams with relatively cool water. Spawning occurs during May and June. It feeds on insects, crustaceans, and smaller fish. The work involved in opening maintenance includes mowing and prescribed fire. The riparian vegetative cover is protected during all openings work, which in turn protects aquatic habitats from potential effects such as sedimentation or increased sunlight. For this reason, aquatic habitat would not be affected, nor would this species. In addition, the no action alternative would have no affect on this species.

Southern redbelly dace (*Phoxinus erythrogaster*) - This species prefers small, clear, cool streams in ravines. Spawning occurs during May and June. They feed mostly on algae and creek sediments. The work involved in opening maintenance includes mowing and prescribed fire. The riparian vegetative cover is protected during all

openings work, which in turn protects aquatic habitats from potential effects such as sedimentation or increased sunlight. For this reason, aquatic habitat would not be affected, nor would this species. In addition, the no action alternative would have no affect on this species.

Rock bass (*Ambloplites rupestris*) - The rock basis found in clear, relatively cool water, in silt-free rocky streams. It has been introduced into some lakes and ponds by anglers. It feeds on insects and crustaceans. It tends to utilize vegetated and brushy stream margins and pools, and the rocky and vegetated margins of lakes. The work involved in opening maintenance includes mowing and prescribed fire. The riparian vegetative cover is protected during all openings work, which in turn protects aquatic habitats from potential effects such as sedimentation or increased sunlight. For this reason, aquatic habitat would not be affected, nor would this species. In addition, the no action alternative would have no affect on this species.

Bluegill (*Lepomis macrochirus*) - This fish is stocked into most ponds and lakes on the Hoosier National Forest. It is found most often in clear ponds with fairly dense vegetation, but may occur in many other bodies of water. It feeds on insects and crustaceans. The work involved in opening maintenance includes mowing and prescribed fire. The riparian vegetative cover is protected during all openings work, which in turn protects aquatic habitats from potential effects such as sedimentation or increased sunlight. For this reason, aquatic habitat would not be affected, nor would this species. In addition, the no action alternative would have no affect on this species.

Grass pickerel (*Esox americanus*) - The pickerel is found in vegetated pools and slack waters in streams. Spawning occurs during March and April. It feeds on smaller fish. The work involved in opening maintenance includes mowing and prescribed fire. The riparian vegetative cover is protected during all openings work, which in turn protects aquatic habitats from potential effects such as sedimentation or increased sunlight. For this reason, aquatic habitat would not be affected, nor would this species. In addition, the no action alternative would have no affect on this species.

Pugnose minnow (*Opsopoeodus emiliae*) - The pugnose minnow is found in vegetated pools and slack waters of streams. Spawning probably occurs in June. It feeds on small invertebrates. The work involved in opening maintenance includes mowing and prescribed fire. The riparian vegetative cover is protected during all openings work, which in turn protects aquatic habitats from potential effects such as sedimentation or increased sunlight. For this reason, aquatic habitat would not be affected, nor would this species. In addition, the no action alternative would have no affect on this species.

Redfin shiner (*Lythrurus umbratilis*) - This species is found in pools in smaller streams. Their food habits are essentially unknown. The work involved in opening maintenance includes mowing and prescribed fire. The riparian vegetative cover is protected during all openings work, which in turn protects aquatic habitats from potential effects such as sedimentation or increased sunlight. For this reason, aquatic habitat would not be affected, nor would this species. In addition, the no action alternative would have no affect on this species.

Stream invertebrates - Stream invertebrates occur in ephemeral, intermittent, and perennial streams. Each stream type has its own characteristic group of species. This group of animals includes crayfish, molluscs, aquatic larval forms of insects, segmented worms, and others. The work involved in opening maintenance includes mowing and prescribed fire. The riparian vegetative cover is protected during all openings work, which in turn protects aquatic habitats from potential effects such as sedimentation or increased sunlight. For this reason, aquatic habitat would not be affected, nor would these animals. In addition, the no action alternative would have no affect on these animals.

Cave invertebrates - Cave invertebrates may be found in true caves and in deep rock shelters. Cave habitats can be affected by changes in airflow or hydrologic regimes. Openings maintenance is not proposed adjacent to caves so airflow would not be affected. Streams are buffered from treatment so hydrologic regimes would not be affected and maintenance of vegetation cover protects areas from soil erosion. For these reasons mowing or burning would not affect cave invertebrates. The no action alternative would also have no effect on cave invertebrates. Monitoring of caves on the Forest has found an array of species existing in a system with no major environmental problems. Population trends have not been determined (Hobbs 1995).

Wetlands - Wetlands include ephemeral wetlands, marshes (herbaceous dominated permanent wetlands), and swamps (wetlands dominated by trees and or shrubs). Each type has distinct vegetation, soils, and hydrology. No openings maintenance is proposed for wetlands. There will be no effect on wetlands from any alternative. Acres of wetlands are recorded in Combined Data System (CDS) database. The number of acres of wetlands on the Forest has been increased through restoration projects and lake construction.

Monitoring of fish and stream invertebrates - Monitoring of management indicator fish species and stream invertebrates is accomplished by Hoosier National Forest personnel, the Indiana Department of Natural Resources Division of Fish and Wildlife, and the Indiana Department of Environmental Management. Surveys of each water body are completed to develop species composition profiles and information is gathered on water quality and habitat characteristics. Productivity varies between bodies of water and segments of streams and rivers. Baseline information has been gathered which shows comparatively healthy and dynamic aquatic ecosystems on and around the Hoosier National Forest. Population trend data is not yet available. Survey information in the following documents is also incorporated by reference (Andrews 1986, 1991, 1992, and 1996; Andrews and Pearson 1983; Ayers 1978; Ball 1973; Ball and Schoenung 1996; Burch 1987a, 1987b, 1987c, 1988a, 1988b, and 1988c; Burch and Glander 1987, 1988, and 1989; Carnahan 1993, 1995, and 1997; Carnahan and Stevanavage 1995; Clarke et al. 1998; Ewing 1989, 1993, and 1997; Flatt and James 1981; Glander 1984a, 1984b, 1984c, 1984d, 1985, 1986, 1987a, 1987b, 1988, 1989a, and 1989b; Gulish 1968; Hottell 1980; Jones and Pfister 1992; Keller 1971a and 1971b; Lehman 1989, 1990a, 1990b, 1990c, and 1996; Ridenour and Johnson 1974; Simon 1995; Stefanavage 1993a and 1993b; Thomas 1986; and Wenzel 1989a and 1989b).

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Appendix E
Public Comments on the March 8, 1999 Predecisional Environmental Assessment

The interdisciplinary (ID) team categorized each response received on the predecisional environmental assessment (EA) to identify specific comments, issues, and concerns. These comments were identified and sorted. Following each comment is a summary of how the comment was addressed in the analysis.

In the following pages, we group comments by issues. There is also a "general comments" heading which lists non-specific issue comments. "C" indicates a comment. "R" indicates the USDA Forest Service response. Direct quotes are within quotation marks. Paraphrased comments are without quotation marks. In parentheses we list the comment source code (response number - comment number). When we list several comment source codes the quote is from the first comment source code, however, the ID team believes the quote represents the additional comments.

The following lists those who responded to the predecisional EA. A complete listing of the individuals contacted can be found in the project file.

