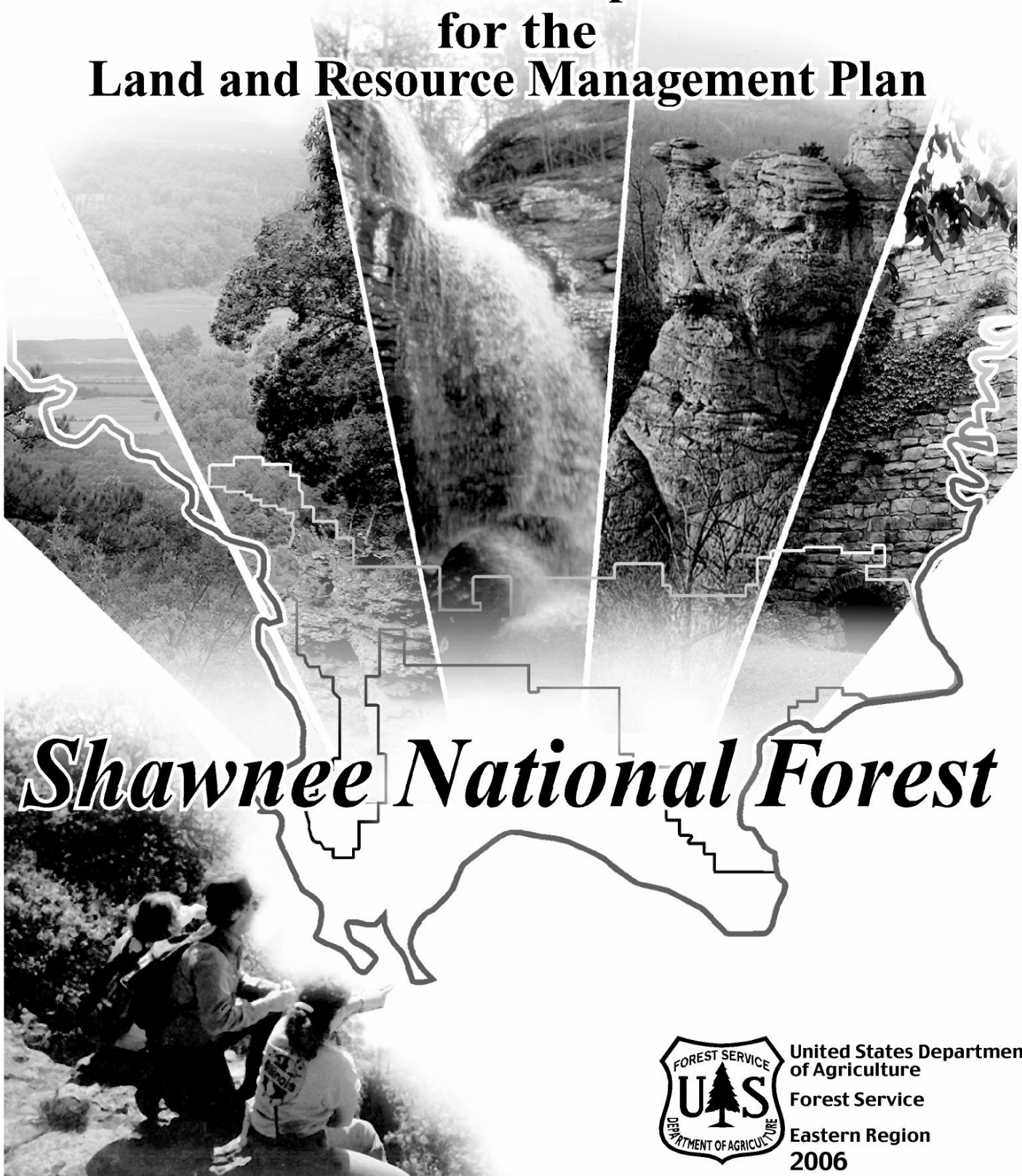


Appendices

Final Environmental Impact Statement for the Land and Resource Management Plan



Shawnee National Forest



United States Department
of Agriculture
Forest Service
Eastern Region
2006

This document can be accessed on the Shawnee National Forest website:
www.fs.fed.us/r9/forests/shawnee.

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APPENDIX A

FOREST PLAN REVISION ISSUES AND PUBLIC INVOLVEMENT

I. INTRODUCTION

The first SNF Land and Resource Management Plan (Plan) was approved on November 24, 1986. In 1988, following 23 administrative appeals, the Forest met with appellants and reached a settlement agreement. Significant changes in the Plan resulted in an amended Forest Plan signed in 1992. A lawsuit on nine counts was filed against the Plan in 1994. The court ruled in favor of the Forest Service on five counts and in favor of the plaintiffs on four. The court remanded the entire Plan, but allowed implementation, enjoining specific activities, including commercial, hardwood-timber harvest, ATV trail designation and oil and gas development. The 1992 Plan is now being revised in compliance with the NFMA, to address the deficiencies found by the court, to address items found in need of change based on new information, the results of monitoring, and changed circumstances.

As a federal agency, the Forest Service is required under NEPA to solicit public comment involving significant actions. Comments are critical to the shaping of a responsible plan for the management of the Forest that best meets the Forest Service mission, legal mandates, the goals of NEPA and NFMA, and the interests of the American public as a whole.

This appendix documents public participation associated with preparing the draft and final EISs and the Plan. This document discusses issues that prompted the revision of the 1992 Forest Plan, as well as issues raised in response to our notice of intent to revise the Forest Plan. The substantive issues and concerns related to the revision are addressed in the FEIS.

II. NEED FOR CHANGE ISSUES LEADING TO THE PROPOSED ACTION

To set the stage for the revision, the Forest Service developed a preliminary list of potential need-for-change issues, based on a review of the following:

- The results of the monitoring and evaluation of implementation of the 1992 Forest Plan
- New scientific information
- Changed conditions of the land
- Changing public demands
- Forest Plan and project-level appeal issues and decisions
- Lawsuit issues and court decisions
- The USDA Forest Service Government Performance and Results Act Strategic Plan (2000)

Results of this review indicated that much of the information and direction in the 1992 Forest Plan remains appropriate and should be carried forward into the revised Plan with little or no change. The review also pointed out several concerns that cannot be addressed effectively through planning or Plan revision because they are operational, budget-dependent, or outside the control of the Forest Service. For instance, public responses indicated concerns with trail maintenance. An important issue such as this must be addressed; not as a strategic issue, such as would be addressed during Plan revision, but as an operational issue. Resolution of this issue to improve trail conditions does not require a change in the Plan, but may require more money or partnerships.

An interdisciplinary team of Forest resource specialists proposed changes in management direction, considering and incorporating ideas and concerns from the public and other public agencies. The Forest leadership team reviewed the proposed changes and endorsed the proposal considered in this document.

The public was involved in the need-for-change review process through letters and public meetings. The Forest communicated with over 1,400 people in October, 1999, inviting comments on the possible needs for change of the 1992 Forest Plan. The Public Policy Institute at Southern Illinois University conducted a public hearing on October 19, 1999 and invited comments on the issues related to management of the Forest. The Forest Service held a public open-house on November 10, 1999 to discuss the Forest Plan revision process and proposed timelines, answer questions, and accept potential need-for-change topics. From this interaction, the Forest Service identified aspects of the 1992 Forest Plan that possibly required change and that could be effectively addressed in Plan revision. The Forest Service shared this list of potential topics for revision with the public on December 4, 2000:

- Watershed Resources
- Biological Diversity, Wildlife and Aquatic Habitat
- Recreation Management
- Forest Ecosystem Health and Sustainability
- Mineral Resources
- Wilderness, Roadless, Wild and Scenic Rivers
- Land-Ownership Adjustment

The Forest conducted a public meeting on January 8, 2001 for review and discussion of the topics. Questions were answered and comments were accepted. Additionally, the Forest invited the public to meetings on July 27, 2000 and January 22, 2001 to participate in development of the appropriate vision, niche and role for the SNF. The resulting broader perspective on the future of the Forest helped guide development of the proposed action and alternatives to the proposed action. The revision focuses on the seven need-for-change topics. Other management direction of the Plan requires little or no change. Topics outside the Plan revision process are listed in section V, below.

A. Watershed Resources

1. Need for Proposed Action

- Recently acquired bottomlands in the Mississippi River floodplain cannot be allocated logically into an existing management-area prescription.
- Public demand for clean water for consumption and aquatic habitats supports management emphasis on protection of water-supply watersheds.
- Unified Federal Policy for Watershed Management requires prioritization of fifth-level watersheds that contain National Forest System land.
- Within high-priority watersheds, emphasis on road and trail maintenance and obliteration, as well as other soil-stabilizing activities, will be needed.
- Filter-strip guidelines for the protection of ephemeral drainageways require clarification.
- Best management practices have been established by the State of Illinois and should be considered for incorporation into management standards and guidelines.

2. Representative Comments on Need for Change

- Emphasize watershed maintenance and restoration.
- Give highest priority to protection of the watersheds for Kinkaid Lake, Cedar Lake, Lake of Egypt and Little Cedar Lake.
- Protect high-quality streams, especially Bay, Big, Lusk and Big Grande Pierre Creeks.
- Protect and restore the Mississippi River floodplain.
- Protect wetlands and their associated habitats.
- Provide a well-designed, well-located, signed and maintained trail system to prevent the erosion problems on many roads and trails.
- Monitor the effects of trail use.

B. Biological Diversity, Wildlife and Aquatic Habitat

1. Need for Proposed Action

- New information and research is available that indicates the best management for forest-interior birds may differ from current management direction.
- There is new information related to the management of habitat for openland species indicating that large tracts of early-successional, openland habitat are important to associated mammals and birds. Several large tracts of relatively open land have been acquired that were previously cultivated cropland and pasture. They do not fit well in the Uneven-Aged Hardwood management area prescription because the desired condition is a closed-canopy forest. These early-successional openland tracts are expected to benefit openland-dependant species.
- Recent research on wildlife openings and their effects on forest-interior species indicates that not all openings have adverse effects on interior species' habitats. In addition, the vegetative and physical conditions of wildlife openings have changed substantially since they were last intensively managed, prior to the 1992 Forest Plan.

As a result, it might not be economically feasible to manage the numbers and acres of openings listed in the 1992 Forest Plan.

- The revision of Plan standards and guidelines must be considered in light of newly listed threatened, endangered or sensitive species; new information on existing threatened, endangered and sensitive species; and ongoing ecological analyses and conservation assessments that could identify ecosystems and/or communities at risk of loss or further degradation.
- National direction for the control of non-native invasive species should be incorporated into the Forest Plan. The existing Plan does not emphasize the control of invasive species that are threatening the biodiversity of native ecosystems.
- The current MIS do not represent all communities, including recently purchased, wetland communities in the Mississippi River floodplain. Future MIS should be of sufficient abundance to be effectively monitored.
- Recent land acquisitions include several thousand acres of farmland in the Mississippi River floodplain, once extremely valuable wetland-wildlife habitat for many native, resident and migratory species, as well as bottomland hardwood forest compatible with management at Oakwood Bottoms Greentree Reservoir.
- As compared to manual or mechanical methods, some pesticides are more efficient and effective in the management of non-native invasive species. The language of the 1992 Plan's Forest-wide standards and guidelines requiring a pesticide to be "essential" for achieving management objectives is overly stringent. The potential use of pesticides should be based on efficiency, safety and effectiveness.
- The eastern wild turkey and northern bobwhite are listed as MIS in the 1992 Plan. However, they are not listed as species of recreational interest and should be listed as such.

2. Representative Comments on the Need for Change

- Maintain wildlife openings for game species. Abandon and reforest wildlife openings and openlands because they fragment the Forest.
- Ensure the protection of all natural areas. Neither create new areas nor expand existing areas because of restrictions imposed on recreational use.
- Protect threatened and endangered species and maintain biological diversity, giving priority to native forest species.
- Utilize large, landscape-scale prescribed fire as the best hope for restoring and maintaining biological diversity.
- Continue to manage for forest-interior species, especially Neotropical migratory birds, incorporating findings of recent research.
- Attend to the needs of bird species of grasslands in early-successional or shrub habitats due to documented declines in their populations.
- Prevent the loss of the oak component of forested stands to avoid adverse effects on many types of wildlife, recreation, tourism and the overall health and productivity of the Forest.
- Use pesticides for more efficient and effective control of non-native invasive species and fisheries' populations. Use no chemicals.
- Update the list of MIS, to include fish species.

- Restrict the recreational use of caves to protect wintering bat populations, which monitoring has indicated have increased on the Forest, and to encourage bats to colonize caves on the Forest in the future. Provide year-round access to caves.

C. Recreation Management

1. Need for Proposed Action

- There is strong public demand for the Forest to develop a comprehensive system of well-designed, maintained, marked and mapped trails. The recreation management goal in the 1992 Plan does not address this demand specifically. Unrestricted equestrian use, including yearlong and cross-country use, as allowed in the 1992 Forest Plan, has led to soil, water and vegetation damage in some parts of the Forest. Increased user-developed trail densities, along with an increase in equestrian-based businesses and special events in and adjacent to the Forest, indicate an increase in equestrian use and demand. Associated with increased equestrian use are user-developed, equestrian trails poorly located and not maintained. These trails have led to increased resource damage. Trail-planning analyses conducted since the 1992 Forest Plan indicate site-specific analysis is warranted, rather than that Plan's programmatic map of potential trail locations.
- Two privately owned ATV/OHM recreational areas have opened near the Forest since the 1992 Forest Plan. They enable high speeds and challenging riding opportunities, thereby accommodating some of the demand for this type of recreation. Similar to the issue of equestrian trails, past consideration of ATV/OHM opportunities indicates site-specific analysis of access opportunities is warranted, rather than a programmatic map of potential route locations. Public comment indicates a high demand for ATV/OHM access to portions of the Forest for hunting and sightseeing opportunities. Since many of the Forest's lower-class system roads have not been managed to support use by large, four-wheel-drive trucks and jeeps, and since ATV/OHM use must be restricted to routes capable of supporting this use, the road system would benefit from closing lower-class roads to larger licensed vehicles and allowing use by smaller and lighter ATVs.
- Another ATV issue concerns the Forest's ATV access permit for people with disabilities. The use of this program has grown substantially in the last nine years, from 33 permits issued in 1993 to 483 issued in 2001. This program provides a form of recreation to the disabled not being provided to other members of the public. If ATVs are allowed to gain access to the Forest on our lower-class system roads, then everyone should have access to these roads, and the disabled-access permit system would not be necessary.
- The 1992 Plan allows for use of bicycles on open roads and designated ATV/OHM routes. It has been noted that bicycles cause lower impacts on resources and less noise-disturbance of other users than motorized vehicles. Demand for bicycle use has increased since the 1992 Forest Plan. There is a need to restrict bicycles to routes capable of withstanding this use without resource damage.
- There is a need for the Forest to provide more resources to trails, law enforcement and monitoring. Currently the recreation management goal does not address the cost-effective management of campgrounds, picnic areas and trails.

2. Representative Comments on the Need for Change

- Provide a well-designed, signed, mapped and maintained trail system.
- Emphasize tourism and local economic development, as requested by local community leaders.
- Retain all developed recreational sites and promote development of new sites, as recommended by tourism proponents.
- Dedicate the Forest to non-commodity uses only, emphasizing hiking, bird-watching, photography, camping, nature study and similar types of low-impact recreation. These activities are in direct conflict with commodity extraction.
- Prohibit all recreational ATV/OHM use on the Forest. Allow ATV/OHM recreational use on the Forest.
- Designate trails for multiple uses by hikers, bicyclists and equestrians. Do not require hikers and bicyclists to use trails utilized by equestrians and ATVs/OHMs.
- Obliterate all user-developed trails. Retain and maintain all user-developed routes.
- Restrict horseback-riding to system trails only and consider a seasonal (winter/wet weather) closure to equestrian use.
- Allow visitors into all the natural areas without limitations, since these are the most scenic and desirable areas of the Forest.