Name Of Individual/Organization	Post Mark	Com #
Rex Watters, Reservoir Wildlife Specialist, Monroe Reservoir	3/12/99	001
Diana Kaye and Mary Clinton	3/15/99	002
Glenn F. Day	3/16/99	003
Dave Elliott	3/17/99	004
Carl Eisfelder	3/18/99	005
Tiffany Kinsey	3/19/99	006
Larry E. Lehman	3/19/99	007
Michael L. Axson, Superintendent West Boggs Park	3/19/99	008
Dean P. Baker, Pike Lumber Co.	3/22/99	009
Jerry James, NWTF- Sand Hill Chapter	3/23/99	010
Mark Banker, The Ruffed Grouse Society	3/23/99	011
Paul T. Ash	3/25/99	012
James H. Patric, Principle Forest Hydrologist, USDA Forest Service (ret.)	3/26/99	013
Danny D. King	3/29/99	014
Daniel F. Fuhs	3/29/99	015
Suzanne Mittenthal, Hoosier Hikers Council	3/30/99	016
Mitch Marcus	3/30/99	017
Jeff Hampshire	3/30/99	018
Martha Campbell	3/31/99	019
John C. Moody, Prof. Science Educ., Indiana University Southeast	3/31/99	020
James Earl Kennamer, Vice President of Conservation Programs, National Wild Turkey Federation	4/1/99	021
John Castrale, Non-game Biologist, IDNR	4/1/99	022
Corey Wade	4/1/99	023
Charles Phillips, Heartwood	4/3/99	024
Eldon Colber	4/5/99	025

Name Of Individual/Organization	Post Mark	Com #
Paul Wigginton	4/5/99	026
Bret Collignon, President, Dubois County Sportsman	4/5/99	027
Gary Doxtater, Director, IDNR Div. of Fish & Wildlife	4/6/99	028
Ryan Stringer	4/6/99	029
Greg Goldman	4/9/99	030
Gordon Goldman	4/9/99	031
Jerry Goldman	4/10/99	032
Keith Goldman	4/10/99	033
Harry Hollis	4/12/99	034
Richard W. McIlvaine, Director, Indiana State Trappers Association	4/12/99	035
Ed Theroff	4/12/99	036
Sarah E. Frey, Protect Our Woods	4/13/99	037
Jim Bensman, Forest Watch Coordinator, Heartwood	4/12/99	038
Mary Kay Rothert	4/12/99	039
Douglas D. King	4/12/99	040
Randy Showalter, Regional Director, Indiana National Wild Turkey Federation	4/13/99	041
Larry D. King	4/13/99	042
Gwen Marshall	4/13/99	043
James Earl Kennamer Vice President of Conservation Programs, National Wild Turkey Federation	4/13/99	044
Alan Murray	4/13/99	045
Selene Zander	4/13/99	046
Paul Goettlich	4/13/99	047
Ross Brittain, Wild Birds Unlimited	4/14/99	048
Richard Hill, President, Save the Valley	4/14/99	049
David B. Curry	4/15/99	050
Mike Englert	4/15/99	051
Larry W. Allen	4/15/99	052
Sandra L. Wilmore, Program Director Save the Dunes Conservation Fund	4/16/99	053
Linnea Floyd	4/17/99	054
Jeff K. Eisfelder	4/17/99	055
Robert E. Fisher, Vice President, Chicago Ornithological Society	4/18/99	056
Jess A. Gwinn	4/17/99	057
Paula L. Fitzgerald	4/17/99	058
Tobi Van Dyck	4/17/99	059
Gerald Coomer	4/17/99	060
R. M. Uni (form letter, 45 copies received)	4/17/99	061
Mark Donham, President, and Kristi Hanson, Board of Directors, R.A.C.E.	4/15/99	062
Brook Kramer	4/19/99	063
Marcia Daehler	4/19/99	064
Greg Garvey, Indiana Forest Alliance	4/19/99	065
Donna McNeely	4/19/99	066
Steve E. Backs	4/19/99	067
Donald Whitehead, Professor Emeritus, Indiana University	4/19/99	068
A. J. Sneller	4/20/99	069

Name Of Individual/Organization	Post Mark	Com #
Donald Winslow, Indiana Forest Alliance	4/19/99	070
Mary Lee Paoletti	4/19/99	071
Paul E. Steffen, Eco Exposures	4/19/99	072
Mark Stoops	4/19/99	073
Cloyce Hedge, IDNR Div. of Nature Preserves *	4/20/99	074
Liz Day	4/20/99	075
Cloyce Hedge, IDNR Div. of Nature Preserves*	4/20/99	076
Bobby Schroader	4/20/99	077
Jill Dodd	4/20/99	078
Tim Maloney, Natural Heritage Director Hoosier Environmental Council	4/20/99	079
Scott Pruitt, USDI Fish and Wildlife Service	4/20/99	080
Jim Wehmeyer, President Indiana State Chapter National Wild Turkey Federation	4/20/99	081
Lisa Tokarz	4/22/99	082
James Gerbracht, Indiana Chapter, The Wildlife Society	4/26/99	083
Ed Schools, Sassafras Audubon Society	4/21/99	084
Bob Stanton, Prescribed Fire Consulting Inc.	4/22/99	085
Kristin Amdahl	4/28/99	086
Michael Walters, Auburn City Council	4/29/99	087
Phi Pizzo	5/08/99	088

*Same letter received and numbered twice. Kept in list to account for numbering.

Comments and Responses

General Comments

G-1. General support for Alternative A - Proposed Action 1-1, 4-1, 7-1, 8-1, 10-1, 14-1, 15-1, 17-1, 18-1, 19-1, 20-3, 21-1, 22-2, 26-1, 28-2, 30-1, 31-1, 32-1, 33-1, 36-1, 40-1, 41-1, 42-1, 52-1, 54-1, 55-1, 67-2, 81-1, and 83-1

C: " . . . we strongly support the decision to maintain these openings as described in alternative A"

R: The proposed action would manage forest openings to benefit early seral and edge - loving species as well as species which nest or den elsewhere but forage in open areas. The effects of mowing and burning openings, Alternatives A and B, are analyzed the environmental effects section of this document.

G-2. General support for Alternative C - No Action Alternative, Opposed to maintenance, Allow openings to regenerate 2-1, 3-1, 6-1, 23-1, 38-1, 43-1, 45-1, 46-1, 47-1, 48-1, 49-1, 50, 51-1, 53-1, 56-1, 57-3, 58-1, 59-1, 60-1, 61-1, 63-1, 64-1, 66-1, 69-1, 71-1, 72-1, 73-1, 75-1, 79-4, 82-1, and 88-1

C: "Most of these artificial openings should be allowed to regenerate . . . "

C: "What the forest needs most is to be left alone."

R: The Hoosier National Forest Land and Resource Management Plan (Forest Plan) (U.S. Department of Agriculture Forest Service 1991b) allows forest openings management in some management areas and prohibits it in Management Areas 5.1, 6.2, and 8.1. The Forest Plan projected that between five and seven percent of National Forest System lands would be early-successional habitats. If this proposal to maintain 3,335 acres is implemented and with the existing 925 acres of stands less than 10 years old and with about 700 acres of utility corridors; we estimate about 2.5 percent of the forest would be early-successional habitats (3335+925+700)/196,102 = .0253). The effects of no action alternative, Alternative C, are analyzed in the environmental effects section of this document.

G-3. Citing personal conversation with experts 62-15

C: "Merchant, 1999 is cited but there is actually no publication that one can check to see what research was done regarding impacts to watersheds or erosion as a result of Forest Service management."

R. This is a citation of a personal conversation with a scientific expert in that field. Such references are frequently used as supplements to citations of publications as was done in this document. A conversation record is in the project file.

G-4. No farming, no cc's, no motorized vehicles 3-2

C: "Keep your hands of Our Forest. No farming. NO Clear Cutting. No Motorized vehicles in the Forest."

R: These issues are beyond the scope of this analysis. The effects of the no action alternative, Alternative C, are analyzed the environmental effects section of this document.

G-5. Logging inappropriate, opposed to sale 24-1

C: "Logging is an inappropriate use of public forests . . .."

R: There is no logging in this proposal. This issue is beyond the scope of this analysis.

G-6. Analysis inadequate, Need EIS Cumulative effects, scientific controversy indicate need for EIS due to significance 62-3, 45-2, 46-2, 47-2, 48-2, 49-3, 50-3, 51-2, 53-4, 56-2, 58-2, 61-2, 62-1, 63-2, 64-2, 71-2, 72-2, 78-2, and 82-2

C: "This clearly creates scientific controversy . . . potential for cumulative effects" which meet significance criteria and require an EIS.

C: "If the Forest Service should decide to go ahead with any portion (of) the project, then an environmental impact statement should be completed. The short analysis the Forest Service has completed is very inadequate."

R: This comment is addressed in Appendix A (A-5) of this document and under comment G-22 in this appendix.

G-7. Management efficiency 20-1

C: "After studying the EA on this proposal I am convinced the most efficient and effective manner to properly manage the HNF is by allowing these . . . openings.. to be mowed and/or burned."

R: This proposal was designed as an efficient means to accomplish the purpose. Management efficiency was raised as an issue during scoping and is addressed in the environmental effects section of this analysis.

G-8. Mowing dangerous and expensive 9-1

C: Bush-hogging, in our opinion, is rather expensive, dangerous, and not necessarily useful in developing new forest."