D. Forest Ecosystem Health and Sustainability

1. Need for Proposed Action

- There is a need to change the timber resource goal in the 1992 Plan to forest health and sustainability based on increased demands for habitat sustainability for native plants and animals. Active vegetation management, such as prescribed burning, timber-stand improvement and timber harvest, will be needed for wildlife habitat management, threatened, endangered and sensitive species' needs, and forest health and ecological restoration. The designation of lands not suitable for timber production must be reviewed at least every ten years. It has been ten years since this analysis was performed for the 1992 Plan, so it is necessary to re-evaluate the timber-resource land-suitability and associated allowable sale quantity. The maintenance of plant and animal diversity and abundance associated with the oak-hickory forest-type is essential. Declines of oak-hickory and increases in maple-beech types have led to concerns about the future of oak-hickory habitat for native plants and animals.
- There are no areas suitable for sustained range allotments that do not conflict with wildlife habitat needs. The Forest's only range allotment was not renewed in 1995 due to advances in plant succession and loss of herbaceous forage. There is currently no interest in livestock grazing allotments on the Forest; however, there is interest in hay products.
- Broad soil and vegetation differences have been identified through ecological classification efforts since the 1992 Forest Plan. These ecological units require different management directions to achieve desired future conditions. Large portions of the Fountain Bluff and Iron Mountain 8.3 management areas contain no heritage resources and could benefit from active vegetation management to maintain habitat diversity.

- The use of pesticides is necessary in vegetation management, particularly for control of non-native and invasive species, such as kudzu, fescue and garlic mustard. The 1992 Plan requirement that a pesticide be “essential” for achieving management objectives is overly stringent. Use of pesticides should be based on efficiency, safety and effectiveness.

2. Representative Comments on the Need for Change

- Research indicates forest disturbances and maintenance of oak-hickory communities within the forest ecosystems of the SNF is beneficial in maintaining the diversity of forest-interior birds.
- There is concern about the conversion of the oak-hickory type to the maple-beech type because of possible adverse effects on flora and fauna. There is a lack of conviction that conversion to the maple-beech type would have any adverse effects on biodiversity.
- Verify the vegetation composition-needs and objectives for oak-hickory forest based on the historic, natural range of variability to provide habitat for dependent plants and animals.
- Some research indicates that any harvest, regardless of silvicultural system, will reduce the oak component in the next stand.
- There is need for standards and guidelines that require adequate advanced oak-hickory regeneration prior to overstory removal.
- Maintain a balanced forest age-class distribution with limited timber harvesting. Base forest age-classes on pre-settlement conditions.
- The historic frequency of fire, the need for fire and its effects on the Forest require further analysis. Use no prescribed fire. Use prescribed fire more frequently and on a larger, landscape scale.
- There should be no timber sales and associated road building. Timber harvesting can aid in the maintenance and promotion of ecosystem health and biodiversity.
- Use no pesticides or biological controls. Use pesticides, especially to control invasive and non-native vegetation, including kudzu, fescue, garlic mustard.
- The decision to use of pesticides in natural resource management programs should be based an evaluation of their safety, efficacy, legality and feasibility in comparison to alternative methods.

E. Mineral Resources

1. Need for Proposed Action

- Current laws and regulations are consistent in their direction that congress intends oil and gas on federal land, including Forest land, to be leased and developed in an orderly and efficient manner.

2. Representative Comments on the Need for Change

- Terminate the exploration for, and development and extraction of, oil, gas and other minerals so that the Forest surface can be entirely preserved.

- Do not renew current leases when they expire.
- Prohibit surface occupancy to protect the ecological and recreational resources of the Forest.

F. Wilderness, Roadless, Wild and Scenic Rivers

1. Need for Proposed Action

- The Camp Hutchins area, adjacent to the Bald Knob and Clear Springs Wildernesses and the LaRue-Pine Hills research natural area, was evaluated for roadless qualities as part of a larger area during the Roadless Area Review and Evaluation (RARE) process. The 1992 Plan directs an interim management for this area pending study of its ecological values. It has been requested that this area be studied for its roadless qualities.
- The Burke Branch area, analyzed during the RARE II processes, was found lacking in characteristics for management as wilderness. Wilderness designation for Burke Branch has support and a site-specific analysis of the area has been requested.
- Recreation use within the seven designated wildernesses has increased since their designation in 1990. Additional monitoring should be done of the effects of this increased use on wilderness resources.
- The Illinois Wilderness Act of 1990 identified the East Fork and Eagle Creek as special management areas to be incorporated into the Lusk Creek and Garden of the Gods Wildernesses in eight years, unless marketable quantities of the mineral fluorite were discovered. These areas were incorporated into the wildernesses in 1998; consequently, the 5.2 management prescription now affects no land base and is not needed.
- The 1992 Plan specifies trail densities of one mile per square mile in wilderness. The current total density of system and user-developed trails exceeds the density standard in most wildernesses. Unrestricted equestrian use has generated soil, water and vegetation damage in some wildernesses. Current system-trail densities are near maximum density within the Ripple Hollow management area. The Illinois Wilderness Act allows access to cemeteries within wilderness and descendants of those interred in these cemeteries have requested clarification regarding access.
- A 1987 settlement agreement between the Forest Service Eastern Region and American Rivers, Inc. directs that national forests review their plans and EISs to ensure that they properly determine eligibility and tentative classification for the national rivers inventory. The six candidate wild and scenic rivers on the Forest have been determined eligible; however, the tentative classification of these rivers remains undetermined.

2. Representative Comments on the Need for Change

- Designate appropriately the six streams eligible for study as wild and scenic rivers, and add Barren Creek to the list. Designate the Ripple Hollow, Burke Branch and Camp Hutchins areas as wilderness.
- Designate no more special areas that could restrict recreation or commercial uses of the Forest.
- Dedicate all areas of federal land 500 acres or larger to roadless management.

- Roadless area management is detrimental to tourism. Wilderness and roadless areas are an attraction to tourists.
- Conduct additional monitoring of recreational use in special areas.
- The necessity of ecological restoration would not be precluded by recommendation of some areas, such as Burke Branch, for wilderness.
- Maintain trail-density in wilderness at one mile per square mile, calculated for each wilderness, not cumulatively for all.

G. Land-Ownership Adjustment

1. Need for Proposed Action

- Isolated land parcels are difficult and expensive to manage and public access and recreational benefits are limited.
- The standard and guidelines associated with surface ownership prioritizes land-acquisition opportunities based on management prescriptions. The list requires review.
- The United States has acquired land in the Mississippi River floodplain that is not within the Forest proclamation boundary. Additionally, the boundary includes areas within Alexander, Massac and Williamson Counties where land acquisition is unlikely.
- The 1992 Plan displays specific land-ownership adjustment priorities (consolidation map and narratives), impeding the acquisition of parcels that could provide public benefits.
- Direction in the 1992 Plan for acquisition of only the interest required to achieve land-management objectives, rather than all available property rights, could result in the acquisition of scenic easements, conservation easements, surface rights and other limited property rights. Acquisition of less than fee title limits future management alternatives, fee ownership generally allowing a greater flexibility for management decisions.

2. Representative Comments on the Need for Change

- There is opposition from counties, taxing bodies and members of the public to additional federal ownership because of effects on the tax base.
- There is support for exchanges and opposition to purchases. There is support for purchases and opposition to exchanges.
- Emphasize the acquisition of easements that connect blocks of Forest land along the River-to-River trail and other long distance trails.
- Prioritize land acquisition to support biological corridors linked to larger blocks of land.
- Return small, isolated tracts to private ownership. Retain public ownership of the small tracts.
- There is support for land acquisition in the Mississippi River floodplain, with protection and restoration after acquisition.
- There is opposition to the exchange of forested land for cutover land regardless of price or other resource values.

- Include Inahgeh and Lovett’s Pond in the purchase area and add them to the Forest’s holdings.
- Prioritize land-adjustment priorities by resource needs in conjunction with management area prescriptions.
- The 1992 Plan standards and guidelines for land-ownership adjustment and the Forest consolidation map limit the ability to respond to many significant acquisition and exchange opportunities.

III. PUBLIC NOTIFICATION AND COMMENT ON THE PROPOSED ACTION – PLAN REVISION

A. Public Notification and Involvement

1. Federal Register Notice

On March 20, 2002 the Notice of Intent to prepare an Environmental Impact Statement for the revision of the Forest Land and Resource Management Plan was published in the *Federal Register*. The Notice of Intent described the proposed federal action, requested comments, provided background information on the proposal and the process, and announced five public meetings on the proposed action. The proposed action was to revise the 1992 Forest Plan in the seven “need for change” issue areas. A supplemental Notice of Intent was published on April 3, 2002 announcing two additional public meetings and extending the comment period.

2. Direct Mailing

On March 15, 2002 the Notice of Intent was mailed to more than 3,100 individuals who had previously expressed interest in the management of the Forest.

3. Public Meetings

In addition to the *Federal Register*, the seven open-house public meetings were announced in the *Southern Illinoisan*, the Forest’s newspaper of record. The meetings were held to explain the proposed action and answer questions, and to receive comments. The meetings were held at these locations and dates:

- | | |
|-------------------------|----------------|
| • Eddyville, Illinois | April 2, 2002 |
| • Chicago, Illinois | April 3, 2002 |
| • Belleville, Illinois | April 4, 2002 |
| • Evansville, Indiana | April 10, 2002 |
| • Marion, Illinois | April 11, 2002 |
| • Murphysboro, Illinois | May 28, 2002 |
| • Chicago, Illinois | May 29, 2002 |

B. Public Comment on the Proposed Action

Formal scoping for the Plan Revision EIS resulted in 582 separate comments from 2,731 commentators representing 29 states and the District of Columbia. Most commentators (2,221, or 81 percent) were from Illinois; 375 (17 percent) were from Chicago. Comments addressed all seven of the topics outlined in the need-for-change document of March 12, 2002. Ninety-one percent of the commentators, 2,491 persons, sent one of six different form letters. Following is a summary of the comments by issue area.

1. Issue A: Watershed Resources

About four percent of the comments (21) addressed various aspects of watershed resources, the fewest number of comments on any topic. Major subtopics included critical watersheds, floodplain management, filterstrip guidelines, water quality and watershed planning.

Most supported the general idea of revising management prescriptions, making the protection and restoration of watersheds a priority and protecting critical watersheds. Some qualified their comments or provided recommendations for managing trails, riparian areas and local drinking-water supplies. Some offered a strongly different point of view, opposing watershed management prescriptions or filter-strip guidelines if they interfered with recreational access and the use of certain watersheds.

2. Issue B: Biological Diversity and Wildlife and Aquatic Habitat

This issue received 28 percent of the comments (161), about evenly divided between vegetation and wildlife concerns, with major topics including: use of herbicides and pesticides to control noxious weeds; oak-hickory and pine plantation management; wildlife openings and openlands management; forest-interior species and management units; prescribed fire; habitat fragmentation; threatened, endangered, candidate and indicator species; game and non-game species; and commercial logging.

Typical general comments supported the idea of conserving biological diversity and maintaining a separation between incompatible uses in order to protect diverse areas of the Forest. Some believed that herbicides and pesticides are appropriate tools for the maintenance of biodiversity; many saw them as the tool of last resort and/or for carefully targeted applications. Some stated they should not be used on the Forest.

Prescribed fire comments were more uniform, although some expressed concern or suggested specific implementation methods. One noted that it is acceptable because nature uses it; others recommended caution and more study to ensure it actually does what it is expected to do. Some called for fire to be included in a “toolbox” for maintaining openings and natural hill prairies, along with other tools, such as timber harvest.

Openlands management, including effects on forest-interior species and the use of openings by hunters, stimulated different points of view and management suggestions. Some called for elimination of openlands and reforestation of existing openings. Some noted the use of such openings by game species and supported their continuation for this reason. Others framed their comments in terms of the contribution of openings to forest-succession, species diversity, or hunting access. Some stated that openings can serve as “ecological

traps,” and should be restricted to the most heavily fragmented edges of Forest lands. Occasionally, opinions about openlands were grouped together with other activities viewed as undesirable, such as roads, timber harvest, oil and gas extraction and powerline placement.

The topic of habitat fragmentation drew comments about the need to include species other than birds in biodiversity assessments and suggestions that all areas of contiguous forest 500 acres or larger should be protected from unnecessary disturbance. Regarding maintenance of the native oak-hickory forest-cover, some wanted the native pin oak and oak-hickory forests to be emphasized, while others wanted pine plantations to be maintained as well. Other native-vegetation topics, such as maintaining native prairies and protecting mosses and other collectible plants, were also addressed.

Commercial logging was described both as essential and as unnecessary. Some called for a total cessation of all logging, while others saw a need for active timber management, with selective harvest for timber production and prescribed burns. One noted that the present vegetative and animal diversity on the Forest is the result of various timber-harvesting activities that have taken place in the past. Similarly, grazing was described as both useful and useless, either an efficient means for maintaining healthy, grassland habitats or out of place on the Forest.

Proposals to manage for threatened, endangered and sensitive species were generally supported, although some suggested updating management priorities to reflect current situations and removing certain species from the list. Many agree the current list of MIS should be revised; several had specific suggestions for what should be included on a revised list. Some noted that there remain baseline field surveys to be done, along with monitoring. Protection of specific species and habitats (such as bats and caves) drew support. Some suggested designating certain tracts for the protection of endangered bats.

Comments relating to forest-interior species specifically requested continued management for Neotropical migratory birds, and included data from declines noted in breeding-bird surveys in the eastern and central United States. Game and non-game species and their interactions also were addressed. Some supported management to maintain populations of ruffed grouse and turkey; some deplored the increase in deer populations and the resulting nuisance effects on agricultural crops.

3. Issue C: Recreation Management

This issue drew 28 percent of the comments (161), with a diversity of viewpoints. Most addressed motorized or non-motorized trail management (including equestrian use), with some focusing on dispersed or developed site management and access for the disabled.

General comments focused on appropriate uses and overall trail systems, including calls to encourage low-impact recreation opportunities and emphasize recreation such as backpacking, birding, canoeing, hiking and photography, while reducing commercial equestrian and motorized use. One requested that some areas be set aside where hunting is prohibited, so that non-hunting user-groups could have safe access during hunting season.

Many spoke to the need for a comprehensive system of designated, marked, mapped and well-maintained multiple-use trails and roads that would be capable of withstanding all-season use. One pointed out transportation management, recreation access and quality of recreational experience are inextricably linked and recommended that all vehicular, bicycle and equestrian traffic be limited to designated and appropriately hardened and sited roads and trails.

Seasonal or other closures drew many comments, most negative. One pointed out that, if trails were properly built and maintained, there would be no need for seasonal closures in this mild climate and, if they were properly marked, there would be no cause for people to ride off-trail or around muddy spots. Some opposed closures of any kind, stating that the Forest should always be open to the public. Some opposed arbitrary closures, and others presented criteria (mostly weather-related) for specific closures.

Many requested a total ban on motorized ATV/OHV vehicles; others supported its use for recreation or as transport for hunters. Some pointed out the history of abuses and the inherent dangers of operating such vehicles in rugged terrain.

Some demanded that equestrian use be restricted by time-periods, usage-volume and selected trails to reduce soil, water and plant damage in wilderness and other areas. Some thought 10 to 20 miles of trails should be available to equestrians, while others requested up to 2,500 miles to meet the growing, horse-tourism needs. Some contended that no evidence exists that horses cause damage; others described extensive resource damage at specific sites. Some thought the Forest Service was at fault for not better maintaining trails; one pointed out that horses need water, so access to streams is important.

Regarding user-developed trails, some thought all should be obliterated; others stated that most should be designated into the system, especially near the campgrounds, where impact is high. Suggestions on the density of trails within and outside of wilderness varied widely, from less than 1 mile per square mile to 10 miles per square mile. Management, design and construction techniques for trails were suggested, from adding markers and signs to reconstructing some trails with different materials.

Some suggested other recreational pursuits, and their management, that should be included during the Plan revision, such as recreational spelunking, bicycling, motor-home camping and hunting.

The future of the ATV access-permit for the disabled was discussed. Many wanted to eliminate the permit, citing abuses and the incompatibility of motorized transport with resource protection. Others believed that removing the program was discriminatory, and that continuing it would allow equal access for all citizens. Some recommended the development of another program that would ensure access, yet avoid the current system's perceived problems.

Some suggested the creation of a permit program for various other aspects of recreation, especially for horse camps and equestrian guides. One stated there are too many roads and asked that the entire system be inventoried, mapped and clearly marked. Finally, several addressed the economics of tourism in southern Illinois, pointing out the pivotal role the

Forest plays and the adverse impacts of closures and delayed maintenance of facilities (campgrounds and trails).

4. Issue D: Forest Ecosystem Health and Sustainability

This issue received 53 comments, nine percent of the total. The issues raised overlap considerably with those identified regarding biodiversity (see 2, above), but were more concerned with the sustainability of the forest, or a specific management practice. Topics were heard related to the recreational use of natural areas (because of the focus on definitions of “appropriate management” for one or all of the areas), the protection of heritage sites, and certain vegetation management.

General comments expressed the desire to protect all natural areas from all incompatible uses, including some recreational uses. Several pointed out a perceived conflict with the state over the designation of natural areas. Trails and trail users (especially equestrians) stimulated much comment, with some desiring access within the boundaries, some to all the areas, and some requesting hitching rails. Several desired reassurance that heritage resources would be better protected and asked that existing protections not be changed.

Commercial logging, including the issue of below-cost timber sales, received comments under this category. Some requested an end to all logging; some, the use of best management practices. Some supported limited logging for specialty woods, selective cutting for forest regeneration, and cutting and selling all mature timber. Some wanted logging roads to be used for recreation, the money saved from timber-sale management to be redirected to research and education, and tracts of less than 200 acres to receive special management and protection. One wanted to cease logging the pine plantations as a means of ecological restoration and one asked that openlands management be confined to the Forest edge. The need to consider the historical variability of forest resources was pointed out. Pesticide-use discussions continued, with some supporting the very-controlled use of pesticides to control invasive species, such as applied to individual plants by well-trained personnel.

5. Issue E: Mineral Resources

This issue attracted five percent of the comments (28), relating to mining, oil and gas leasing, or cave management.

Comments on oil and gas topics were mixed, with those on hard-rock mining mostly negative, but with suggestions for maintaining environmental integrity. Some wanted the elimination of new leases or mines, along with the possibility of restricting or prohibiting surface-disturbing exploration in some management areas. Some stated that forest ecosystem health and sustainability and the protection of environmental values should be considered when deciding the suitability of minerals development. Others wanted exploration restricted to tracts over 200 acres, with suitable surface protections. One wanted management of these resources to remain the same, while one asked for an alternative with no minerals development.

Most comments regarding caves spoke to the need for further identification and protection of these resources, with specific suggestions for management actions: Increase attention to the inventory of caves and cave systems, protect them from impacts (as far as 20 miles away), and manage access in general and during bat hibernation. Aquatic cave-systems and those containing new or rare species should be given special protections.

6. Issue F: Wilderness, Roadless Areas, Wild and Scenic Rivers

About six percent of the comments (38) addressed this issue. A broad disparity in belief and factual information was evident in often very strong opinions. The comments addressed wilderness management, wild and scenic rivers, and roadless areas.

General comments included support for the designation of three additional wilderness areas: Camp Hutchins, Ripple Hollow and Burke Branch, and of wild and scenic river study areas within a quarter-mile corridor along Lusk Creek, Bay Creek, Big Creek, Grand Pierre Creek, Hutchins Creek and Barren Creek. There was also opposition to any such designations. One wanted all forest-health issues to be corrected prior to wilderness consideration. One wanted all areas greater than 500 acres to be dedicated to roadless management. Another challenged the idea of any roadless area on or near the Forest since European settlement. Several debated the need for a special management designation that would allow other recreational uses; others both supported and opposed such a designation for Burke Branch.

7. Issue G: Land-Ownership Adjustment

This issue attracted four percent of the comments (23), with a wide variety of opinions. One believed that additional federal ownership and preservation and enhancement of the Forest would be beneficial to the public and should be pursued; another requested that the Forest cease acquiring more public land to remove from the county tax bases; another wanted the Forest to follow the wishes of the local county taxing body. Opposition and support were expressed for elimination of the consolidation map.

Most provided criteria or factors to be considered for land acquisition, such as closing a forest gap, protecting biological corridors, acquiring mineral rights in fragile areas, buying conservation easements rather than fee simple and acquiring by purchase rather than exchange to avoid perceived abuses. Several wanted the Forest to avoid exchanging lands simply to fulfill consolidation goals, but rather to ensure acquisition of high quality habitat.

IV. TOPICS NOT ADDRESSED IN THE PLAN REVISION PROCESS

Forest Plan decisions apply only to National Forest System lands. We have no legal authority to make decisions regarding the management or use of privately owned lands and outstanding mineral estates.

A. Topics outside the Scope of the Forest Plan

The following are considered outside the scope of the Forest Plan revision:

- Items unrelated to the six decisions required by the planning regulations at 36 CFR 219
- Site-specific projects/decisions related to implementation of the Plan
- Decisions outside Forest Service jurisdiction
- Decisions on the Forest budget or allocations of personnel
- Actions requiring changes in laws or regulations

The following are issues raised that are outside the scope of the Forest Plan revision.

1. Unrelated to the Six Required Decisions

- Promotion of medicinal plants on the Forest.
- Establishment of private restaurants on the Forest.

2. Site-Specific Plan-Implementation Projects

- Strategically placed hitching posts on system trails
- Specific trail design and construction techniques
- Development of recreational attractions such as lakes and picnic areas
- Designation of system trails in all natural areas
- Enforce requirement of special-use permits for equestrian campground operators
- Specific studies, monitoring and analysis tools and techniques
- Requests to volunteer on forest management and maintenance projects.
- Setting aside areas where hunting is prohibited
- Review of ATV permit program for the disabled
- Separate trail systems for hiking and equestrian use

3. Outside Forest Service Jurisdiction

- Re-introduction of elk or ruffed grouse on the Forest.
- Off-Forest adjustments in location of the River-to-River Trail
- Prohibition of all licensed and unlicensed motorized vehicle use on the Forest

4. Related to Budget or Personnel Allocation

- More educational programs
- Use of prison labor for trail maintenance and other activities
- Imposition of user fees
- Volunteer programs for trail maintenance and other activities
- Increasing funding for trail construction and maintenance.
- Providing more accurate maps to the public
- Hire more botanists, biologists and law enforcement officers
- Determination of road jurisdiction
- Preparation of a Forest- or Region-wide EIS for pesticide use
- Fragmentation reduction in the Hutchins Creek Valley and Illinois Ozarks through acquisition, partnership and restoration

5. Requiring Change in Law or Regulation

- Creation of a Shawnee Songbird National Monument
- Transfer of Forest management to the US Park Service or the state
- Acquisition of key land parcels regardless of their fair market value
- A total ban in perpetuity on oil and gas leasing, timber harvest and ATV use.
- Increase payments to counties of 25-percent fund and in lieu of taxes
- Formation of a forest management advisory council made up of local government officials only
- Allowance of access to natural areas and wilderness for people with disabilities or the elderly, utilizing horses or motorized vehicles
- Dedication of all areas greater than 500 acres to roadless management

C. Topics Proposed in the NOI Not Addressed in the FEIS

- Establishment of criteria for prioritizing watershed protection and restoration
- Development of criteria for the control of invasive species
- Revision of the list of species of recreational interest
- Conversion from the Visual Management System to the Scenery Management System
- Subdivision of the UM and MH management areas along ecological boundaries
- Change of management-area designations for Fountain Bluff and Iron Mountain from HR to MH to allow for active vegetation management
- Formulation of management area standards and guidelines for cemetery access and maintenance in wilderness

V. ISSUES TREATED IN THE SAME MANNER UNDER EACH ALTERNATIVE

These issues were treated in the same manner under each alternative, generally through Plan standards and guidelines.

A. Threatened, Endangered and Sensitive Species

Plan standards and guidelines have been revised for federally listed threatened and endangered species, Regional Forester sensitive species and other species whose viability is of concern to promote their recovery. The Plan incorporates by reference all federally listed threatened and endangered species and Regional Forester sensitive species.

B. Management Indicator Species

While expanding the monitoring program, the Forest is focusing monitoring resources on a reduced MIS list of five bird species, representing openland and forest-interior habitats: northern bobwhite, yellow-breasted chat, scarlet tanager, wood thrush and worm-eating warbler. These species can be easily monitored.

C. Oakwood Bottoms Greentree Reservoir

The management area boundary has been expanded to include newly acquired lands.

D. Special Management Area Prescription

The Special Management Area prescription for the East Fork and Eagle Creek areas was eliminated because the East Fork and Eagle Creek areas have been incorporated into Lusk Creek and Garden of the Gods Wildernesses, managed under the Wilderness management area prescription.

VI. SIGNIFICANT NEED-FOR-CHANGE ISSUES

The seven need-for-change topics and their related issues define the parameters for development of the alternative approaches to revising the 1992 Forest Plan. They are a consolidation of interconnected issues and resource management concerns. Each issue describes an important consideration in deciding the role of the Forest, the desired future condition of the Forest and the management required to achieve the desired condition. These significant issues, concerns and opportunities have been addressed through the various alternative approaches to Plan revision.

A. Watershed Resources

Watershed protection being one of the primary reasons for establishment of the Forest Service, the agency is committed to protecting water quality. The lands adjacent to streams and rivers are rich in biological diversity and especially important for recreation and wildlife. Opportunities for improving watershed conditions by revising prescriptions of the

1992 Plan include: new management direction for water-supply watersheds and the Mississippi and Ohio Rivers floodplains, and improvement of Forest-wide filter-strip guidelines. Most agree that riparian and streamside areas have special values. However, there is concern that restrictions within riparian areas and filter strips will limit recreational opportunities.

B. Biological Diversity and Wildlife and Aquatic Habitat

Virtually every aspect of Forest management affects biological diversity and wildlife habitat. With or without management or recreational use, the forest undoubtedly will change over time through natural processes. We can influence the type of forest that will be here for those who come after us by prescribing or utilizing wildland fire and controlling wildfire, actively managing vegetation and forest openings for certain wildlife species. There is disagreement over the level of human activity that is appropriate within the Forest, over the allowance or degree of vegetation management.

Some people think that there should be little or no active vegetative management. For example, they feel that timber harvesting will always hurt the forest and that natural processes unaltered by people is always the best way to provide old-growth hardwood forests. They feel that human activity in the forest will decrease the overall biological diversity of the forest and its surrounding environment. Methods of control of invasive species should be limited to manual, mechanical and some biological means.

Other people believe that the forest will provide more benefits for everyone who uses it and increase biological diversity, if the forest ecosystem is wisely managed through appropriate vegetation management practices and restoration of prairies, barrens, savannas and forests. These people feel that it is best to maintain the present oak-hickory forest type and provide a mix of vegetative conditions and habitats for a wide diversity of game and non-game wildlife. They feel that biological diversity would be best enhanced through active vegetation management, including prescribed burning and timber harvesting, needed to maintain the oak-hickory forest type and openlands for wildlife habitat and aggressive control of invasive species including the use of appropriate pesticides.

Opportunities for improving biological diversity and wildlife and aquatic habitat include changes in management for forest interior habitat, large openlands and wildlife openings. Other opportunities for improving direction over what was prescribed in the 1992 Amended Forest Plan include updating guidance for threatened and endangered species, natural areas, invasive species and pesticide use. The list of Management Indicator Species and Species of Recreational Interest need to be modified and there is an opportunity to adjust the boundary of the Oakwood Bottoms Greentree Reservoir.

Invasive species and noxious weeds can have significant effects on biological diversity of native ecosystems when aggressive non-native species crowd out the desirable native species.

C. Recreation Management

There are few places in Illinois that can match the natural beauty of the Forest. While most of the state is somewhat featureless cropland, the forest offers a setting of hills, bluffs and trees. This setting attracts thousands of people each year. They come to the Forest seeking many types of recreation. Some spend their entire visit at a campground. Some seek the solitude and challenge of wilderness. Others hike, hunt, fish, ride horses or ATVs, or drive through the forest to view the scenery.

People want the Forest to continue to be a nice place to visit and to be available for as many types of recreation uses as possible. Most people want well maintained trails, roads, campgrounds and picnic areas. These facilities make a trip to the Forest more enjoyable. However, other people want only natural, unaltered environments for their recreation pleasure. Many people are concerned that activities such as timber harvest or oil and gas development might destroy the natural beauty of the forest.

Horseback riding on the Shawnee National has seen large increases in the last 10 years and there is disagreement over the amount of resource damage caused by equestrian use and where and when people should be allowed to ride horses. One thing that everyone seems to agree on is the need for a well marked, mapped and maintained trail system for the Forest.

There is disagreement as to whether the use of off highway vehicles (OHV's) should be allowed. Some people believe that OHV riding is no more impacting than equestrian use and should be allowed anywhere horses can go. Others believe OHV riding has caused problems in the past, but can continue to be an important recreation use if carefully managed. Still others see OHV riding as totally incompatible with environmental protection and other recreation uses.

Opportunities for improving the 1992 Amended Plan include determining appropriate direction for equestrian, OHV and mountain bike use on the Forest. Other opportunities for change include direction for developed and dispersed recreation.

D. Forest Ecosystem Health and Sustainability

The Forest is one of only public land entities in southern Illinois providing large contiguous blocks of diverse forest, grasslands and shrubland tracts that can be managed on a sustainable basis, providing for native plant communities and habitat for native game/non-game fish and wildlife. The Shawnee also includes the largest blocks of oak-hickory forest in Illinois. Much of the oak-hickory forest of southern Illinois are slowly converting to maple-beech forest because of aggressive fire suppression for more than 50 years and reduced natural and human-induced disturbance in the last 15 years. These changes typically are accompanied by a loss of plant and animal diversity.

Many people are concerned about the conversion of the oak-hickory forest to the maple-beech type because of possible adverse effects on flora and fauna. Others are not convinced that conversion to the maple-beech type will have any adverse effects on biodiversity.

There is disagreement about whether trees should be harvested from the Forest. Some people believe that timber harvesting, in conjunction with prescribed burning and other vegetation management activities, can help maintain conditions necessary for maintaining and regenerating the oak-hickory forest on a sustainable basis. Some people encourage the maintenance of a balanced age-class distribution with timber harvesting, while others believe forest composition and age-classes should be based on pre-settlement conditions and the natural range of variability. People who believe that the Forest should be managed to maintain the oak-hickory type differ on how they believe the trees should be harvested. Some support uneven-aged management and group selection harvesting as prescribed in the 1992 Amended Plan. Others feel that a shelterwood harvest under the even-aged management system will be more effective in creating the conditions needed for regenerating oaks and hickories to maintain the present forest type.

Many people want all timber harvest stopped, along with any associated road building. They do not approve of any commercial timber harvesting on National Forest System lands. They are concerned about below-cost timber sales and the effects of timber harvest on wildlife, water quality, visual quality and recreation.

Opportunities for improving forest health include a Forest goal emphasizing forest health and sustainability instead of timber production and determining the most appropriate silvicultural practices for regenerating and maintaining the oak-hickory forest type. Oak-hickory composition objectives based on ecological land types and the natural range of variability, along with prioritization of non-native pine removal based on historic oak-hickory sites are opportunities for improving forest health. Range management opportunities are limited on the Forest and are best suited to research purposes such as Dixon Springs Agricultural Experiment Station

E. Mineral Resources

Many think of a national forest in terms of trees, wildlife and recreation. But beneath the Forest is a wealth of mineral resources owned by the federal government, corporations and private citizens. These minerals can provide important resources for industry and income to the federal and county governments. Mineral production usually requires some change in the forest: Roads, mineshafts, drill rigs, tanks, pipelines, pumps, or open pits may be needed to develop the mineral resource.