R: Costs for implementing the proposed action are addressed in effects section of this EA. We have no record of serious injury over the history of these treatments on the Hoosier National Forest but there are risks attendant with operating power equipment. Bush-hogging produces some types of early-successional habitat very well but these types are different than the dense seedling and sapling stands produced through even aged management treatments.

G-9. Provide early successional through even-aged forest management techniques 9-2 and 11-2

C: "We would propose that this practice (burning) be coupled with regeneration of poorly stocked forest sites, moving about from area to area."

C: " . . . old-field habitat may be marginally suitable for species such as ruffed grouse and some songbirds that require dense young forest that can best be created through even-aged management of hardwood forests."

R: We agree that openings management does not provide some types of young forest. This proposal addresses a portion of the array of habitats that will be provided through implementation of the Forest Plan. While grouse are using managed openings this may be because the preferred habitat created by even-aged timber harvest is limited on the Forest and on private lands nearby. See discussion in environmental effects section and Appendix D of this EA.

G-10. Support for prescribed burning 19-2, 11-4, and 26-3

C: "The naturally occurring fires that once provided the changes necessary for wildlife have been strenuously controlled to protect the public and their investments. The use of controlled fire and other management techniques where appropriate to provide openings and early-successional areas results in improved habitats for a variety of non-game wildlife as well as game species."

R: We agree that historic disturbance regimes have been significantly altered through direct suppression and human developments, particularly in the case of fire. Controlled burning has been successful in providing these habitats in the past and remains an efficient means of doing so. The effects of prescribed burning are discussed in the environmental effects portion of this EA.

G-11. Affected environment of HNF budget doesn't make sense 13-1

C: " . . . page 12 "The affected environment is the Hoosier National Forest's annual budget of $3 to $4 million per year." simply doesn't make sense."

R: One way to gage management efficiency is to determine the cost of accomplishing management objectives. The source of funds for accomplishing work on the Forest is the annual budget. Using that budget as the affected environment allows comparison between alternatives for meeting the purpose and need .

G-12. Global warming, ozone layer effects, air pollution from burning and mowing 29-3

C: "What effects will the maintaining of these openings have on the ozone? Smoke caused by burning will help to create global warming. Exhaust from lawn mowers will do the same."

R: Prescribed burning is performed in compliance with all state and federal regulations. Equipment used for mowing meets emission guidelines. Effects on global warming and the ozone layer are beyond the scope of this analysis.

G-13. Burning compliance with EPA Regulations 29-5

C: "Do these proposed actions comply with the Environmental Protection Agency air quality regulations?"

R: See response to G-12 above.

G-14. Maintenance near special areas, wilderness areas, natural areas 29-8 and 62-6

C: "The maintaining of openings should not happen around wilderness and "special areas" . . . "

R: See discussion of where openings maintenance may occur on the Forest in Appendix A, response to comment G-2 in this EA.

G-15. New openings in Management. Areas 2.4 and 6.4 34-3 and 34-5

C: "It is my understanding that new openings are not permitted in M.A. 6.4 and existing openings cannot be enlarged in this management area."

C: " As in MA 6.4, new forest openings are not permitted, in this MA (2.4)"

R: This comment listed openings which were believed to be new or enlarged in these management areas. Only existing openings are proposed for management under the action alternatives. Openings have not been newly created or enlarged in any management area including 2.4 and 6.4. See further discussion in Appendix A of this EA.

G-16. Burning in Management. Area 6.4, 2.4 not authorized in plan 34-4

C: "I can find no authority for burning in MA 6.4 guidance . . . there is no authorization to use it in MA 2.4 under the Plan Amendment guidelines."

R: There is no guidance precluding the use of fire in MA 6.4 or MA 2.4. Forestwide guidance for openings maintenance includes the use of fire. See discussion in Appendix A , Comment G-14 in this EA.

G-17. Recommend no openings greater than 1 acre in 2.4 34-6

C: I recommend that all forest openings retained in MA 2.4 be reduced in size to 1 ac. or less so that they will not prevent the forest from attaining its closed-canopied goal . . ."

R: Closed canopy is the dominant, but not exclusive, desired condition for Management Area 2.4. Openings in MA 2.4 are managed to provide habitats for a variety of species some of which benefit from openings greater than 1 acre in size in addition to those favored by small canopy gaps. There is no size limitation guidance for these openings in the Forest Plan. While this management area is dominated by closed-canopied conditions, providing for opening and canopy gap species which are also associated with streams and rivers provides an important ecosystem diversity component.

G-18. Large openings in Management Area 6.4, 2.4 contrary to guidelines for that area 34-7

C: "Also, the average size of the openings in MA 2.4 . . . and 6.4 . . . are larger than the average size in MA 2.8. This is another indication that the efficiency program being initiated is having an adverse effect on the long range goals established for MA 2.4 and 6.4, closed-canopied, undisturbed forests."

R: The proposed action contains fewer openings, fewer total acres of openings, and on average, larger openings, than what has been maintained in the past. This is true for all areas where openings are permitted. Actually, having fewer, larger openings provides for greater areas of continuous canopy, not less. See discussion in Appendix A and the environmental effects section of this EA.

G-19. No openings maintenance in 2.4, 6.4 areas 34-8

C: "I recommend that no maintenance be scheduled for the MA 2.4 and MA 6.4 areas in this planning period."

R: This proposal is consistent with Forest Plan guidance for where forest openings may be maintained. Please see discussions in Purpose and Need section and Appendix A of this EA.

G-20. Use previous appeals, Dillon Report to support No Action Alternatives 37-2 and 37-3

C: This respondent listed several appeals and a survey report (Dillon Report) and recommended they be used as supporting documents for the no action alternative.

R: It was not made clear how the appeals, all of which resulted in findings supporting openings maintenance on the Hoosier National Forest, are to be used in support of the no action alternative. The appeals discussed are included in the project record. It was also not clear how the Dillon report, which provided precise, but not necessarily accurate, measurements of some of the proposed openings, would be used.

G-21. Not contacted for scoping 38-2

C: "Please explain why we (Heartwood) were not contacted for scoping."

R: Records for scoping in the project file indicate that several members of Heartwood, including this respondent, were contacted for scoping. Additionally they were provided further information which they requested in response to scoping and they were sent copies of the predecisional EA.

G-22. Need landscape analysis 38-10, 38-13, and 68-2

C: ``The Project Area needs to be considered within a landscape context. The analysis needs to consider the importance of maintaining connectivity between both individual and larger habitat blocks. Analysis should consider impacts on regional landscape: 1) Identify the distribution, richness, and portions of patch (habitat) types and multi-patch landscape types; 2) Consider the collective patterns of species distributions (richness, endemism); 3) Consider heterogeneity, connectivity, spatial linage, patchiness, porosity, contrast, grain size, fragmentation, juxtaposition, patch size frequency distribution, perimeter area ratios, and the pattern of habitat layer distribution; and 4) Consider the disturbance processes (aerial extent, frequency, or return interval, rotation period, predictability, intensity, severity, and seasonality), nutrient cycling rates, energy flow rates, rates of erosion and geomorphic and hydrologic processes, and human land-use trends."

``The community-ecosystem analysis should: 1) Identify relative abundance, frequency, richness, evenness, and diversity of species and guilds; 2) Identify proportions of endemic, exotic, threatened and endangered species; 3) Identify dominance-diversity curves, lifeform proportions, similarity coefficients, and C4:C3 plant species ratios; 4) Consider the substrate and soil variables, slope and aspect, vegetation biomass and physiognomy, foliage density and layering, horizontal patchiness, canopy openness and gap portions, abundance, density, density and distribution of key physical features (e.g. cliffs, sinkholes, and outcrops) and structural elements (snags and down logs), water and resources (mast) availability, and snow cover; 5) Consider the biomass and resource productivity, herbivory, parasitism, and predation rates, colonization and local extinction rates, patch dynamics (fine scale disturbance processes), nutrient cycling rates, and human intrusion rate."

``The population-species analysis should: 1) Identify absolute or relative abundance, frequency, importance or cover value, biomass, and density; 2) Consider dispersion (micro-distribution), range (macro-distribution), population structure (sex and age ratio) habitat variables, and within individual morphological variability; 3) Consider the demographic process (fertility, recruitment rate, survivorship, mortality), metapopulation dynamics, population genetics, population fluctuations, physiology, growth rate (of individuals), acclimation, and adaptation."