There is concern about the effects of oil and gas leasing on the Forest environment. Some people do not think that oil and gas development in any form is appropriate for the Forest. The possible effects of oil spills need to be evaluated as stipulated by the Court ruling on the 1992 Amended Forest Plan.

F. Wilderness, Roadless, Wild and Scenic Rivers

The Illinois Wilderness Act became a law on November 28, 1990. This law designated seven areas on the Forest as wilderness. It also designated two special management areas that became wilderness in 1998 following an opportunity for minerals development. In all, these areas encompass 28,233 acres of National Forest System land, or about 10 percent of the Forest.

Through this revision process, we considered opportunities for recommendation of wilderness study for three areas: Ripple Hollow, Camp Hutchins and Burke Branch. The Ripple Hollow area was recommended for wilderness study in the 1992 Plan. Although the Forest Service can only recommend wilderness study, it is highly probable that Congress would designate the areas as wilderness based on a wilderness study recommendation. If these areas were designated wilderness by Congress, there would be no motorized use, no timber harvest and no development of the federal mineral estate. Wilderness provides excellent opportunities for people to hunt, trap, fish, hike and ride horses.

There is disagreement about the benefits of wilderness and the need for additional wilderness on the Forest. Many people would like to see additional wilderness on the Forest and many others do not want to see any more areas designated as wilderness. The most significant issues concerning the future of the Camp Hutchins, Burke Branch and Ripple Hollow areas concern motorized use, effective and efficient trail maintenance and mineral exploration. These issues could be dealt with through the management of these areas under prescriptions other than the wilderness study prescription.

Opportunities for additional roadless areas and candidate Wild and Scenic Rivers are examined along with potential classification of existing candidate Wild and Scenic Rivers.

G. Land-Ownership Adjustment

The 284,600-acre SNF is the largest tract of public land in the State of Illinois and is looked upon as an important resource by the people of Illinois and nearby states. These forested lands in the agricultural heartland of America contribute to biodiversity and health of the ecosystem. They also supply important recreation opportunities.

The Shawnee is comprised of fairly broken federal ownership within the Forest proclamation boundary. A consolidated land base provides for better public use and efficient management of the Forest. Existing land ownership and adjustment guidelines occasionally provide direction that inhibits national forest acquisition of land parcels that provide public benefits like the Mississippi floodplain area known as the Inahgeh project. Opportunities for improving land adjustment guidelines found in the 1992 Amended Forest Plan include: new direction revising the prioritization list for surface ownership; providing recommendation for statutory boundary adjustment; eliminating the Forest Consolidation Map; and emphasizing acquisition of all available property rights in each land adjustment case.

VII. PUBLIC PARTICIPATION AND COLLABORATION DURING ALTERNATIVES DEVELOPMENT

Employing a collaborative approach to the development of alternatives to the proposed action, the Forest utilized the facilitation expertise of Drs. Gregg Walker and Steven Daniels, authors of the book *Working Through Environmental Conflict*, to guide alternatives development through collaborative learning. Following an introductory meeting with the public that introduced participants to the collaborative learning process, four public workshops were held to develop alternative approaches to addressing different resource issues. Participants discussed and recorded ways to improve the situation as it

related to the meeting's subject issues. The input was used by the planning team to define the alternatives to the proposed action. An additional public meeting was held to present and discuss the draft alternatives. The workshops were held in Harrisburg, Marion and Murphysboro, as listed in Table A-1.

VIII. PUBLIC PARTICIPATION DURING THE DEIS COMMENT PERIOD

The proposed Forest Plan and DEIS were released for public review on March 10, 2005. A Notice of Availability pursuant to 40 CFR 1506.9 was printed in the *Federal Register* on Friday, March 18, 2005, Volume 70, Number 52, page 13189. This began a 90-day public comment period which ended on June 20, 2005, as noted in an Amended Notice of Availability published in the *Federal Register* on Friday May 20, 2005, Volume 70, Number 97, Page 29307.

Public involvement during the 90-day public comment period was extensive. Nearly 2,200 copies of the planning documents were mailed to individuals on compact disks, 570 people were notified that the documents were available on the Forest website, and 240 hardcopy sets of the documents were mailed to individuals who had expressed interest in the planning process. Copies of these documents were also available at 45 public libraries throughout Illinois. Several hundred Executive Summaries and copies of a seven-page briefing answering questions about the Proposed Forest Plan were handed out at public meetings.

The public-involvement objective was to provide information about the proposal and encourage people to comment. The public involvement program gave notice to potential reviewers, stressed the importance of public participation and the benefit of submitting comments that were as specific as possible, and offered opportunities for meetings with Forest Service representatives.

The Forest Service held public open-house meetings in Marion, Belleville, and Vienna, Illinois to answer questions about the planning documents. Total attendance at those meetings was 106 people. A total of 2,315 comments were received from 1,471 individual commentators representing 35 states and the District of Columbia. Most of the commentators, 68 percent, were from Illinois. Details of the comments received and our response to these comments are in Appendix H, Response to Comments, to the FEIS. Table A-1 summarizes the public involvement that occurred in conjunction with the comment period on the Proposed Plan and DEIS.

Shawnee National Forest
Forest Plan FEIS
Appendix A – Forest Plan Revision Issues and Public Involvement

Table A-1. Public participation summary.

Date	Public Participation Activity
10/15/99	Initial "Need for Change" scoping letter mailed to over 1,400 people, inviting comments on possible "needs for change" of the 1992 Forest Plan.
10/19/99	A public hearing was conducted by the Public Policy Institute at Southern Illinois University regarding "needs for change" of the 1992 Forest Plan.
11/10/99	An open-house meeting held to discuss the Plan revision process and proposed timelines, answer questions and accept potential "need for change" topics.
7/27/00	Initial public meeting/workshop held to aid development of desired Vision, Niche and Role for the Forest.
1/22/01	Public meeting held to review Vision, Niche and Role papers regarding future management of the Forest.
3/15/02	Notice of Intent sent to over 3,100 people who had expressed interest in management of the Forest.
3/20/02	Notice of Intent to prepare an Environmental Impact Statement (EIS) for the revision of the Forest Plan published in the <i>Federal Register</i> .
4/2/02	Open-house public meeting held in Eddyville, Illinois to explain the proposed action and answer questions.
4/3/02	Supplemental Notice of Intent published in <i>Federal Register</i> announcing two additional public meetings and extending the comment period.
4/3/02	Open-house public meeting held in Chicago to explain the proposed action and answer questions.
4/4/02	Open-house public meeting held in Belleville, Illinois to explain the proposed action and answer questions.
4/10/02	Open-house public meeting held in Evansville, Indiana to explain the proposed action and answer questions.
4/11/02	Open-house public meeting held in Marion, Illinois to explain the proposed action and answer questions.
5/28/02	Open-house public meeting held in Murphysboro, Illinois to explain the proposed action and answer questions.
5/29/02	Open-house public meeting held in Chicago to explain the proposed action and answer questions.
11/12/02	Public meeting held in Harrisburg, Illinois to introduce use of collaborative learning in alternatives development.
11/18/02	Public meeting held in Murphysboro to discuss possible alternatives addressing watershed resources, land-ownership adjustment and minerals management.
11/21/02	Public meeting held in Harrisburg to discuss possible alternatives addressing recreation management, wilderness, roadless areas and wild and scenic rivers.
11/25/02	Public meeting held in Murphysboro to discuss possible alternatives addressing biological diversity, wildlife and aquatic habitat and forest ecosystem health and sustainability.
1/22/03	Public meeting held in Marion to discuss possible alternatives addressing recreation management, wilderness, roadless areas and wild and scenic rivers.
1/28/03	Public meeting held in Murphysboro to present and discuss proposed draft alternatives.
3/10/05	Planning documents posted to Forest website and mailed or noted to about 3,000 people who had expressed interest in management of the Forest.
3/18/05	Notice of Availability for Draft EIS (DEIS) and proposed Land and Resource Management Plan published in the <i>Federal Register</i> .
4/19/05	Open-house public meeting held in Marion to explain the proposed Forest Plan and DEIS, and answer questions.
4/20/05	Open-house public meeting held in Belleville to explain the proposed Forest Plan and DEIS, and answer questions.
4/21/05	Open-house public meeting held in Vienna to explain the proposed Forest Plan and DEIS, and answer questions.
5/20/05	Amended Notice of Availability extending comment period to 6/20/05.

IX. MEETINGS WITH AGENCIES AND ORGANIZATIONS

Throughout the Plan revision process, meetings were held with other state and federal government agencies and with various interest groups to talk about specific issues. Meetings were arranged and held at the request of the group or agency. Table A-2 lists the agencies and organizations we met with during Plan revision.

Table A-2. Agencies and organizations met with during Plan revision.

Date	Agency or Organization
1/19/00	Illinois Forestry Development Council
2/2/00	US Fish and Wildlife Service
2/23/00	Forest-Interior Habitat Specialists
3/20/00	Southern Illinois University Forestry Class
10/25/00	Illinois Department of Natural Resources
1/26/01	Phoenix Chapter of Illinois Audubon Society
7/3/01	Central Hardwoods Joint Venture
10/9/01	US Fish and Wildlife Service
11/28/01	Illinois Department of Natural Resources
2/12/02	Illinois Farm Bureau
3/19/02	Forest-Interior Habitat Specialists
5/4/03	Illinois Speleological Society
8/21/03	Illinois Department of Natural Resources
9/10/03	Student Chapter of Wildlife Society
12/8/03	Illinois Department of Natural Resources
9/21/04	Illinois Trail Riders
4/7/05	Illinois Department of Natural Resources
4/14/05	Illinois Chapter of the Society of American Foresters
5/10/05	US Environmental Protection Agency Region 5
5/10/05	Illinois Chapter of Sierra Club
6/7/05	US Environmental Protection Agency Region 5 Field Trip on Forest

APPENDIX B

ANALYSIS PROCESS

I. INTRODUCTION

Appendix B presents a discussion of the analysis process and computer models utilized during Plan revision. It focuses on the quantitative methods used to perform the analysis and documents how the analysis was conducted.

The Forest's major planning goal is to provide enough information to help decision-makers determine which combinations of goods, services and land allocations will maximize net public benefits. The regulations (36 CFR 219) developed under the NFMA provide the analytical framework within which these decisions are made. The NFMA and its regulations also state that the requirements of the NEPA and its regulations (40 CFR 1500-1508) must be applied in the analytical process. NEPA regulations require that the environmental effects of a proposed action and alternatives to that proposed action must be disclosed in an environmental impact statement (EIS).

Information presented here supplements the broader and less technical descriptions included in the FEIS. This discussion includes basic assumptions, modeling components and inputs, rules, methods and constraints. Additional information and documents used in the analytical process are contained in the planning records. The planning record in its entirety is incorporated here by reference. The results from the modeling processes are estimates of what can be expected if the alternatives are implemented and facilitate comparison of the alternatives.

A. THE PLANNING PROCESS

Land and resource management planning requires that processes formally used to make individual resource decisions be combined into integrated management decisions. It also requires that mathematical modeling techniques be used to identify the most economically efficient solution to meet the goals and objectives of any alternative. The step-by-step process defined in the NFMA regulations was followed. This appendix describes the analysis phase of this process, steps 2, 3, 4, 5 and 6. Steps 1, 7 and 8 are described in Chapters 1 and 2 of this FEIS. Plan implementation (step 9) and monitoring (step 10), are discussed in the revised Forest Plan. A brief discussion of the steps taken in the process follows.

1. Step 1: Identification of Purpose and Need: Issues, Concerns and Opportunities

In this step, the interdisciplinary planning team assesses changes in public issues, management concerns and resource use and development opportunities since the current Forest plan was developed and amended. FEIS Chapter 1 and Appendix A document this step.

2. Step 2: Planning Criteria

Next, the team designed criteria to guide the collection and use of inventory data and information, the analysis of the management situation, and the design, formulation and evaluation of alternatives. This step establishes guidelines for accomplishing the next five steps. (The criteria are documented in the planning record.)

3. Step 3: Inventory Data and Information Collection

The type of data and information required was determined in step 2, based on the identification of issues, concerns and opportunities, assessment of the management situation, and determination of what should be changed. Existing data is used when possible, or supplemented with new data when practicable, if new data contributes to a more responsive analysis. Data accuracy is evaluated continually. (The data and background documentation are in the planning record.)

4. Step 4: Analysis of the Management Situation

In this step the team assesses the existing situation of the Forest and identifies opportunities for resolving issues and concerns. This information underpins the formulation of an appropriate range of reasonable alternatives. The analysis brings information together from a Forest perspective. It examines supply potentials and market assessments for goods and services, and determines suitability and feasibility for meeting needs. Other objectives of the analysis of the management situation include the following:

- Assessing current direction, including estimates of goods and services most likely to be provided if current direction is continued.
- Assessing the demand for goods and services from National Forest lands.
- Determining if there is a need to change current management direction.

5. Step 5: Formulation of Alternatives

Following a series of public meetings on alternatives development, the team formulates a reasonable range of alternatives according to NEPA procedures, in order to identify the one that best maximizes net public benefit. They provide for the resolution of significant issues and concerns (identified in step 1) and reflect a range of resource management programs. Each identified major public issue and management concern is addressed differently in the alternatives. The programs and land allocations under each alternative represent the most cost-efficient manner of attaining the goals and objectives for that alternative. Both priced and non-priced goods and services (outputs) are considered in formulating each alternative.

6. Step 6: Estimated Effects of Alternatives

The physical, biological and socioeconomic effects of implementing each of the alternatives are considered to respond to the issues and need for change. The Spectrum model estimates some, but not all, of the economic and physical effects. Effects examined outside the model were ecological and social considerations. The effects of the alternatives are displayed in Chapter 2 and 3 of this FEIS.

7. Step 7: Evaluation of Alternatives

Analysis of the potentially significant physical, biological and socioeconomic effects of implementing the alternatives is the basis of evaluating and comparing them. Typically, each alternative can be judged on how it affects the human and natural environment, and addresses the significant issues identified in FEIS Chapter 1. FEIS Chapter 2 summarizes the comparison of the alternatives as they respond to the issues.

8. Step 8: Preferred Alternative

The Forest Supervisor reviews the interdisciplinary team's evaluation of the alternatives and the public's issues and concerns in order to recommend a preferred alternative to the Regional Forester. The Regional Forester can accept the recommendation, select another alternative, or modify the recommended alternative. This alternative is identified as the preferred alternative in DEIS Chapter 2 and is embodied in the revised Forest Plan. Public comments are then solicited and considered in finalizing the EIS and the revised Forest Plan.

9. Step 9: Plan Approval and Implementation

After the team has reviewed the public's comments and incorporated any necessary changes into the EIS or revised Plan, the Regional Forester reviews and approves the FEIS and the revised Forest Plan. A Record of Decision documents this step. After the Plan is approved, the Forest implements it by complying with its Forest-wide and management area-specific standards and guidelines, management-area prescriptions, and guidance to produce the goods and services specified in the Plan.

10. Step 10: Monitoring and Evaluation

The revised Forest Plan establishes a system of measuring, on a sample basis, actual activities and their effects and compares these results with projections contained in the Plan. Monitoring and evaluation comprise an essential feedback mechanism to ensure that the Plan is dynamic and responsive to change. Plan Chapter 6 displays the monitoring and evaluation program.

B. PLANNING CRITERIA

The NFMA regulations require planning criteria be developed to guide each step in the planning process. Process criteria are the standard rules and tests to guide and measure the effectiveness of the planning process. Criteria apply to the collection and use of inventory data and information, analysis of the management situation, and the design, formulation and evaluation of alternatives. Planning criteria are based on:

- Laws, executive orders, regulations and agency policy as set forth in the Forest Service Manual
- Goals and objectives of the Forest Service Strategic Plan
- Recommendations and assumptions developed from public issues, management concerns, and resource use and development opportunities

- The plans and programs of other federal agencies, state and local governments and Indian tribes
- Ecological, technical and socioeconomic factors
- The resource integration and management requirements in 36 CFR. 219.13 through 219.27.

In addition, the Land and Resource Management Planning Handbook (FSH 1909.12) requires that the following criteria be applied:

Alternatives must be technically possible to implement
Alternatives must meet management requirements or standards
Various levels of multiple-use objectives and outputs must be achieved.

II. INVENTORY DATA AND INFORMATION COLLECTION

The interdisciplinary team, with assistance from resource specialists and ranger district personnel, collected data, maps, graphic material and explanatory aids for addressing the issues and conducting required analyses. The inventory was sufficiently detailed to support the management decisions to be made.

The following criteria were applied to all elements in the inventory phase:

1. Use existing data unless it is inadequate.
2. New data and information will be collected on an as needed basis.
3. Sources of information and data will be documented in the planning record.
4. The GIS will be used for map storage and manipulation, spatial analysis and generating maps for the Plan.
5. The attribute system in the GIS will be used when possible to store, manage and display data associated with mapping units.
6. Only information stored in the GIS will be used to develop capability and management areas for use in the Spectrum scheduling model.
7. Where assumptions are used in lieu of specific data or information, the following will occur:
 - a) Analytical techniques and associated assumptions will be identified.
 - b) The rationale for each assumption will be documented.
 - c) The basis for selecting analytical techniques and assumptions will be stated (and the advantages and disadvantages of each identified).

Table B-1. Sources of data.

Item	Data Source	Purpose for Data
Cover -Type/ Age-Class	Combined Data System (CDS)	To estimate acres of land by type to estimate yields. Also to identify suited and unsuited lands and wildlife habitat.
Geographic Information	Primary base series maps at 1:24000 scale	To estimate acres available for various analysis units.
Ecological Units	Ecological Classification System	To develop analysis units based on ecological factors.
Economic and Social Analysis Data	IMPLAN database	To assess socioeconomic impacts by alternative.
Recreational Use Figures	National Visitor Use Monitoring report	To estimate the amount of the various recreational uses of the Forest.
Timber-Stand Composition and Regeneration	Forest Inventory and Analysis (FIA) continuous forest inventory plots	To apply FIA plot data to CDS stands in order to establish stand composition and regeneration for projections with the Forest Vegetation Simulator (FVS) growth projection model.
Timber Volumes	FIA continuous forest inventory plots	To determine existing and projected volumes using the FVS growth-projection model.
Cost Estimates	Past projects and adjacent Forest information	To estimate fixed costs and estimate variable costs.
Timber-Product Values	Timber sale transaction evidence and Indiana State Forest timber sales	To project timber product values for the Spectrum model.
Timber-Demand Trends	Report by Southern Illinois University on demand for timber products	To project timber demand.
Wildlife MIS Information	Habitat Evaluation Program field surveys and numerous references used in estimating effects of alternatives	To provide appropriate information on MIS to evaluate effects of alternatives on habitat.
Fish and Wildlife Population Trends	IDNR and Forest monitoring information and numerous references from journals, symposia and other sources	To estimate existing and potential wildlife population trends and forest wildlife diversity.
Endangered, Threatened and Sensitive Species	US Fish and Wildlife Service and IDNR publications; species recovery plans; references from journals, symposia, experts and other sources	To establish Forest direction for conservation and recovery of these species.

III. FOREST PLANNING MODEL (SPECTRUM)

A. INTRODUCTION

Spectrum modeling software, developed by the Forest Service, is designed to provide decision support for forest plan revision. Spectrum enables a user to build linear programming-based forest-planning models that optimize resource allocation and activity scheduling over a specified time-span, relative to achieving stated management objectives. For example, vegetation management activities can be scheduled to provide sustainable harvest levels, subject to environmental limitations, while minimizing risk of catastrophic fire on the landscape. Spectrum is highly generalized model-building software. It is up to the user to define applicable management activities, specify environmental limitations and identify appropriate measures of fire risk.

Spectrum was developed collaboratively by the Inventory and Monitoring Institute, formerly the detached Washington Office Ecosystem Management Analysis Center located in Fort Collins, Colorado and the Rocky Mountain Forest and Range Experiment Station. Spectrum is based on FORPLAN Version 2, but includes many model-formulation enhancements and a Windows 95 user-interface application. Its primary role is modeling alternative land-management strategies or scenarios over time, and it is being used as a tool to support revisions of Forest Plans across the nation. For Plan revision, the Forest used Spectrum Version 2.6, released 11/26/01.

Spectrum utilizes mathematical programming and optimization techniques to derive solutions to a given model. The specific commercial optimization software employed is C-Whiz from Ketron Management Science.

B. SELECTION OF MANAGEMENT AREA PRESCRIPTIONS

In order to respond to the issues and concerns, the planning team revised management standards and guidelines and identified different management strategies, or prescriptions, to be applied in the management of the various areas of the Forest. The purpose of a management-area prescription is to produce a unique forest environment in a specific area, or management area. A management prescription identifies the goals, desired future condition and associated guidance for the management area. The desired future condition of each management area supports the production of various compatible combinations of goods and services. Guidance provides for management practices essential to creating and maintaining the desired land conditions and the flow of goods and services.

The interdisciplinary team built on the management prescriptions in the 1992 Plan. The following are considered in the development of management prescriptions:

- Major public issues, management concerns and resource opportunities are addressed.
- Strategies reflect the full range of environmental resource uses and values that could be produced from the Forest.
- Strategies are compliant with laws, executive orders, regulations and agency policy.
- Recommendations from the citizen participation process are incorporated.
- Strategies are compatible with the plans and programs of other federal agencies and state and local governments.
- Strategies are ecologically, technically and economically sound.
- Strategies meet the resource integration and management requirements in CFR 219.13 through 219.27.

The acreage assigned and the spatial distribution of management areas can vary by alternative. Management area selection depends on the goods, services, uses and forest conditions desired under each alternative. A specific management prescription could be applied at several locations within the Forest; that is, a management area may not be (and usually is not) one block of land. It is also possible to include one management area within another larger management area. For example, a natural area could be located inside the boundaries of a wilderness or a significant heritage resource area. When this occurs, the more stringent management direction takes precedence over the other. The acreage of the larger management area is included in the total area of the management prescription. The

management prescriptions are included in the Forest Plan and the management areas for each alternative are displayed on the attached maps.

C. MANAGEMENT AREAS BY ALTERNATIVE

1. Alternative 1

This alternative is essentially the continuation of management under the 1992 Plan, with minor changes and updates. The management prescriptions for Alternative 1 are:

- **CH – Camp Hutchins** – A special management prescription to maintain the ecological integrity of this area.
- **CR – Candidate Wild and Scenic River** – Applies to a quarter-mile corridor on either side of streams to maintain their potential scenic classification.
- **CV – Cave Valley** – A special prescription for maintaining the bottomland-hardwood habitat in this area.
- **DR – Developed Recreational Site** – Applies to sites such as campgrounds and picnic areas.
- **FI – Forest Interior** - Provides habitat with unfragmented forest-interior management units of approximately 1,100 acres minimum size.
- **FR – Filter Strips and Riparian Area** – Applies to management of filter strips and riparian areas, unmapped areas within other management areas.
- **HR – Heritage Resource Significant Site** – Provides for protection and interpretation of significant heritage resource sites, including Fountain Bluff and Iron Mountain.
- **MH – Mature Hardwood Forest** – Emphasizes wildlife habitat and recreation, usually in proximity to areas of high recreational use.
- **MM – Minimum Management** – Applies to generally isolated parcels where the cost of access would be high.
- **NA – Natural Area** – Provides for the maintenance of biological diversity and natural communities.
- **OB – Oakwood Bottoms Greentree Reservoir** – Provides for flooded habitat for migratory and wintering waterfowl and other wetland species.
- **RA – Research Area** – Applies to the manipulative research sites: Dixon Springs Agricultural Center, Kaskaskia Experimental Forest and the Palzo mine-reclamation site.
- **RW – Ripple Hollow** – Applies to area recommended for wilderness study.
- **UH – Uneven-Aged Hardwood Forest** – Includes most of Forest; emphasizes group selection as probable method of timber harvest on only lands classified as suitable for timber production. Pine is not considered part of the suitable base.
- **WD – Wilderness** – Provides for maintenance of wilderness character and recreational experience.

2. Alternative 2

This alternative includes several of the management prescriptions identified under Alternative 1: CV, DR, MH, MM, OB, RA and WD. Forest-interior habitat is provided for in several management areas, but is actively managed under the EH and MH prescriptions in all one-mile–diameter tracts of unfragmented federal ownership. Where timber is harvested to improve forest-interior habitat, primarily on ridge-tops and upper slopes, the shelterwood-with-reserve harvest method would be used. Soil and water resources are protected through application of Forest-wide standards and guidelines, except in OB and in the new Mississippi and Ohio Rivers floodplains management area. New or differing prescriptions include:

- **CR – Candidate Wild and Scenic River** – Applies to a quarter-mile corridor on either side of six streams to maintain their potential recreation classification and of a portion of Lusk Creek to maintain a potential scenic classification.
- **EH – Even-Aged Hardwood Forest** – Emphasizes creation of conditions more suitable for maintenance of the oak-hickory forest-type, and shelterwood as the probable method of timber harvest on lands classified as suitable for timber production. Pine in the area is considered part of the suitable base.
- **HR – Heritage Resource Significant Site** – No longer applies to the Iron Mountain area. (Heritage resources around Iron Mountain are protected under Forest-wide standards and guidelines.)
- **LO – Large Openlands** – Provides for habitat for wildlife species requiring large openlands.
- **MO – Mississippi and Ohio Rivers Floodplains** – Provides for bottomland hardwoods and wetlands for wildlife species requiring these habitats.
- **NA – Natural Area** – Allows designation of bicycle trails in natural areas.
- **NM – Non-motorized Recreation** – Applies to the Ripple Hollow and Camp Hutchins areas.
- **WW – Water-Supply Watersheds** – A new prescription, emphasizes the maintenance of water quality in watersheds that are sources of community water supplies. Includes watersheds for Cedar Lake, Kinkaid Lake and Lake of Egypt.

3. Alternative 3

This alternative emphasizes the minimization of human-caused disturbance of the forest, while allowing some access for recreational purposes. There would be no timber harvest in any management area for any reason other than human health and safety. Most of the Forest would be managed under prescription MH, with emphasis on mature and old-growth forest conditions, recreation and wildlife. Vegetation management normally would be allowed only for threatened and endangered species habitat needs. Prescriptions similar to those under Alternatives 1 and 2 include: CV, DR, MH, MM, MO, OB, RA and WD. Prescriptions with differences include:

- **NA – Natural Area** – Allows access for foot travel only.
- **NM – Non-motorized Recreation** – Applies additionally to the Burke Branch area.

4. Alternative 4

This alternative includes all of the management prescriptions identified under Alternative 2, except NM. Maintenance of the oak-hickory forest-type is also important under this alternative and even-aged hardwood forest is emphasized in an effort to create conditions suitable for the maintenance of oak-hickory. However, where timber harvesting might occur, the shelterwood with reserves would be the probable method.

D. MODEL DESIGN AND APPLICATION

The Forest model design is based on the need to address the following analytical questions and objectives:

- What management actions, if any, should be applied to the landscape in order to maintain or increase the presence of oak-hickory over time?
- What is the distribution of the oak-hickory type across the landscape over time under each alternative?
- What are the residual vegetation conditions each decade following scheduled treatments (measured in terms of acres by vegetation type, condition class and canopy closure)?
- What is the sustainable timber-harvest potential and estimated present net value of each alternative?
- Enable differentiation among the effects of no management, mechanical vegetation treatment, use of prescribed fire and natural disturbance on landscape-scale vegetation composition and structure over time.

Using Spectrum software, models were formulated for each alternative and Plan benchmark. Each model applies a range of vegetation-management choices, including no management, to landscapes in order to achieve stated resource objectives—but within the confines of satisfying all specified constraints. Natural disturbance (blowdown) is simplistically modeled at long-term average historical levels (one percent per decade). The generalized vegetation model represented in Spectrum for the Forest shows hardwoods transitioning over time from oak-hickory types to maple-beech in the absence of management. Simultaneously, pine types would be transitioning to maple-beech unless they are converted to oak-hickory. Vegetation dynamics are tracked over time within the model as acres transition through vegetation-types and size-classes, based on management, natural disturbance, or succession.

A Spectrum model consists of seven major data components: 1) a time-horizon for analysis, 2) a land-stratification scheme for classifying acres, 3) management-action choices, 4) activities, outcomes and conditions that comprise the management actions, 5) costs and values for economic analysis, 6) objective functions for deriving solutions and 7) constraints. Each component is detailed here.

1. Time Horizon

Each model was run for 150 years, represented as 15 ten-year periods.

2. Land Stratification

Six layers, or land themes, are available in Spectrum for categorizing land attributes. The GIS is used to determine the acreage in each combination of attributes across the six layers. Each of these combinations with associated acres is referred to as an analysis unit. There are approximately 900-1,200 analysis units in each Forest model. The number varies slightly by alternative based on the different numbers of acres in each of the management areas. The layers used to define analysis units, and the attributes within each layer, are as follows:

- Layer 1 is not in use
- Layer 2 is Management Areas (MA) with 22 attributes
 1. MA 1.3 -- Oakwood Bottoms (OB)
 2. MA 2.1s-- General Forest Suited [uneven-aged mgmt] (UH)
 3. MA 2.1u-- General Forest Unsited [uneven-aged mgmt] (UH)
 4. MA 3.1s-- General Forest Suited [even-aged mgmt] (EH)
 5. MA 3.1u-- General Forest Unsited [even-aged mgmt] (EH)
 6. MA 5.1 -- Wilderness (WD)
 7. MA 6.1 -- Water Supply Watersheds (WW)
 8. MA 6.2 -- Mississippi & Ohio River Floodplains (MO)
 9. MA 6.3 -- Filter Strips & Riparian Areas (FR)
 10. MA 6.4 -- Forest Interior Mgmt. Units (FI)
 11. MA 6.5 -- Cave Valley (CV)
 12. MA 6.6 -- Mature/Old Growth, Wildlife, Recreation (MH)
 13. MA 6.7 -- Large Open Lands (LO)
 14. MA 6.8 -- Non-Motorized Rec. (NM)
 15. MA 7.1 -- Developed Recreation Areas (DR)
 16. MA 8.1 -- Research Areas (RA)
 17. MA 8.2 -- Natural Areas (NA)
 18. MA 8.3 -- Heritage Resource Sites (HR)
 19. MA 9.1 -- Minimum Level Management (MM)
 20. MA 9.2 -- Candidate Wild & Scenic Rivers (CR)
 21. MA 9.3 -- Recommended Wilderness Study (RW)
 22. MA 9.4 -- Camp Hutchins (CH)
- Layer 3 is Forest Interior Management Units with 2 attributes
 1. FIMU – Forest Interior Mgmt.
 2. Other – not within a FIMU
- Layer 4 is Vegetation Type with 7 attributes
 1. Maple-Beech
 2. Oak-Hickory Low Site (<70 S.I.) Deep Soils
 3. Oak-Hickory High Site (>70 S.I.) Deep Soils
 4. Oak-Hickory All Sites Shallow Soils
 5. Other Hardwood Species
 6. Pine
 7. Open Lands
- Layer 5 is Land Class with 7 attributes
 1. Bottom Lands, Low Slopes and Alluvial Soils
 2. Deep Soils – Ridge Tops
 3. Deep Soils – South and Southwest Slopes

- 4. Deep Soils – North Slopes
- 5. Shallow Soils – Ridge Tops
- 6. Shallow Soils – South and Southwest Slopes
- 7. Shallow Soils – North Slopes
- Layer 6 is current Condition Class with 4 attributes
 - 1. Seedlings and Saplings
 - 2. Posts and Poles
 - 3. Sawtimber
 - 4. Open Lands and Brush

Each Plan alternative has its own set of analysis units.