R: Regional landscape patterns were considered at the Forest Plan level of analysis which is incorporated by reference. The commentator does not indicate how these parameters are related to the site-specific project. No evidence or rationale is given that demonstrates the need for the analysis of these parameters for these proposed actions and alternatives. Effects on biological diversity and fragmentation from proposed actions and the alternatives was discussed in the Environmental Effects section of the EA. Identification of wildlife current conditions and effects from the proposed action and alternatives can be found in the Environmental Effects section of the EA.

The forest's inventory data shows which vegetation types and ages occur within the project area; species distribution for rare plants and animals is on the State Heritage data base. Information on the ecological classification site specific to the area was used to predict changes and effects. A biological evaluation was prepared that evaluated the project activities on rare plants and animals. Erosion is addressed in the soil resources part of the environmental effects section. Protection of karst features in the project area is addressed in the proposed mitigations, environmental effects and Appendix A of this EA. The Forest Plan provides guidance for wildlife habitat, vegetation manipulation, special areas, and other resources with the intention of protecting, maintaining, and restoring the entire array of diverse natural communities and their successional stages which are and have been a part of the project area. By ensuring that actions proposed in this project follow Forest Plan guidance, the communities which support genetic, community, and species diversity will be maintained.

G-23. Analysis methodology 62-7 and 62-22

C: " . . . serious questions about the methodology used by the agency to prepare the draft EA. . . . "Olson 1999a and b is cited but the reference given (p24) does not allow one to find it. What research was done, what methodology was used, and does Olson work for or have his research supported by agencies likely to support the Forest Service arguments?" "

R: The documents in question are the biological evaluation and forest species of concern memo for the project, not research reports. Supporting research, as well as USDI Fish and Wildlife Service concurrence with the findings are cited these documents, with reference lists included. Steve Olson is the Forest Service biologist who prepared these reports. His name is included in the list of participants (p. 31) This commentator did not request these documents which are available from the project file.

G-24. Range of alternatives insufficient 62-9 and 69-3

C: "Finally, the range of alternatives in the draft EA is inadequate. An EA which would eliminate all small openings and leave the larger ones, which are currently providing sufficient habitat for some openland species on the edges of the forest should be considered."

C: "The three options considered in this analysis, including the no action alternative mandated by NEPA, hardly represent a range of alternatives."

R: A wide range of alternatives, from 2,000 acres to 5,000 acres, for managing openings was considered and analyzed in the DEIS and FEIS for the Forest Plan. The decision on the forest plan included managing openings; this analysis is tiered to that analysis. See EA preface. Other options have been considered in this analysis but not fully developed. See discussion in the alternatives section of this EA. Still others were analyzed in previous analyses referenced in this EA (Jacquart and Stafford 1992; Jacquart and Morgan 1996a

and 1996b; U.S. Department of Agriculture Forest Service 1990, 1991a, 1991b, 1992, 1993a, 1993b, 1995a, 1995b, 1996). The alternative suggested above and its effects are a subset of the alternatives analyzed and could be selected by a decision maker based on this analysis. See also discussions on opening sizes in this appendix, comment P-17.

G-25. Fragmentation white paper not reviewed 62-10

C: "We do not give credence to the referenced (Southern Tier Habitat Fragmentation) report because it was not properly promulgated. It does not qualify as up to date accurate scientific information."

R: The paper referred to is an agency white paper (U.S. Department of Agriculture Forest Service 1995c), addressing fragmentation issues for southern tier forests of the Eastern Region. It was extensively reviewed by scientists familiar with fragmentation issues in that area. These scientists include many from outside the agency. (A list is included in the project file.) The references used to compile the paper clearly include pertinent, up-to-date, scientific information from creditable, refereed publications.

G-26. Comments opposing openings ignored 62-13

C: "Apparently comments from such (wildlife conservation groups representing hunters) mean more to the Forest Service than that of many opposing openings. The Forest Service mentions only one comment recommending maintaining all existing openings in the forest. Page 10 lists a number of comments opposing such management."

R: Every comment received is closely reviewed to identify specific issues or concerns. General comments opposing or in support are addressed by the action and no action alternatives. (See Appendix A, G-1 and G-2 and Appendix E, G-1 and G-2.) Comments regarding specific concerns or issues, or providing information not previously considered, are addressed separately in Appendix A and Appendix E of this EA. Revisions to the analysis or to alternatives are based on those specific comments.

G-27. Burning a waste of money 62-14

C: "If areas burned revert to canopied forest, will not such areas revert faster if not burned. And in the end, why spend money burning if the result is canopied forest."

R: Periodic burning of openings prevents reversion to canopied forest and maintains habitat for opening and edge favored plants and animals. That is the purpose of the proposed action. Reversion to canopied forest is an effect of the no action alternative.

G-28. Can't use CE, Not following NEPA 62-24 and 62-29

C: "The Forest Service claims that the FS NEPA handbook is simply guidance - how then is the FS required to have legally enforceable NEPA procedures? The Forest Service suggests that it cannot exclude any of the actions, just because it does not have the required procedures."

R: We agree that we cannot use a categorical exclusion (CE) for this project. The discussion referred to in Appendix A, page A-5, related to categorically excluded activities and effects of a recent court decision. The Seventh Circuit Court of Appeals in Chicago, Illinois on August 27, 1998 in Rhodes v. Johnson (No. 97-3687, slip op.) held that the USDA Forest Service Environmental Policy and Procedures Handbook is binding on the USDA Forest Service. The court interpreted the Handbook as demanding "that the presence of an extraordinary circumstance requires the Forest Service to prepare an environmental assessment." We first attempted to use a CE for this project. Notice of this project and requests for comments were sent to about 360 interested parties on March 20, 1998. James E. Denoncour signed for Kenneth G. Day Forest Supervisor a decision memo on July 22, 1998 to maintain 952 openings (approximately 3, 138 acres) by bush-hogging and removal of small trees along opening edges. With the assistance of our partners (Quail Unlimited, National Wild Turkey Federation, and the Department of Natural Resources Division of Fish and Wildlife) we maintained approximately 300 acres of openings. However, Kenneth G. Day decided to withdraw that decision on September 21, 1998. He did this to be consistent with the August 27, 1998 Seventh Circuit Court of Appeals ruling and do an environmental assessment (EA) and make a new decision.

G-29. No action saves money, Use of public funds 62-28 and 65-12

C: "The Forest Service is concerned about expense in maintaining wildlife openings. They could save $62,000 by not doing so."

R: We are always trying to achieve desirable objectives in the most cost effective manner. It is true that not doing openings maintenance would save money. It would also not meet the purpose and need for the project. Effects of no action on management efficiency are discussed in the environmental effects section of this EA.

G-30. Eliminate Pleasant Run openings 68-5

C: "I urged you to eliminate openings from the PRU - and especially from the Deckard Ridge area (our long term study sites) and a broad swath surrounding the Deam Wilderness. This would result in a substantial decrease in early successional and grass habitat within that area and thus lower the cowbird and predator densities. As the maps appended to your assessment indicate all of my suggestions were ignored."

R: The number of openings in the areas described has been reduced. The alternative suggested is discussed in the alternatives section of this EA. Effects of openings on fragmentation, cowbird densities, and predation are addressed in the environmental effects section, Appendix A, and Appendix E of this EA.

G-32. Administrative efficiency 67-4

C: "I applaud your effort and administrative efficiency in setting up a 5 year proposed action plan."

R: Thank you. A single planning effort covering 5 years worth of work is more efficient than annual or two year plans.

G-33. Drop openings near Jubin Creek special area 74-3

C: "Due to the large size and the proximity of this opening (old field) to the Jubin Creek Special Area our office requests this opening be dropped from further maintenance and allowed to return to native forest conditions... as a buffer to this special area."

R: This opening provides important habitat for area dependent old field or grassland species that is not provided by smaller openings. Openings in special areas were reviewed to determine compatibility with special area guidance. Openings outside of those areas are comparable with Forest Plan guidance for the management area where they are located.

G-34. Openings in previously proposed special areas 74-8

C: "This area is within an area previously proposed by this office as a special area (Buzzards Roost). We request this opening not be scheduled for maintenance."

R: Special Areas were designated after extensive review during the forest planning process. This opening is consistent with the management are guidance for its location.