3. Management Actions

Management actions are combinations of vegetation treatments applied to groups of analysis units. Each management action has timing, or scheduling choices, associated with it. For example, one management action option is to shelterwood oak-hickory hardwood. Within this option, the timing choices for treatment allow scheduling anytime between decade 1 and decade 15 for mature stands. All management actions are not necessarily available under every alternative. For example, group selection is only available in Alternative 1.

4. Activities, Outputs and Conditions

Management actions are combinations of activities with associated costs. For example, the management action of shelterwood in oak-hickory stands is comprised of sale preparation, road reconstruction, temporary road construction, sale administration, prescribed burning/brush disposal and natural regeneration. Outputs result from scheduling management actions and generally have associated values. Sawtimber and pulpwood are examples of outputs resulting from mechanical harvest treatments. Conditions can be thought of as ecological or environmental outcomes from a management action. The following activities, outputs and conditions are present in the Forest Spectrum models.

Activities	Cost
Sale preparation	\$40.57 - \$54.51 per acre
Sale administration	\$25.40 - \$31.75 per acre
Road reconstruction	\$20,000.00 per mile
Temporary road construction	\$1,000.00 per mile
Planting	\$400.00 per acre
Natural regeneration	\$85.00 per acre
Burning/brush disposal	\$28.00 per acre
TSI-release	\$125.00 per acre
Silvicultural exam	\$1.47 per acre
Ecological burning (barrens)	\$84.00 per acre
Hardwood site preparation (fire)	\$28.00 per acre
Artificial regeneration of open lands	\$400.00 per acre
Dozing of open lands	\$200.00 per acre
Wildlife opening maintenance	\$756.00 per acre
Large open land maintenance	\$512.00 per acre

Outputs	Value
Pine sawtimber	\$268.90 per mcf
Pine pulpwood	\$19.00 per mcf
Hardwood sawtimber	\$1509.00 per mcf
Hardwood pulpwood	\$19.00 per mcf

Conditions

Acres of 0-29% canopy closure
Acres of 30-59% canopy closure
Acres of 60-80% canopy closure
Acres of 81-100% canopy closure
Acres of maple-beech type
Acres of oak-hickory type
Acres of pine
Acres of other hardwood species
Acres of open lands
Acres of created openings from harvest
Acres of blowdown
Acres of seedlings/saplings
Acres of posts/poles
Acres of sawtimber
Acres of old growth

5. Costs and Values

Costs and values associated with individual activities and outputs are displayed above. These figures go into the internal calculation of present net value (discounted total revenue minus discounted total cost), assuming a four percent discount rate, for each alternative and benchmark. In the Forest Spectrum models, only vegetation management-related costs and values are present. The values and costs associated with other resources, such as recreation, are accounted for externally.

6. Objective Functions

Linear programming (LP) involves optimization of an objective function. An objective function is either maximized or minimized over time, subject to satisfying all specified constraints, in order to derive a model solution. Examples include minimizing cost or maximizing sustainable harvest for a given alternative.

Six objective functions were specified in the Forest models to explore solution possibilities within alternatives and benchmarks, address issues and comply with planning regulations:

- Maximize acres of oak-hickory vegetation type over 15 decades;
- Maximize pine conversion over decades 1 – 4;
- Maximize present net value (PNV) over 15 decades (four percent discount rate);
- Maximize timber harvest for the first decade;
- Maximize timber harvest over 15 decades; and
- Maximize acres of prescribed burning over 15 decades.

The last three objective functions were used infrequently, primarily to help establish “sideboards” within alternatives or benchmarks as they were being developed. While only a single objective function may be optimized at a time using LP, it is possible with Spectrum to solve models sequentially for a number of objective functions. The solution to a prior objective function becomes a constraint in a subsequent execution of the model. Maximizing PNV was always the final objective function for an alternative, in order to be in compliance with agency regulations.

Most alternatives were solved using a sequence of up to three objective functions. First, pine conversion was maximized over the first to fourth decades. Next, occurrence of the oak-hickory type was maximized over 15 decades, while achieving at least 99 percent of the maximum pine conversion in the first to fourth decades established in the previous solution. Finally, PNV was maximized over 15 decades, subject to achieving 99 percent of the maximum pine conversion and 99 percent of the maximum oak-hickory occurrence established in the second solution.

7. Constraints

Even though Spectrum utilizes optimization techniques, in order for a model solution to be feasible it must comply with all specified constraints within the problem. Constraints are used to represent physical, ecological, financial, or social thresholds that a solution must meet in order to be considered reasonable or appropriate to implement. Models of alternatives must satisfy numerous types of constraints in order to be considered feasible.

a. Harvest Policy Compliance

In all alternatives and benchmarks, a set of harvest policy constraints are applied in compliance with agency regulations requiring that timber harvest be sustainable over the long term. Harvest levels must be non-declining at or below the long-term, sustained-yield capacity of the forest. Further, timber inventory conditions must be sufficient at the end of the 150-year planning horizon so that estimated harvest levels can be sustained in perpetuity.

b. Dispersion of Created Openings

Limiting the maximum area that can be treated in a single entry into an individual stand can ultimately limit overall levels of vegetation treatment across an entire forest. For example, if only 40 acres can be treated at a time in such a way that forest openings are created and these openings need to be separated by at least an area equal to the size of the created opening, then dispersion of created openings may become an overall limiting factor in scheduling management activities on the landscape.

NFMA specifies maximum harvest-unit sizes. Therefore, dispersion of created openings is modeled in Spectrum as vegetation-type/condition-class-specific constraints that permit no more than 25 percent of each vegetation-type/condition-class combination to be in an open condition in each decade. The 25 percent factor was derived using a simple assumption that harvest units could be laid out in grid-like fashion, not allowing corners to touch, with leave-units equal in size to harvest-units. Management actions that create openings include only

shelterwood preparatory cuts and group-selection harvest (adjusted for the amount of area actually harvested during each group-selection entry).

For purposes of benchmarks, created openings require one decade to no longer be considered open. Re-growth would achieve minimum height requirements within one decade after harvest. However, for alternatives, openings remained openings for three decades, based on the assumption that it takes 30 years to attain post/pole-size stands within openings prior to harvesting adjacent mature stands. This is the desired situation for alternatives—to not harvest adjacent to a created opening until the opening has achieved post/pole-size.

The net effect of dispersion constraints in benchmarks is to allow up to 25 percent per decade in each vegetation-type/condition-class combination to be harvested using shelterwood and/or group-selection methods. In alternatives, up to 25 percent in each combination can be harvested every three decades.

c. Market Demand for Pine Volume

Based on the projected demand in the marketplace for pine volume and local milling capacity, an upper limit of 4.1 mmbf per year for the first decade is imposed on pine harvest. After the first decade, it is assumed that additional markets can develop to utilize additional pine volume.

d. Controls on Management Actions

For a variety of reasons, specific types of management actions are sometimes limited, or required to occur at specified levels, for certain alternatives. For example, group-selection in hardwood-types is allowed only under alternative 1. Additionally, management-action options for openlands vary by alternative. As a consequence, constraints are placed on management actions to help model the intent of a given alternative.

IV. VEGETATION-YIELD TABLES AND MODELS

Construction of the vegetation-yield tables addressed two primary objectives:

1. Obtain the information necessary to display volume differences among the alternatives.
2. Document the volume-yields used in the analysis versus actual yields obtained during implementation of the revised Plan. Monitoring and evaluation will determine if the projected yields are being realized.

A secondary objective was the tracking of forest succession over long periods of time. An identified concern of the public and Forest staff was the transition of shade-intolerant forest-types (e.g., oak-hickory) to shade-tolerant types (e.g., maple-beech). Silvicultural treatments can have a significant effect on species composition and structure. It was considered necessary to demonstrate the forest-type outcomes of different treatment scenarios.

Table B-2. Groupings of forest-types in the combined data system (CDS) for yield tables.

Forest-Type	CDS Code
Oak-Hickory	
Post oak-blackjack oak	51
Chestnut oak	52
Black oak-scarlet oak-hickory	53
White oak	54
Northern red oak	55
Yellow poplar-white oak-northern red oak	56
Mixed oaks	59
Chestnut oak-cherrybark oak-pin oak	61
Sweetgum-Nuttall's oak-willow oak	62
Maple-Beech	
Black ash-American elm-red maple	71
Red maple (wet site)	76
Sugar maple-beech-yellow birch	81
Red maple (dry site)	84
Sugar maple	85
Beech	86
Sugar maple- beech- yellow birch-red spruce	87
Pine	
White pine	03
Loblolly pine	31
Shortleaf pine	32
Virginia pine	33
Pitch pine	38
White pine- northern red oak-white ash	41
Shortleaf pine-oak	44
Red pine-oak	49
Other Hardwoods	
Sweetgum-yellow poplar	58
Baldcypress-water tupelo	67
Black ash-American elm-red maple	71
River birch-sycamore	72
Cottonwood	73
Sycamore-pecan-American elm	75
Green ash	77
Black walnut	78
Mixed lowland hardwoods	79
Black cherry- white ash-yellow poplar	83
Black locust	88
Mixed hardwoods	89
Eastern redcedar	35
Eastern redcedar-hardwoods	42
Open	
Lowland brush	97
Upland brush	98
Open	99

Several steps were involved in building the growth and yield tables for the Forest. The first was to stratify stand polygon data from the Forest's Combined Data System (CDS) database using groupings of forest-types (refer to Table B-1). Since detailed stand inventory data was not available from the CDS database, the second step was to assemble inventory data sets that could be used to correlate with the stand level attributes available in CDS.

The Forest Service conducts periodic forest inventories of all states including Illinois. The Forest Inventory and Analysis (FIA) program has the responsibility to collect, maintain and provide required analysis of this data. Forest Inventory Analysis (FIA) plots (managed by North Central Research Station in St. Paul, Minnesota) were used to project stand growth and development. The CDS inventory contains stand summary data and served as the basis for acreage compilation per forest type. Data elements included in CDS were: cover type, size class, age, site index and stand acres.

Since FIA plots are on all ownerships, they are available from both National Forest System lands and other ownerships. However, sufficient samples were available from the plots within the Forest. Additionally, to assist the tracking of forest succession, ecological land types (ELT), as described in the report by the Southern Illinois University Department of Forestry, “Presettlement, Present and Projected Forest Communities of the Shawnee National Forest, Illinois” (planning record) were used. Prior to 2000, FIA plots were regularly measured on a ten-year cycle. The 1985 and 1998 periodic inventories were used as independent samples. After 2000, FIA initiated an annual inventory. Data collected on the Forest from 2001 and 2002 was also used.

Sample-plot data collected by the FIA includes individual tree information, such as tree height, diameter and species. Each plot is assigned a forest-type, age and other characteristics that correlate well with the Forest’s CDS stand polygon data. The FIA forest-type was used to correlate the FIA plots to the National Forest System forest-type classifications. FIA forest-types were used in conjunction with corresponding CDS forest-types to apply the FIA plot-data to the CDS stands. However, before FIA data could be used, a reasonable sample area and number of plots had to be selected for each stratum. Once the plots were selected and stratified, statistical metrics, such as the coefficient of variation and standard error, were used to evaluate the data-set used to represent each of the major forest-types. This analysis was accomplished through the use of the Pre-Suppose computer program.

A. TREATMENT TYPES

Yield estimates were developed for the natural stand growth-Projection and for the different types of proposed harvest treatments. The harvest treatments modeled with the Forest vegetation simulator (FVS) included shelterwood, shelterwood with reserves, group selection and perpetual thinning.

B. METHODS USED TO DEVELOP YIELD TABLES

The Washington Office Forest Management Service Center (FMSC) in Fort Collins, Colorado, supplied the software and expertise used to create the yield tables. Several software programs were employed:

- Pre-Suppose
- Suppose
- FVS Southern Variant
- FVSStand

1. Pre-Suppose

Pre-Suppose is a program developed by the FMSC to query and sort forest inventory and analysis (FIA) data. Pre-Suppose groups FIA plots and converts them into data that can be read by the Suppose program. The FIA data are first reformatted to be compatible with Pre-Suppose. As the data are sorted, the program prepares a “locations” file and a “stand”-list file needed for the next step of analysis (the Suppose program). FIA data that was converted to an FVS-ready format was downloaded, extracted and set up for the Forest using a web-based program developed by the North Central FIA Unit and the FMSC. Pre-Suppose also displays a summary of the plot-groupings with associated forestry attributes (average trees/acre, total basal area, volume, diameter, etc). Standard error percentages are also given for each attribute.

2. Suppose

Suppose is the graphical user interface (GUI) for the FVS. Suppose permits proposed management actions or policies to be entered into the FVS system, using methods more directly related to forest management than directly using the FVS input system (keywords). The program provides tools allowing use of FVS without knowing the FVS keyword language or the details of keyword usage. Suppose also provides an evaluation platform that can be used to gather user feedback for the designers of the system. Suppose simulates changes in forest vegetation over a long time span (100-400 years) for a stand or group of selected stands. Suppose accomplishes the simulation by creating an input file used by the geographic variant (southern variant) and then starting the appropriate FVS program that reads and processes the input file. The program contains the desired geographic variants and extensions to the base FVS system. However, the FVS variant, not Suppose, actually accomplishes the simulation. The output from Suppose is a simulation file interpreted by the FVS variant as a keyword file. This file is read by FVS, along with the tree-level inventory data, for FVS to make the projection.

3. Forest Vegetation Simulator (FVS) Southern Variant Model

The primary tool used for building the time-based yield tables that are used in the Spectrum model is the FVS. FVS is an individual-tree, distance-independent, growth and yield model. It is based on the Stand Prognosis Model. The team at the FMSC has now calibrated 21 variants of the model to geographic areas in most regions of the United States. The southern variant with the fuels and fire extension was used for the SNF growth projections. It requires plot-level data, with individual trees identified by species and diameter at breast height (dbh). Important variables include the site species and site index for the plot, and crown ratio and diameter growth increment for individual trees. Growth-cycles were set at five-year intervals as required by the southern variant.

FVS allows the user to calculate estimates of forest-stand structure and species-composition over time and to quantify this information to 1) describe current and future forest stand conditions, 2) simplify complex concepts of forest vegetation into user-defined indices, attributes, etc. and 3) allow managers to ask better questions about growth and yield of forest stands. The FVS model structure contains modules for growing trees; predicting mortality; establishing regeneration; simulating growth reductions, damage and mortality due to insects and pathogens; performing management activities; calculating tree volumes;

and producing reports. One of the strengths of the FVS system is its ability to incorporate local growth-rate data directly into the simulation results.

Growth-rates for common species on FIA plots were compared to growth-rates generated by FVS. Also, volume information from past timber sales on the Forest was compared to yields generated by FVS. The information obtained from these comparisons was used to calibrate FVS.

4. FVSSTAND

FVSStand takes output from the FVS variant run and groups it as needed for the desired yield-tables. FVSStand allowed grouping of the individual species and size-classes to comprise forest type-groups such as maple-beech, oak-hickory, other hardwoods, and southern pines. Thus, it was possible to identify the species and product combinations of interest in modeling.

The FVSStand option of creating “age-dependent” yield tables was used with 5-year age classes. The 5-year age classes range from X1 to X0 (for example, age 61 to 65, 66 to 70, etc.). Since the plot groupings created in Pre-Suppose and processed with Suppose include plots with a range of age-classes, only those plots that met the age-class range or younger, contributed to the volume-yield table for that age class.

FVS volumes are shown in cubic feet per acre and board feet per acre in the yield tables. The volume equations and merchantability are those used in the Region 9 cruise program (based on Gevorkiantz and Olsen, 1955). Minimum dbh to qualify as saw logs is 11 inches for hardwoods and 9 inches for softwoods. Associated minimum top diameters, inside the bark, are 9.6 and 7.6 inches, respectively. Pulpwood-size material has a minimum dbh of 5 inches for softwoods and 6 inches for hardwoods. Minimum top-diameter (inside the bark) for pulpwood is 4 inches. Cordwood volumes were calculated by dividing the cubic foot volume by 79.3 (cubic feet per cord).

a. Modifying Yields

Several modifiers were available to improve the volume projections from FVSStand. The following were used to improve the growth projections: ReadCorD adjusts the diameter growth of individual trees based on local increment rates. FixMort modifiers changed the degree of mortality for individual tree species. Yields were modified until projections approximated the standing inventory data from empirical yield-tables (existing measurements, not modeled). These modifiers are not perfect and further work could improve the projections. Modifiers were developed until reasonable values were achieved, with an emphasis on the forest type-groups dominating landscapes on the Forest.