Plant and Animal Effects

P-1. Fragmentation - Interior Species Habitat 12-1, 24-3, 2-2, 2-4, 24-4, 29-2, 29-7, 37-5, 38-5, 38-8, 39-2, 46-3, 47-3, 48-3, 50-2, 53-2, 56-3, 57-1, 58-3, 63-3, 59-2, 60-2, 61-3, 62-2, 64-3, 66-3, 68-8, 71-3, 72-3, 73-3, 75-2, 75-4, 78-1, 80-1, 82-3, and 84-5

C: "You must close any and all existing openings to minimize further damage to those species that require a denser forest."

C: "The issue of biodiversity and forest fragmentation needs to be considered."

R: The important issue of forest fragmentation has been addressed extensively in this document (see environmental effects section and Appendix A, P-1 and P-2) and in the many previous analyses this document has referenced or is directly tiered to. We agree that it is important to provide for interior species and most of the forest is managed consistent with that purpose. In a balanced ecosystem management approach, this Forest must also provide for species which use early successional, edge, and openland habitats. Recent analyses have shown these species to be equally rare or more so than interior species as discussed in the environmental effects section. Further, it is within our mandate to provide for these species.

All projects must be consistent with the Forest Plan. The National Forest System Land and Resource Management Planning Regulations (36 CFR 219) require us to provide that habitats for management indicator species are maintained and improved to the degree consistent with the multiple-use objectives established in the Forest Plan (36 CFR 219.27a(6)). In the Record of Decision (p. 8) the Regional Forester identified diversity

(i.e. the potential for fragmentation) as a major concern in the choice of the Forest Plan (U.S. Department of Agriculture Forest Service 1991c). Forest openings, an issue closely related to fragmentation and biological diversity, was thoroughly analyzed in the Forest Plan EIS and Forest Plan (see, e.g. FEIS, p. 2-25 to 2-26, 9-32 to 9-34; and DEIS, p. 4-42 to 4-47). Forest-wide standards and guidelines demonstrate that openings (including wildlife openings and water impoundments) will be managed to enhance diversity (Forest Plan, p. 2-9 to 2-10; and FEIS, p. 9-30). Some management areas will not have managed openings, e.g., Management Area 6.2 (FEIS, p. 9-32, 9-34, and 9-38). It is anticipated that the area of permanently maintained forest openings will remain at present levels (FEIS, p. 9-33). Forest openings may be necessary for research and for restoration of ecosystems that contain essential habitat for sensitive plan or animal species (FEIS, p. 9-29, and 9-33; and Appendix A, p. A-8). In some cases, forest openings enhance biological diversity (FEIS, p. 9-49).

The NFMA, 16 U.S.C. 1604(g)(3)(B), requires the Forest Service to develop regulations which "provide for diversity of plant and animal communities based on the suitability and capability of the specific land area in order to meet overall multiple use objectives . . . . ." The NFMA does not define "diversity." However, the statutory language clearly underscores Congress' desire to ensure that (1) diversity is considered in the multiple use context, and (2) the Forest, in its planning process, is allowed flexibility in meeting NFMA's diversity goals within that context.

The issue raised by commentators concerning biodiversity and forest fragmentation has been addressed in federal district court in several decisions. In the seventh circuit the court upheld the diversity analysis and provisions of the Chequamegon and Nicolet Forest Plans (U.S. District Court, Eastern District of Wisconsin, 1994). Plaintiffs alleged violations of NEPA, NFMA, and MUSYA with regard to timber harvesting and road construction impacts upon biological diversity (e.g. forest fragmentation, viability of wildlife species). Plaintiffs in these cases contended that large tracts of national forest land must be removed from multiple use management as biological reserves. However, the court concluded that the government had not acted arbitrarily or capriciously with regard to the NFMA diversity requirement in approving the programmatic forest plans. These court decisions are an affirmation of our rationale for proposing this forest opening maintenance project to enhance biodiversity.

This area functions as an important source area for birds to populate other less healthy habitats (Whitehead 1999). The status of this area as a source area is an indication of the overall health and productivity of the Forest for species of great management concern. It should be noted that this productivity and health has been maintained during a period when many more forest openings than are currently proposed were being maintained. The strategy designed during the forest planning process of protecting interior forest blocks and allowing greater disturbance elsewhere is apparently effective.

P-2 Openings better located along forest edges 62-11 and 80-3

C: "Successional habitat would be better located at the edges of the forest rather than disrupting the interior canopies"

R: We agree. Interior blocks have been identified and protected through management area guidelines in the Forest Plan. Openings are located in the more fragmented portions of the landscape where fragmentation effects are largely dictated by management practices on other ownerships including agriculture and development. Please see discussion of fragmentation in the environmental effects section, Appendix A and this appendix of this EA.

P-3. Cumulative effects on forest fragmentation 37-1

C: " . . . it is the contribution of all forest service programs to fragmentation of HNF that must be assessed."

R: Cumulative effects on forest fragmentation are addressed in the environmental effects section of this EA.

P-4. Analysis of need for creation of early successional habitat, Don't need to provide for early successional species 24-2, 38-4, and 84-4

C: "The need analysis must also address why natural processes do not provide enough early successional habitat"

R: Population declines for early successional species, lack of suitable habitat in the landscape, successional trends resulting in loss of early-successional habitat and the small percentage of such habitats currently provided on the Hoosier National Forest are all addressed in the Purpose and Need and Environmental Effects sections of this EA.

P-5. Need to provide for early successional species, Early succession bird habitat needs attention 11-3, 28-1, and 54-2

C: "Wildlife survey data for Indiana strongly support the Forest's contention that the management of early-successional habitat is critical. The Breeding Bird survey (BBS) shows that 38 percent of early-successional (scrub/shrub) breeding bird populations in Indiana declined significantly from 1966 to 1996. This compares to 17 percent of mature forest breeding birds showing significant declines during the same period. Additionally significant declines in woodcock and an 80 percent decline in ruffed grouse populations have been documented."

R: We agree. See discussion in Purpose and Need section of this EA.

P-6. Analysis of early seral conditions 38-3

C: "What kind of analysis do you have to show how much early successional habitat there is on the forest?"

R Please see discussion in the Purpose and Need section of this EA.

P-7. Site factors not considered in analysis of vegetative changes 79-3

C: "The EA makes many inaccurate comments. For example, " . . . The predominant factors influencing composition and structure of native plant communities are succession and disturbance." This statement completely ignores the role of site, slope, soils, and aspect in determining vegetative communities."

R: Actually, the statement in the EA takes these site potential factors as given, not changeable in human planning time references, whereas succession and disturbance can be affected by the proposed activity and in the short term. The statement is clarified for the final EA.

P-8. Manage for both interior and edge species 44-1

C: "By including the Audubon Society Partners in Flight Watch list, you've presented the array of bird species of concern for both interior and edge habitats for the public to see. The Forest Service has the responsibility to address habitat needs for all species on that list, and the EA clearly explains how the Hoosier National Forest is conducting management to that end."
R: We agree that it is important to manage for a wide range of habitats and species. The Watchlist addresses some bird species of concern and was used to partially demonstrate need for action. Many other species, such as bobcat and small mammals, benefit from openings management.

P-9. Need to maintain HNF as a migratory bird source area 68-4

C: "It is my feeling, and that of many other Midwestern ornithologists, that management of HNF (and other forests in the region) must focus first on forest-dependent birds. In this context it is important that the "source" be as strong as possible (highest possible reproductive output)."

R: We agree. That is, in part, why we manage for species that depend on early-successional forest and forest edges as well as for those which use late-successional or interior forest types.

P-10. HNF not appropriate place to manage for grassland species, opening species; early successional provided elsewhere 2-3, 2-6, 23-3, 29-6, 34-1, 38-6, 68-1, and 73-2

C: "These huge "early-successional habitats", otherwise known as farm fields, pastures, lawns, golf courses, state and local parks and timber cuts, are constantly maintained by mowing and cutting and provide all the berry picking and grassland bird viewing that Hoosiers could desire."

R: The differences between these areas and openings or early-successional forest vegetation required by many species are discussed in the Purpose and Need and Environmental Effects sections of this EA. In addition to lacking the required vegetative structure and composition many of these areas are disturbed by mowing, haying or harvesting during nesting periods critical to early-successional animals. This further diminishes their ability to provide that function in the landscape. If these areas were providing the quality habitat required by early-successional species the well documented declines in those species would likely not be occurring.