Pine volumes developed through the FVS growth projections were found to be somewhat lower than past timber-sale volumes. This is likely due to the limited number of FIA plots that represented the pine-plantation type. Pine volumes were adjusted in the Spectrum model by a factor of 3.5 to adjust the FVS yields.

Throughout the revision process, the planning team worked on the difficult task of modeling ecological landscape-change resulting from land-management activities such as

timber harvesting and prescribed burning. One outcome is the acres of forest in different age-classes and the composition of the different species growing within them, as needed by various plant and animal species. Of major concern is the amount of oak-hickory forest that might convert to maple-beech forest over time.

b. Use of Yield Tables

The yield tables were used in modeling efforts to project the volumes harvested and stumpage values received for both the benchmark runs and each alternative selected for analysis. The Spectrum model determined if a polygon (GIS term for stand or portion of stand which equates to an analysis area) was to be harvested and which harvest type was to be used, based on management area direction and constraints. The existing cover-type and harvest method identifies the choice of yield table. The yield tables were created for a forest-cover type or group of cover types. When management area direction indicated stand conversion to another cover type was necessary, the new cover type would identify the successive yields.

IV. ECONOMIC EFFICIENCY ANALYSIS

Financial efficiency is defined as how well the dollars invested in any alternative produce revenues for the agency. Economic efficiency is defined as how well the dollars invested in any alternative produce benefits to society. The present net value (PNV) is used as an indicator of financial and economic efficiency.

A spreadsheet was used to calculate the PNV for each alternative over a 100-year period. A four-percent real discount rate, prescribed by FSH 1909.17, was used. Ten-year and 100-year cumulative, present values for program benefits and costs, as well as PNVs are the product of this spreadsheet. The financial values for timber were derived from average 2000 stumpage prices; prices for recreation and wildlife from RPA were updated to 2000 dollars and transformed to NVUM unit measurements. All values are in 2000 constant dollars.

C. PRESENT NET VALUE OF THE ALTERNATIVES

Table B-3 displays, in 2000 dollars, the estimated present net values, net costs and cumulative PNV by alternative. The PNV includes market values and non-market estimated values. Market values include those for which the Forest Service receives revenue, such as timber, special uses, etc. Non-market values are the estimated worth of amenities such as recreation, including hunting and fishing, and non-consumptive wildlife, which under any of the alternatives provides the greatest amount of benefits. As can be seen below, the relative ranking of the four alternatives does not change from the first decade (0-10 years) to the last decade (90-100 years).

Alternative 3 has the highest PNV because of its relatively high values for recreation. However, the overall PNV costs are the lowest of the alternatives mainly due to a substantially lowered cost for both recreation and timber/vegetation management. Alternative 3 emphasizes preservation management for mature and old-growth forest across the landscape, non-motorized recreation, additional restrictions on equestrian use and additional habitat for forest-interior wildlife and plants.

Table B-3. PNV by alternative (in thousands of dollars).

Decade	1	2	3	4	5	6	7	8	9	10
Program										
Alternative 1										
Recreation Values	\$55,961	\$105,195	\$143,885	\$174,699	\$199,578	\$220,058	\$237,256	\$251,967	\$264,764	\$276,062
Recreation Costs	-\$26,155	-\$37,279	-\$44,579	-\$49,510	-\$52,842	-\$55,093	-\$56,613	-\$57,640	-\$58,334	-\$58,803
Timber/Vegetation Management Cost	-\$5,559	-\$9,906	-\$13,112	-\$15,362	-\$15,841	-\$15,929	-\$15,994	-\$16,037	-\$16,049	-\$15,957
Cumulative Total PNV	\$24,247	\$58,010	\$86,194	\$109,827	\$130,895	\$149,036	\$164,649	\$178,290	\$190,381	\$201,302
Alternative 2										
Recreation Values	\$57,716	\$108,363	\$148,095	\$179,672	\$205,095	\$225,957	\$243,421	\$258,314	\$271,233	\$282,610
Recreation Cost	-\$49,165	-\$76,428	-\$94,804	-\$107,217	-\$115,603	-\$121,269	-\$125,096	-\$127,682	-\$129,429	-\$130,609
Timber/Vegetation Management Cost	-\$7,021	-\$8,902	-\$10,193	-\$12,159	-\$11,420	-\$11,251	-\$11,078	-\$10,741	-\$10,421	-\$10,159
Cumulative Total PNV	\$1,530	\$23,033	\$43,098	\$60,296	\$78,072	\$93,437	\$107,247	\$119,891	\$131,383	\$141,842
Alternative 3										
Recreation Values	\$57,716	\$108,363	\$147,816	\$178,869	\$203,748	\$224,135	\$241,217	\$255,817	\$268,516	\$279,731
Recreation Cost	-\$21,501	-\$31,475	-\$37,998	-\$42,404	-\$45,381	-\$47,392	-\$48,750	-\$49,668	-\$50,288	-\$50,707
Timber/Vegetation Management Cost	-\$2,466	-\$3,376	-\$3,692	-\$3,904	-\$4,048	-\$4,145	-\$4,211	-\$4,255	-\$4,285	-\$4,306
Cumulative Total PNV	\$33,749	\$73,512	\$106,126	\$132,561	\$154,319	\$172,598	\$188,256	\$201,894	\$213,943	\$224,718
Alternative 4										
Recreation Values	\$59,441	\$111,670	\$152,656	\$185,231	\$211,447	\$232,939	\$250,902	\$266,193	\$279,428	\$291,058
Recreation Cost	-\$53,656	-\$81,742	-\$100,673	-\$113,461	-\$122,101	-\$127,938	-\$131,881	-\$134,544	-\$136,344	-\$137,560
Timber/Vegetation Management Cost	-\$8,237	-\$12,364	-\$15,202	-\$18,442	-\$18,737	-\$19,041	-\$19,368	-\$19,336	-\$19,245	-\$19,096
Cumulative Total PNV	-\$2,452	\$17,564	\$36,781	\$53,328	\$70,609	\$85,960	\$99,653	\$112,313	\$123,839	\$134,402

Alternative 1, the current management direction, has the second-highest PNV, with relatively low costs for both vegetation management and recreation, and a high value for recreation. Alternative 4, with the highest recreation values of any alternative, has the lowest PNV because it has the highest recreation costs of any of the alternatives. It also has the highest timber/vegetation management costs.

By maintaining a forest ecosystem, the SNF provides the public with many valuable, non-market/non-monetary resource benefits that are not fully considered in the PNV analysis. These benefits are not available, or are of limited availability, on other lands, particularly private lands. They include: a forested landscape with high visual quality, clean water resources, and habitat for a wide range of forest plant and animal species. These values also are most beneficial to recreation and wildlife, the resources that provide the most benefit to the Forest Service.

In assessing these non-market, aesthetic resource values, values and costs proposed for management of these benefits (i.e., recreation and wildlife and vegetation management) by alternative, Alternative 2 provides the most overall benefits (maintained recreation values and moderate vegetation-management costs); Alternative 4 is similar but includes much higher vegetation-management costs. Alternatives 1 and 3 are similar, with high recreation values and very low vegetation-management costs. Alternative 3 focuses on custodial management of the mature and old-growth forest across the forest, with little management of wildlife habitat, recreational opportunities and forest health and sustainability.

V. ECONOMIC IMPACT ANALYSIS

A. INTRODUCTION

Economic effects on local counties were estimated using an economic input-output model developed with IMPLAN (Impact Analysis for Planning) Professional 2.0 (IMPLAN). IMPLAN software was originally developed by the Forest Service and is now maintained by the Minnesota IMPLAN Group, Inc. (MIG). The personal computer software uses the latest national input-output tables from the Bureau of Economic Analysis. Counties are used as the building blocks for developing the SNF economic impact analyses.

Economic relationships generated within IMPLAN have been extracted and used in the Forest Economic Analysis Spreadsheet Tool (FEAST) model. The FEAST/IMPLAN information has traditionally been the professionally accepted means of analyzing effects of Forest Plan alternatives. It provides for an area-wide view of the relative difference for employment, income and revenue. This model and spreadsheet analyze only the first decade of the planning horizon.

The IMPLAN model, utilizing FEAST, was used to analyze the economic variation of forest management based on each alternative's proposed management emphases. Information used in IMPLAN is specific to the SNF for the first decade of the planning horizon (2006-2015); later impacts are not estimated. A central characteristic of IMPLAN is that it represents the structure of the area economy. Therefore, it is particularly useful in estimating short-term impacts when major economic shifts are less likely. The US Department of Commerce, Bureau of Economic Analysis (BEA) previously made regional economic projections, but these are no longer available from the BEA or the related

University of Virginia Fisher Library web site. Hence, the discussion of economic impacts will center on the first decade of plan implementation.

Definitions of terms used within the IMPLAN model followed those provided by the BEA and are standards in economic reporting. For example, the “agricultural sector” includes agriculture, forestry and fishing as a classification of economic data provided by the BEA and Census Bureau. The basic assumptions of IMPLAN do not include restructuring the economy, nor predict the specific future of industry related to the opening or closing of businesses. The results from the model presented in this analysis represent jobs and income related only to national forest resources and subsequent changes in the proposed management of those resources.

The estimates are based on changes in final demand for certain sectors of the economy (e.g., agriculture). For Forest Service timber, for example, the sawmill industry provides the first step in the manufacturing process. Impacts include all of those industries initially affected, as well as those linked with supplying inputs to production, and the workers in those industries who spend wages in their households (known as direct, indirect and induced effects, respectively). Thus, impact analysis assumes a new demand is made on the economy and this leads to changes in employment and income.

Publics interested in national forest management often focus on specific recreational activities or resource outputs. IMPLAN analyzes direct, indirect and induced effects by sector based on timber-volume produced and specific, measurable recreational, wildlife, fisheries and mineral-related resources use. However, for recreational activities, economists generally group recreational visitors by the type of economic activity they create. For example, day users have a different pattern of spending than overnight forest visitors. This approach is used to estimate impacts for the SNF.

Analysis of economic impacts requires several interrelated steps. One requires the identification of the area affected by national forest management. This is often called the economic impact area. In another part of the process, the types of activities and outputs that will be analyzed are identified. Finally, using IMPLAN/FEAST, economic impacts of the activities and outputs on the impact area are estimated.

B. ECONOMIC IMPACT AREA

For economic impact analysis, the region should encompass an area with economic interactions between different sectors of the economy. These interactions are reflected in part by economic multipliers that quantify how money spent within the local economy circulates. By including more counties, less money leaves the local economy—that is, the multiplier becomes slightly larger. In the 1986 and 1992 Forest Plans, the economic impact area for the SNF included Alexander, Gallatin, Hardin, Jackson, Johnson, Massac, Pope, Saline and Union Counties, and Perry County, Missouri.

Local expenditures are made by recreational visitors, resource-based industries and the SNF in support of its programs. Further, Forest employees spend money in the local economy. For recreational activities, spending profiles are used and Forest personnel estimated how many recreational visits come from local users versus non-local users. The non-local recreational visitors' expenditures bring “new” money into the region, whereas

local users do not. Combined, the “new” money and the local money contribute to the economic well-being of the region.

Several factors were reviewed in defining the current economic impact area. The previously defined regions (i.e., for the 1986 and 1992 Plans) provide historic reference points for comparison, and national forest supply-based regions (e.g., recreation, minerals, etc.) provide additional insights. Generally, all Forest counties are included in the impact area. In addition, Bureau of Labor Statistics Labor Market Areas and BEA Component Economic Areas provide more details on local functional economies.

Based on the review, the following counties were included in the economic impact area: Alexander, Gallatin, Hardin, Jackson, Johnson, Massac, Pope, Pulaski, Saline, Union and Williamson in Illinois; Ballard, McCracken and Crittenden in Kentucky; and Cape Girardeau and Perry in Missouri. The Illinois counties are consistent with the recently completed SNF social assessment (Welch and Evans, 2002). Though timber production is not envisioned as a major activity in the revised Plan, Ballard County, Kentucky and Perry County, Missouri would likely be important processors of harvested timber and, so, are included in the economic impact area. The other Missouri and Kentucky counties are included because of their proximity to the SNF and the bridges and ferries that facilitate commerce between the states.

Approximately 400,000 people live in the impact area in over 160,000 households with a combined income of \$9 billion. People within these counties are affected by and interested in national forest management decisions that may change the mix of uses, values, products and services that the SNF provides.

Economic benefits contributed to the region by national forest land include market and non-market opportunities, such as timber production, tourism, wilderness use, sightseeing and fishing and hunting. Local government units and others have a strong interest to look at the finest economic scale possible (e.g., the community level). Finer-scale impact areas require resource specialists to disaggregate recreational and timber activities beyond the level of precision required for the analysis of Forest Plan alternatives and, so, were not addressed during Plan revision.

C. ACTIVITIES AND OUTPUTS ANALYZED

Each of the four alternatives yields different economic impacts. The impacts are estimated based on expected recreational visits, timber production, payments to local county governments, expenditures for Forest Service programs and spending by SNF employees.

1. Recreational Visits

From 2000 to 2003, the Forest Service conducted the National Visitor Use Monitoring (NVUM) project aimed at quantifying both total recreational use and visitor characteristics. All national forests, including the SNF, were surveyed (NVUM; Kocis *et al.*, 2002). The general NVUM visitor segments (based upon visitor lodging-type) and some specialized visitor segments applicable to the Forest Plan revision are used in this analysis (Table 1).

Table B-4. Generic and specialized recreation segments for the SNF (based on NVUM).

Visitor Type	Abbreviation	Description
Non-local day-trip visitor	NL-Day	Visitors who live more than 30 straight-line miles (non-local) from the national forest and whose trip does not involve an overnight stay
Non-local NF camper	NL-OVNNF	Non-local visitors staying overnight in national forest campgrounds or backcountry sites
Non-local overnight off-forest visitor	NL-OVN	Non-local visitors staying overnight near the forest (motel, cabin, bed & breakfast, with friends and relatives, owned seasonal homes)
Local day-trip visitor	L-Day	Visitors who live within 30 straight-line miles (local) of the national forest and whose trip does not involve an overnight stay
Local NF camper	L-OVNNF	Local visitors staying overnight in national forest campgrounds or backcountry sites
Local overnight off-forest visitor	L-OVN	Local visitors staying overnight near the forest (motel, cabin, bed & breakfast, with friends and relatives, owned seasonal homes)
Not-primary visitor	Not-primary	Local or non-local visitors to the national forest whose primary trip purpose was something other than “visiting the national forest”
Horse-related day-trip visitor	Day Horse	Visitors whose primary activity was horseback riding and whose trip to the national forest did not include an overnight stay
Horse-related overnight-trip visitor	OVN Horse	Visitors whose primary activity was horseback riding and whose trip to the national forest included an overnight stay
Motorized recreational visitor	ORV	Visitors whose primary activity is off-road vehicle (ORV) use
Biker	Bike	Visitors whose primary activity is biking

Specific activity-levels and visitor segments for each alternative are detailed in the forest planning record. The spending profiles are based on NVUM surveys.

The average party-size (people per vehicle) for the Forest is 2.6 (varying between 1.9 and 3.1 across segments based on NVUM data). Spending varies from \$142 per party, if staying overnight off the forest, to \$20 per party for biking trips. Strictly speaking, only non-local recreational visitors create “new” economic activity because these visitors introduce “new” money into the region; however, in this analysis, local day-use and local overnight-use are included in order to estimate the significance of those activities relative to the overall economy.