P-11. Openings provided through other forest service activities 62-12

C: "Many Forest Service activities, e.g. timber stand improvement and group selection will provide openings in the forest"

R: These activities do provide some opening habitat, particularly for species which utilize small canopy gaps similar to the smaller openings in the proposed action. They do not provide for species which require midsize or large openings nor do they provide grassland or shrub stage habitats. In any event, we do not do much of these activities. The very low level of timber harvest on the forest is discussed in the Purpose and Need section of this EA.

P-12. Need openings for predators 7-3

C: "Predators such as red fox, bobcat, or coyotes can successfully hunt in these openings"

R: We agree that these areas provide important foraging areas for predators. Availability of small openings, in a matrix of forest cover is particularly important for bobcat which are secretive and prefer these areas.

P-13. Grouse habitat losses due to lack of habitat, grouse not helped by openings 7-4 and 79- 5

C: ``I've also witnessed drastic declines in ruffed grouse populations in many areas due in no small part to lack of maintenance of young brushy cover types found among old field sites that were fairly common in many portions of the Hoosier National Forest 25 years ago. The near absolute cessation of timber harvests on the HNF in the past 10-15 years has severely reduced the opportunity to provide the early successional stages required by ruffed grouse."

C: "Maintaining forest openings will not address this issue (grouse habitat) since they will be kept free of significant woody vegetation."

R: Many openings are managed to retain significant woody components. Important food sources providing soft and hard mast as well as ragged edges and pockets of dense woody cover are part of the design of these openings. Other openings, designed for grassland species, are maintained comparatively free of trees and shrubs. Each opening is different to provide an array of habitats. In the past clearcuts and aging farms provided dense woody cover for grouse. There is evidence that forest openings are being used increasingly by this species since those areas have largely grown beyond the stage of forest development they require, generally young stands in the 5-15 year age class. Grouse populations, though much reduced, are hanging on in forest openings, the remaining suitable young forest resultant from clearcuts, and areas severely damaged by winter storms and tornados.

P-14. Openings good for fur bearers 35-1

C: Maintaining small openings is good management for some furbearers. For several years I trapped both red and gray fox in forest openings, as openings grow over the fox leave."

R: We agree openings provide important habitat for these species. This is largely due to small mammals they support which are common prey for fox and to the proximity of cover.

P-15. Wildlife habitat diversity 22-3, 17-3, 18-3, 19-3, 20-2, and 24-3

C: "Since very little timber cutting has occurred the last 20 years, maintenance of forest openings is now the only planned way to maintain a proportion (albeit small) of the forest in early successional habitats. This will increase animal biodiversity in the Forest"

R: We agree. Most of the Forest is managed in ways that produce mature forest habitats. Forest openings provide most of the small amount of early-successional habitat on the forest.

P-16. Blowdown near openings 24-6

C: "The issue of the effects the project will have on other stands in times with high winds needs to be addressed. The analysis needs to address if the openings will have funnel the wind to other trees that will result in blowdown."

R: The openings proposed for management have been in existence for years. There has been no detectable increase in blowdown during their existence. Observation of extreme wind events such as the tornados of 1996 showed heavier damage to interior stands, perhaps because they had not developed buttress root systems which trees more often exposed to wind often do.

P-17. Action not effective, openings too small for opening species, area-dependent species like Henslow's sparrows, quail need large openings 45-3, 25-1, 46-4, 47-4, 48-4, 49-2, 51-3, 53-3, 56-4, 57-2, 58-4, 59-3, 61-4, 62-4, 62-17, 63-4, 65-11, 66-2, 71-4, 72-4, 75-3,79-2, 80-2, and 84-2

C: "The few species that are of concern and need more open habitat will not use these openings because they are too small."

R: The effects of openings maintenance on a number of wildlife species are discussed in the environmental effects section, and Appendices A and E of this EA. Some species, like Henslow's sparrow, are area dependent and require large openings. Henslow's sparrows have been documented on or near several of the largest openings in the proposed action. In some cases, smaller openings on federal land provide protected nesting habitat in landscapes where territory size is supplemented by hay fields or pasture. A range of opening sizes and conditions are managed to provide for a diverse range of species. Smaller openings are utilized by woodcock for nesting and provide secure foraging areas for bobcats. They favor species which utilize small canopy gaps and forest edges.

P-18. Research on small openings not cited 62-25

C: "There is no cited research to show that openings of less than 1 acre have little effect on most interior species."

R We added the following citations on page A-11(Thompson 1993, Castrale 1999a).

P-19. Get rid of fescue 25-1

C: "The opening maintenance program you are doing is only promoting the growth of fescue. This is a disgrace to call this management, you are doing no good at all."

R: We agree that other species, particularly a diverse mix of native plant species, provide for better wildlife habitat. Many of the openings, which have been managed for some time, are dominated by native plants. More recent acquisitions often have fescue and efforts to convert to native species are underway.

P-20. Need soil disturbance 27-2

C: "We ask that you continue this program and expand it to include soil disturbance. This will loosen up the soil as to stimulate new growth."

R: The proposed treatments limit soil disturbance by design. This is done to limit erosion or sedimentation. Burning and mowing do stimulate new growth. Burning removes dead material in grass/forb habitats and creates favorable habitat for species like quail which also benefit from soil exposure, however the roost systems remain intact to limit erosion.

P-21. Need edge maintenance 26-2

C: "I wish more chainsaw work could be included as well. It doesn't take many years of no disturbance for saplings to become small trees too big to bush-hog."

R: Edge maintenance may be required in the future to maintain opening sizes. The proposed mowing and burning will be sufficient for the five year period planned.

P-22. Escaped prescription burns, effects on vegetation 29-4

C: "Even though the prescribed burnings are watched and observed, what are the possibilities that surrounding trees and vegetation could be damaged."

R: Because burns are implemented under controlled prescriptions and conditions escapes are rare. Effects to nearby opening or early-successional vegetation would be similar to those for the openings. In forest stands elevated moisture conditions would limit fire spread. Since openings dry out faster they are burned while the surrounding forest is still too wet to burn.

P-23. Protect NTMB's 38-9

C: "It is time to act to protect Neotropical migrants and biodiversity in general."

R: We agree. The proposed action is designed to promote a biologically diverse forest. Several early-successional Neotropical migrants which are in decline will benefit from the proposed maintenance. Providing habitats for both early-successional or edge species and for interior species on the forest promotes biodiversity better than providing only one habitat type. Effects of the alternatives on NTMB's and biodiversity are discussed in the environmental effects section and Appendices A, D, and E of this EA.

P-24. Cumulative effects on biodiversity 38-13 and 68-2

C: "The analysis needs to consider the cumulative and site specific effects of forest openings on biodiversity"

R: The cumulative and site specific effects of the alternatives are addressed in the environmental effects section and Appendices A, D, and E of this EA.

P-25. Old growth evaluation 38-14

C: "All old growth opportunities should be evaluated independently of potential timber stands."

R: Allocation of land to management prescriptions is a Forest Plan level decision and beyond the scope of this analysis. This issue will not be carried forward in the analysis. There is no timber management in any of the alternatives.

P-26. T & E Species 38-15

C: For all state and federal threatened and endangered (including candidate species), sensitive species, species of concern, and rare species the analysis needs to 1) Describe the desired future condition, 2) Disclose any known or suspected limiting factors, 3) Define suitable habitat and the status of the habitation on the project area . . . and 4) List management recommendations which would remove or mitigate any adverse affects."

R: Effects to MIS are discussed in the Plant and Animal Habitat section of this EA. Effects to Federally endangered, threatened and proposed species and Regional Forester's sensitive species are discussed in the biological evaluation for this project (Olson 1999a). Effects to Forest species of concern are discussed in a memo to the file (Olson 1999b).

The effect of the proposed project and alternatives upon biological diversity (three levels - genetic, plant and animal diversity, and community or ecosystem diversity) was considered throughout the environmental effects section of the EA. The depth of analysis and conclusions documented in the EA was sufficient for the Responsible Official to make an informed decision about the impacts to biodiversity from the actions taken or not taken.

P-27. Use Breeding Bird Survey information. 38-12

C: The results of the USFWS Breeding Bird Survey must also be considered.

R: The Atlas of Breeding Birds of Indiana (Castrale et al. 1998), used extensively as a reference in this analysis incorporates information from the Breeding Bird Survey.

P-28. Increased deer impacts 38-19

C: "The impact of increased deer on other species needs to be considered."

R: This project with its limited size and scope will have no effect on the deer population. While the deer distribution may change as a result of the activities, the population levels will remain about the same.

P-29. Effects of songbird declines on forest growth 38-16

C: Impact of song bird declines on insect population. Research has shown insect populations rise 15-30 percent when song birds are kept out.

R: We agree with the suggested observation of Robert J. Marquis and Christopher J. Whelan in the cited paper "Insectivorous Birds Increase Growth of White Oak Through Consumption of Leaf-Chewing Insects" (Ecology, 75 (7), 1994, p. 2007-2014). The birds will come to the forest openings to feed where there will be higher populations of insects. The additional feeding by the birds will be to the advantage of nearby oak seedlings which will enhance the seedling growth. The effects of the proposed action and alternatives upon songbird populations and other wildlife species are documented in the environmental effects section of this EA.

P-30. Road impacts 38-17 and 73-3

C: "The issue of the impacts of roads needs to be addressed."

R: There is no road construction in any of the alternatives.

P-31. Base line data for MIS species needed, monitoring management indicator species 62-8 and 38-18

C: Any findings in regards to effects on wildlife must be based upon the required in-the-field monitoring of management indicator species.

R: Effects of the alternatives on management indicator species and trends for those species based on monitoring information are discussed in the environmental effects section and Appendix D of this EA.

P-32. Change to larger openings wrong 39-1

C: "The change from smaller openings to larger ones have been shown to be a move in the wrong direction. . . . The larger the opening the more likely the damage to important forest species."

R: Larger openings provide for important area dependent species. Effects of larger openings are discussed in the environmental effects section and Appendices A, D, and E of this EA.

P-33. Indiana bat and fragmentation effects 62-5

C: "Recent research out of Pennsylvania indicates that arthropod production is higher in forest interiors than in edge habitats. Clearly this could indicate and adverse effect on Indiana bat from increased fragmentation."

R: The commentator did not state why localized variation in arthropod production would adversely affect the Indiana bat in an area where prey availability is not limiting nor was a reference for the Pennsylvania research provided. Effects to Indiana bats are discussed in the environmental effects section of this EA.

P-34. Henslow's sparrows abandon mowed sites 62-18

C: "When its habitat is mowed, Henslow's sparrows abandon the site."

R: Mitigation for that is to treat only a portion of those large openings in any given year See mitigations section of this EA. This species also abandons sites if there is to much encroachment by woody stems so treatment is necessary to keep the habitat suitable.

P-35. Research effects of management on any species 62-23

C: "Has the Forest Service done any valid research on the effects of its management on any species let alone endangered or threatened species."

R: Research and monitoring used for this analysis, whether by the Forest Service or others, is cited in the references lists in this EA and its appendices as well as in the environmental documents to which it is tiered.

P-36. Mitigation insufficient to protect sensitive species 65-7

C: "Your mitigation measures are inadequate to prevent taking sensitive species. Some bird species nest through October. Therefore beginning the forest openings project after July 1st will not prevent migratory birds from being killed by burning or the mowers. In addition many reptiles and amphibians, including the timber rattlesnake, are active through October leaving them vulnerable to burning or mowing as well."

R: Forest-wide guidance for opening maintenance states that "time of flowering and habitat needs of rare plants, as well as wildlife needs such as nesting birds, are important considerations in scheduling opening maintenance." Those factors were considered in determining treatment seasons. While some inadvertent mortality of individual animals may occur after the July first start date, this timing limits that possibility.

Additionally agency regulations 36 CFR 219.27 a(6) direct that we "provide adequate fish and wildlife habitat to maintain viable populations of existing native vertebrate species" (U.S. Department of Agriculture Forest Service 1982). These treatments provide such habitat and the limited mortality which occurs during treatment does not affect overall population levels.

P-37. Openings don't provide organic matter, mesic conditions 65-8

C: "The proposed openings do not contribute to a buildup of leaves, needles, and other organic decaying material that is necessary habitat for microbial, insect, and amphibian communities. The absence of canopy on these ridgetops leads to dry conditions that are not favorable to mesic forest species."

R: Forest openings are maintained with a variety of vegetative structures and compositions which produce a range of types and amounts of organic matter. Some sites are quite mesic while others are dry. This provides for habitat diversity. The commentator does not say if or why creating uniform mesic conditions is preferable to providing a variety of conditions.

P-38. Lack of openings in forest matrix 67-3

C: "However, it is unfortunate that these types of habitats will not be managed in the wilderness and no management designations. In time this lack of opening maintenance will reduce the biological diversity of these areas since the unique habitats within a forest matrix are not readily found elsewhere in Indiana."

R: Opening and early-successional habitats within a forest matrix are provided under the action alternatives. The decision to limit disturbance allowed in some areas is a Forest Plan land allocation level decision beyond the scope of this analysis. The strategy of providing interior habitats in some portions of the forest and openings or edge habitats elsewhere provides for biodiversity at a landscape level.

P-39. Locations of openings 79-6

C: "The EA states that only openings in small, fragmented portions of the forest will be maintained, thus not contributing to fragmentation of the HNF. However a substantial number of the openings are in larger, less disturbed areas of the forest."

R: Extensive analysis of this issue occurred as part of the forest planning process. Land allocations made at the time permitted openings management in management areas which are generally more affected by fragmenting practices on other ownerships such as agriculture or residential development. Openings are not managed in areas identified during the planning process to provide interior forest habitats such as forest core areas.

P-40. Corrections for bird table 68-9

C: One commentator suggested we not include Bewick's wren or Bachman's sparrow in our analysis since they may be extirpated from the state.

R: These species were included, after some consideration, because they are still listed as possible in the state and still on rare species lists referenced including the Regional Forester's Sensitive Species list and the Forest Species of Concern list. The text has been modified to include a statement about possible extirpation.

P-41. Use a different list for Audubon Society list 68-10

C: One commentator suggested we use a different list of bird species (which he provided) than the Audubon Society list in the EA.

R: The Audubon Society Watchlist for Indiana was used to partially demonstrate need to provide early-successional habitat. It was used because, as a watchlist, it includes species of specific concern. The listing of some bird species which prefer open habitats indicates a benefit which can be realized by providing them. It was not intended to be an exhaustive list of every species that could benefit from forest openings. Benefits to a number of other species are also discussed in the EA.

P-42. Drop some openings on Tell City Ranger District near Hemlock Cliffs 74-1

C: "These two openings are within the area proposed as the Hemlock Cliffs Special Area and in very proximity to sandstone cliffs. These openings are likely old fields and are not natural. We strongly recommend that these openings be dropped" The commentator recommended a substitute.

R: These openings are part of a home range for Henslow's sparrows. Substituting open areas elsewhere would cause a decline in that habitat and potential abandonment by those birds. All cliffs are buffered from treatments.

P-43. Protect sandstone cliffs or alcoves 74-2, 74-5, 74-12, 74-13, and 74-15

C: "This opening appears to be adjacent to sandstone cliffs or alcoves. We recommend a field inspection prior to scheduling maintenance to determine any concerns, and compliance with forest standards for buffering cliffs" The commentator cited several other openings near these features.

R: These features will be buffered according to Forest standards.

P-44. No openings in Forest core areas 74-4, 74-6, 74-10, 74-11, and 74-21

C: One commentator expressed concerns that some openings were located within forest core areas where opening maintenance was not permitted. He provided a list which was reviewed.

R: No openings will be maintained within the designated forest core areas. These areas are listed in Appendix M of the Forest Plan (U.S. Department of Agriculture Forest Service 1991b).

P-45. Openings in barrens 74-7, and 74-9

C: "This opening is within the area originally proposed as Boone Creek Barrens Special Area. Your letter of June 22 states that "openings within these areas should be dropped from the forest openings program . . . These four openings are within the Clover Lick Barrens Special Area" and should be dropped consistent with past recommendations.

R: The first opening is outside the special area boundary. The four at Clover Lick Barrens are being proposed for maintenance because they constitute the single best seed source for native Indian grass (*Sorghastrum nutans)* on the Forest. While they will be treated by landscape burning similar to other barrens areas, some mowing will be needed so they can function as seed collection areas. They are not occupied by barrens communities although they are within the special area boundary.

P-46. Openings on karst features 74-16, 74-17, and 79-9

C: This opening is situated in a large and significant karst valley which is a portion of the primary drainage area for the Orangeville Rise of the Lost River. We recommend this opening be dropped.

R: Please see response to G-15 in Appendix A of this EA.

P-47. Openings in Sams Creek Interior Forest Corridor 74-20 and 79-7

C: " . . . these two openings appear to be within the interior forest corridor for Sam's Creek."

R: The opportunity analysis for this area (OA 11 on Brownstown Ranger District) identified two areas in the Sam's Creek and Big Creek drainages for management of continuous forest. The "managed forest corridor" is designed to link interior forest tracts to high quality communities around the creeks (U.S. Department of Agriculture Forest Service 1993c). Within this corridor openings maintenance is "generally discouraged". The two openings mentioned in this comment are at least partially within the boundaries of this corridor and have now been dropped from the Forest Openings program.

P-49. Disagree that birds will benefit. 68-11

C: One commentator reviewed the analysis of the Audubon Society Watchlist species and disagreed with the EA's assertions of benefits to those species based on the opening sizes provided and on effects from fragmentation, cowbird parasitism, and nest predation.

R: Determination of benefits to bird species are based on utilization of opening, edge, and early-successional habitats for nesting or foraging as described in the cited references (Mumford and Keller 1984, Castrale et al. 1998). The list was reviewed by bird experts to validate the occurrence or possible occurrence on or near the Forest as well as the ascribed effects (Olson 1999c, Castrale 1999b). Effects of fragmentation, including cowbird parasitism and nest predation are addressed extensively in the environmental effects section and Appendices A, D, and E of this EA.

P-50. Consider references on fragmentation, area dependent species, cowbird parasitism and edge effects. 68-12

C: "I have also included a list of references which should be consulted in developing a scientifically sound environmental assessment."

R: A number of the recommended references had already been cited in the predecisional EA. The commentator did not provide the references he suggested we use. We attempted to get those we had not already used and have been able to obtain 10 of the 12 he listed by contacting authors and utilizing the Indiana University library system. The other two were ordered (since we were unsuccessful in obtaining them from the university) but have not been received to date. We have reviewed those we could get in a timely manner.

These references deal extensively with forest fragmentation, effects of landscape vegetative patterns, effects of edges, area dependant species, nest predation, and cowbird parasitism. They principally discuss effects on birds. The findings in these references are similar to other references and have been discussed extensively in this document, documents to which it is tiered, and references cited in this EA. The references support many of the findings in this EA (Burke and Nol 1998; Doran et al. (in review); Probst and Thompson 1996; Roberts and Norment 1999; Robinson 1996; Robinson et al. 1995; Thompson et al. 1999; Thompson et al. 1996; Walk and Warner 1999; and Winslow et al. 1999). The findings of these references can be summarized as follows.

1. A number of species are area-dependent. They require large patch sizes of suitable habitat. Small openings will not provide good habitat for area-dependent grassland or shrubland species.

2. Fragmented forests, forests with large amounts of open, agricultural, and residential land do not provide good habitat for area dependent interior forest species. Forest openings, which are not meant to, also do no provide good habitat for these species.

3. Forest openings may attract parasites and predators, however the level of parasitism by cowbirds (cited as the principal species of concern) is controlled by total feeding habitat for cowbirds found in agricultural lands, pastures, and lawns.

4. South-central Indiana, including the Hoosier National Forest, is an important source area for many Neotropical migratory bird species of concern. This indicates a healthy forest ecosystem.

5. It is important to maintain the range of forest cover types to provide for species diversity.

Soil and Water Effects

S-1. Use BMP's to protect against sediment in sinkholes 13-2

C: "The last sentence on page 15 expresses concern that forest management will increase sediment delivery to sinkholes, a problem readily avoided with standard best management practices, plus and additional buffer strip around sinkholes."

R: We agree. The vegetation cover maintained around these features and limiting equipment operation to dry conditions will address this concern. See mitigations in Appendix B of this document.

S-2. Better sediment references 13-3

C: One commentator suggested using other, "better" sediment references than those cited in the EA.

R: The commentator's recommended references were reviewed and cited in the soil scientist's specialist report (Merchant 1999b). The reference cited in the EA (Thurow et al. 1975) was used because it specifically addressed "sediment", while the recommended references addressed "soil loss".

S-3. No action and karst sedimentation, soil compaction, erosion 62-16 and 62-21

C: "The Forest Service admits that the No Action Alternative would not increase sedimentation in Karst areas."

R: The purpose of the analysis is to disclose effects to the decision-maker. Lack of change in sediment rates is one effect of the no action alternative which was discussed in the analysis.

S-4. Effects from equipment access 62-19

C: ``How does the Forest Service get its equipment to the interior wildlife openings? If they go thru the forest than more than just the opening is affected."

R: Openings are located along existing, multi-purpose, roads and trails.

S-5. Firelines add to disturbance 62-20

C: "Thirteen acres of firelines merely adds to the disturbance. One can not justify this by claiming the acreage is only a very small amount of the landscape."

R: The purpose of the analysis is to disclose effects so the decision maker can make an informed decision. The analysis mentioned the small number of acres in firelines in the proposed action because there is a small effect associated with them.

S-6. Openings maintenance will increase sediment, erosion 65-9

C: "The openings program will increase sedimentation. Road building and maintenance activities will result in an increase in erosion."

R: There is no road building in any of the alternatives. Burning and mowing leave the root systems intact so soil stability is maintained. Equipment is limited to gentle slopes or flat areas and dry operating conditions to further mitigate any potential for erosion.

Visuals and Recreation Effects

V-1: Openings enhance visuals 17-2, 22-4, 18-2, and 26-3 Openings hurt visuals 38-7

C: " . . . wildlife openings in a forest setting provide diversity for a variety of species as well as enhancing visual aesthetics of the landscape."

C: "Openings also provide a more interesting landscape for hikers and other users of the forest."

C: "The issue of visual quality needs to be addressed. . . . When hiking in a forest, artificial looking openings detract from the forest experience.

R: As these comments illustrate, people seek a variety of visual experiences on the Forest. Openings are maintained on some portions of the forest and not on other portions. This provides areas with a variable landscape for those who prefer that and areas of continuous canopy for those who prefer that condition.

V-2. Wildlife viewing opportunities 19-4

C: "The openings not only provide better opportunities for viewing wildlife, the diversified plant species provide food and habitat for a greater number of wildlife species."

R: We agree. Many species use openings to meet all or part of their habitat requirements. This provides opportunities for viewing a diverse plant and animal community.

V-3. Recreation - Support want increased recreational opportunities associated with openings 4-2, 5-1, 36-2, and 54-3

C: "This will create increased wildlife populations, greater fruit and nut gathering opportunities, greater deer and turkey hunting, and enhanced wildlife viewing opportunities."

R: We agree that these openings provide diverse recreational opportunities.

V-4. FS favoring hunters over birders by openings management 62-27

C: "Moreover, the Forest Service to one relatively small group (16.7 million hunters) as compared to a much larger public (61 million birders, plus others)."

R: Openings provide habitat for a diverse array of bird species (see environmental effects and purpose and need sections of this EA). They are accessible and heavily used by people observing the variety of wildlife they support. They also provide excellent opportunities for hunting. We think it is important to provide for a variety of recreational opportunities.

V-5. Want trees, not openings for recreation 65-10

C: "We'd like to see trees for a change. its easy enough to fine bramble patches . . .."

R: Many portions of the forest are maintained with continuous canopies of trees. Only a small portion of the forest (about 2.58 percent) is in openings or early-successional forest (Weber 1999). These areas are maintained as forest openings, utility corridors, or forest stands less than 10 years old. Opportunities are provided for recreation in a range of forest conditions.

Heritage Site Effects

H-1. Cultural resource site protection 62-21

C: "The Forest Service cannot assume that mowing will have no effect on cultural resource sites."

R: Mowing occurs on gentle slopes, during dry conditions to avoid compaction or soil disturbance which might affect heritage sites. The Forest Archaeologist concluded that mowing was not a ground disturbing activity and would not affect these sites (Krieger, 1998). Sites which were proposed for burning were surveyed and identified heritage resources will be protected. See environmental effects section and Appendix B of this EA.