Relative to the recent use, local day-use and local overnight-use are expected to decline slightly over the next decade under Alternative 3. Horseback-riding is expected to increase under Alternatives 1 and 4 and to decrease under Alternatives 2 and 3. Off-road vehicle use is expected to increase under Alternatives 1 and 4. Overall, Alternative 3 has the lowest level of recreational activity; Alternative 4 has the highest. Recreational use-estimates are based on NVUM results, Forest staff expertise and discussions with Forest Service recreation researchers and specialists.

2. Timber Production, Land-Use Permit Fees and Mineral-Lease Receipts

In recent years, timber harvesting on the Forest has been confined to firewood production. This continuing level of production over the next decade is proposed under Alternative 3. Timber production of softwood and hardwood sawtimber and pulpwood is projected to increase under Alternatives 1, 2 and 4. Timber production estimates are based on Spectrum model results. Timber enters several sectors of the regional economy: logging contractors and camps, sawmills, and planing and paper mills.

Land-use permit fees will range between \$10,000-\$13,000 per year under any of the alternatives. Relative to recent levels, mineral-lease receipts are expected to increase under Alternatives 1 and 2, decrease under Alternative 4 and become non-existent under Alternative 3. Forest estimates are based on staff expertise. Land-use fees and mineral-lease receipts are payments made to the federal government that do not directly affect the local economy.

3. Expenditures for Forest Service Programs and Personnel

As compared to recent years, Forest Service budget expenditures for programs are estimated to increase between 2 percent and 15 percent. Alternative 3 has the lowest projected increase and Alternative 4 the largest. Alternatives 1 and 2 have slightly lower increases than Alternative 4. Projected Forest Service employment follows a pattern similar to the budget projections.

D. ECONOMIC IMPACTS

The Forest provides direct and indirect multiple economic benefits to Illinois and surrounding states and especially to nearby individuals and communities. Employment and labor income are derived from recreational visitors' expenditures in the regional economy, purchases of timber from area firms, federal payments to the state and counties, and agency expenditures in support of Forest Service programs (Tables 2 and 3). National forest resource specialists have provided budget estimates based on the best available information and professional judgment. The output levels used for this analysis represent the projected ten-year average for the next decade. Output and revenue projections, and resulting employment and income, are based on fully funded/full implementation of each of the alternatives. For comparative purposes, impacts for recent or current levels of activity are presented. Note that labor income is expressed in Year 2004 dollars.

1. Employment by Expenditure Source

The impacts of the alternatives are projected based on Forest Service expenditures and the estimated outputs in two principal program areas of forest management: recreation/tourism and timber. Recreation/tourism includes expenditures by local and non-local visitors who engage in a variety of activities, including those wildlife- and fish-related. Combined, the recreational activities provide the most support for employment (Table B-5). The second major source of employment is from Forest Service expenditures used to implement its programs, and timber production is the third major source.

Table B-5. Average annual employment by expenditure source in Decade 1.

Expenditure Source	Current	Alt. 1	Alt. 2	Alt. 3	Alt. 4
Recreation	257	289	274	269	296
Timber	0	34	59	0	57
Payments to state/counties	4	4	4	4	4
Forest Service expenditures	152	164	174	155	177
Total Forest Service management	412	491	510	428	534
Percent change from current	---	19.1	23.8	3.8	29.5

Payments to the state and counties are a minor component of the overall impacts. These are based on policies that provide local units of government some financial support, depending on the historic level of revenues coming from the SNF to the federal treasury. The Forest provides a constant level of payments based on the “high three payments between fiscal year 1986 and fiscal year 1999.”

Alternative 4 provides the highest number of jobs, a 29.5-percent increase over the current situation (122 additional). The largest source of additional jobs is from timber production. Timber provides job support only for the three Alternatives—1, 2, and 4—under which there is non-firewood timber management. Alternative 2 provides the second largest number of jobs (98 additional) relative to alternative 4. Fewer recreation-based jobs account for the reduction. Alternative 2 supplies a 24-percent increase over the current employment level. The increase, in descending order of magnitude, is from timber, recreation and Forest Service expenditures. Alternative 3 provides a similar number of jobs as the current situation (428 vs. 412). Recreation-based jobs provide the main source for the small increase. Alternative 1, when compared to Alternatives 3 and 4, provides a relatively high level of recreation-based jobs and a lower level of timber-based jobs—resulting in an overall 19-percent increase in jobs.

2. Labor Income by Expenditure Source

Current labor income from forest management is \$10.4 million per year (Table B-6). Relative to employment estimates, there are several shifts in labor income due largely to pay differences. Overall, Forest Service expenditures provide the highest level of labor income, followed by recreational expenditures. Though more jobs are in the recreation-related sectors (e.g., hotels), they pay less on average than jobs associated directly with Forest Service program expenditures.

Table B-6. Average annual labor Income by expenditure source in Decade 1 in millions of dollars.

Expenditure Source	Current	Alt. 1	Alt. 2	Alt. 3	Alt. 4
Recreation	\$4.9	\$5.5	\$5.2	\$5.1	\$5.6
Timber	0	\$1.0	\$1.8	0	\$1.7
Payments to state/counties	\$0.1	\$0.1	\$0.1	\$0.1	\$0.1
Forest Service expenditures	\$5.3	\$6.1	\$6.0	\$5.4	\$6.2
Total Forest management	\$10.4	\$12.7	\$13.2	\$10.6	\$13.7
Percent change from current	---	23.0	27.1	2.6	32.0

Alternatives 2 and 4 provide the highest labor income, \$13.2 and \$13.7 million per year, respectively. Alternative 1 supplies a slightly lower level, \$12.7 million, and Alternative 3 labor income is similar to the current level. Again, timber production leads to the largest incremental increases in labor income for Alternatives 1, 2 and 4.

3. Employment and Labor Income by Major Industry

Distribution of employment and labor income across 11 major industry sectors illustrates how diverse are the effects of forest management on the regional economy (Tables B-7 and B-8). IMPLAN accounts for these important linkages between sectors.

Table B-7. Average annual employment (number of jobs) by major Industry in Decade 1.

Industry	Current	Alt. 1	Alt. 2	Alt. 3	Alt. 4
Agriculture	4	4	5	4	5
Mining	0	0	0	0	0
Construction	8	9	10	10	10
Manufacturing	4	24	38	5	37
Transportation, communication, utilities	9	11	12	9	13
Wholesale trade	11	14	14	11	15
Retail trade	147	170	163	154	175
Finance, insurance, real estate	9	11	11	9	12
Services	127	149	148	132	156
Government (federal, state, local)	92	97	107	93	109
Miscellaneous	2	2	2	2	2
Total Forest management	412	491	510	428	534
Percent change from current	---	19.1	23.8	3.8	29.5

Retail trade and services sectors have the highest level of employment under any of the alternatives. The government sector consistently has the third-highest level of employment. These results are consistent with expenditure sources; that is, recreational visitors spend much of their money in the retail trade and service sectors. Although mineral leasing is allowed under three of the alternatives, actual minerals production is unknown and, so, not analyzed. Hence, no jobs are associated with the minerals sector.

Table B-8 Average annual labor income by major industry in Decade 1 in millions of dollars.

Industry	Current	Alt. 1	Alt. 2	Alt. 3	Alt. 4
Agriculture	\$0.1	\$0.1	\$0.1	\$0.1	\$0.1
Mining	0	0	0	0	0
Construction	\$0.3	\$0.4	\$0.4	\$0.4	\$0.4
Manufacturing	\$0.2	\$0.8	\$1.3	\$0.2	\$1.2
Transportation, communication, utilities	\$0.4	\$0.5	\$0.5	\$0.4	\$0.5
Wholesale trade	\$0.4	\$0.5	\$0.6	\$0.4	\$0.6
Retail trade	\$2.2	\$2.5	\$2.5	\$2.3	\$2.6
Finance, insurance, real estate	\$0.2	\$0.3	\$0.3	\$0.2	\$0.3
Services	\$2.8	\$3.3	\$3.3	\$2.9	\$3.5
Government (federal, state, local)	\$3.8	\$4.3	\$4.3	\$3.7	\$4.4
Miscellaneous	0	0	0	0	0
Total Forest management	\$10.4	\$12.7	\$13.2	\$10.6	\$13.7
Percent change from current	---	23.0	27.1	2.6	32.0

The government sector provides the highest level of labor income under any of the alternatives (Table B-8). It is followed by the service and retail trade sectors. Across all alternatives, these three sectors account for approximately 80 percent of the labor income.

4. Current Role of the Forest in the Area Economy

The Forest currently plays a minor role in the regional economy (Table B-9). In terms of employment and labor income, the SNF accounts for only 0.2 percent of the overall economic activity. However, each of the alternatives proposes an expanded role in terms of employment and labor income, especially under Alternatives 1, 2 and 4.

Table B-9. Current role of Forest Service-related contributions to the area economy.

Industry	Employment (Jobs)		Labor Income (\$ Millions)	
	Area Totals	FS-Related	Area Totals	FS-Related
Agriculture	11,745	4	\$139.0	\$0.1
Mining	2,112	0	\$128.7	0
Construction	16,540	8	\$556.6	\$0.3
Manufacturing	21,731	4	\$910.1	\$0.2
Transportation, communication, utilities	12,121	9	\$506.9	\$0.4
Wholesale trade	8,874	11	\$312.9	\$0.4
Retail trade	43,318	147	\$674.9	\$2.2
Finance, insurance, real estate	12,000	9	\$309.1	\$0.2
Services	63,997	127	\$1,749.1	\$2.8
Government (federal, state, local)	40,211	92	\$1,401.7	\$3.8
Miscellaneous	1,594	2	\$13.2	0
Total	234,243	412	\$6,702.3	\$10.4
Percent of total	100	0.2	100	0.2

The magnitude of the impact area economy reflects the large size of the region in which the economic impacts of SNF programs were examined. A smaller region (e.g., fewer counties) would yield a larger *percentage* of jobs and income, but probably a slightly lower *number* of jobs and income, due to “leakages” to counties outside the impact area. From an impact standpoint, understanding the role in the regional economy is important. However, for decision-making, the impacts of alternatives on the local economy are of more interest.

VI. ANALYSIS PRIOR TO DEVELOPMENT OF ALTERNATIVES

In addition to the emerging issues, the need for change was identified through analysis of the management situation. This analysis considers results of monitoring, other policy and direction under the 1992 Plan, current condition of the resources, and supply-and-demand factors to determine the need for change in management direction and the ability of the planning area to supply goods and services. It provides a basis for formulating a broad range of reasonable alternatives. A summary of the major findings of this analysis is in the revised Plan and in the affected environment sections for the resources analyzed in the FEIS. Documents used for analysis of the management situation are in the planning record. Some primary documents used as the basis for the analysis of the management situation include:

- *The Hoosier-Shawnee Ecological Assessment;*
- *Presettlement, Present and Projected Forest Communities of the Shawnee National Forest;*
- *The Forest Resources of the Shawnee National Forest, 1998;*
- *A Social Assessment of the Shawnee National Forest;*
- *A Watershed Assessment for the Shawnee National Forest;*
- *Roads Analysis for the Shawnee National Forest;*
- *Recreation Facility Master Plan for the Shawnee National Forest;*
- *Shawnee National Forest Recreation Report;*
- *National Visitor Use Monitoring Report;*
- *Estimating the Demand for Timber Products for the Shawnee National Forest Market Area;*
- *Federal Mineral Resources – Trends in Supply and Demand.*
- *Need for Change – Description of Proposal for Revising the Forest Plan.*

Prior to the development of benchmarks, the planning team determined the minimum management requirements to accomplish the specifications of 36 CFR 219.27. The team worked with the operations research analyst to determine how the minimum requirements could best be incorporated into the Spectrum analysis and how to ensure that duplication of minimum requirements did not occur. Some requirements could most effectively be achieved through guidance specified for each Spectrum prescription. Others would be best met through constraints, project planning, spatial arrangements, or the monitoring of Plan implementation. The following discussion elaborates on each method used to meet the minimum management requirements.

A. GUIDANCE AND MINIMUM MANAGEMENT REQUIREMENTS

The team combined management practices and other activities to produce multiple-use integrated prescriptions, for which guidance was developed to assure that minimum management requirements would be met. The costs of management practices within the Spectrum prescriptions reflected the costs and other inputs needed to meet the requirements. The costs of achieving the minimum management requirements reflect the influence of different site-characteristics. When more than one option was possible, the appropriate guidance that was the most cost-effective was selected to meet the minimum requirements. Minimum management requirements were developed to comply with the requirements of the 1982 planning regulations.

The Plan Forest-wide guidance contains many and various resource protection requirements. These resource-protection measures may also be considered mitigation measures. Because they apply generally to the Forest, they are not site-specific. The Plan management area guidance contains additional resource protection measures. These also are not site-specific because many of the management areas are thousands of acres in size.

B. CONSTRAINTS

Although most of the minimum requirements are assured through guidance provided in the Plan, some requirements could most effectively be achieved by using constraints in Spectrum. In particular, Spectrum constraints were effective in meeting minimum management requirements that dictated specific activity timing or allocation needs.

C. SOLUTIONS FROM SPECTRUM

The allocation and schedule developed with the Spectrum model ensures that certain minimum requirements are met. Section 219.27(c)(1) regulations require that “no timber harvesting shall occur on lands classified as not suited for timber production pursuant to 219.14 except for salvage sales, sales necessary to protect other multiple-use values or activities that meet other objectives on such lands if the forest plan establishes that such actions are appropriate.” In part, lands are determined not to be suitable if they are not cost-efficient in meeting Forest objectives over the planning horizon. The lands that are not cost-efficient are determined based on the prescriptions chosen by Spectrum, given the goals and objectives of the benchmarks.

D. PROJECT PLANNING

In some cases, compliance with minimum management requirements is dependent on site-specific situations and information. Although some general guidance has been developed to ensure these requirements are met, minimum requirements will be addressed in more detail through project plans and the application of site-specific guidance. For example, Section 219.27(a)(3) of the regulations requires protection by “utilizing principles of integrated pest management.” This requirement is generally addressed through guidance; but since the precise application of integrated pest management principles is dependent on uncertain and site-specific factors, the minimum management requirements will be addressed in more detail through project plans.

E. SPATIAL ARRANGEMENT OF PRESCRIPTIONS

Minimum management requirements are also achieved through the spatial arrangements of prescriptions and the allocation of specific management prescriptions to management areas.

F. MONITORING

The ultimate determination of whether the minimum management requirements are achieved depends on systematic and frequent monitoring of the Forest Plan. Some requirements can only be met through monitoring. It is not possible to set guidance or constraints or use other methods to assure their achievement. For example, Section 219.27(c)(5) regulations state that harvest levels based on intensified management practices shall be decreased no later than the end of each planning period, if such practices cannot be completed substantially as planned. It is obvious that this requirement could not be met without careful monitoring of planned and actual intensified management accomplishments.

We will also use monitoring to ensure compliance with the guidance section of the Plan. We list monitoring in Chapter IV of the revised Forest Plan when it is the primary method of achievement. Table B-10 displays a summary of the principal work required in each management requirement specified in 36 CFR 219.27 and notes how the analysis process ensures compliance.

Table B-10. Plan analysis compliance with regulations.

Requirement 36 CFR 219.27	Standards & Guides	Other Considerations
(a) Resource protection		
(1) Conserve soil & water.	2500	Spectrum constraints restricting harvest by land-class and management areas. Project plan coordination.
(2) Minimize hazards of nature.	2100, 2500, 5100	Project plan coordination.
(3) Mitigate pest organism hazards.	2100, 3400	Project plan coordination.
(4) Protect bodies of water.	2100, 2500	Project plan coordination.
(5) Maintain diversity.	2100, 2400, 2600	Project plan coordination. Spatial assignment of management areas and practices.
(6) Maintain viable populations.	2600	Project plan coordination.
(7) Assess prescriptions for potential impacts.	All	Project plan coordination.
(8) Protect T & E habitat.	2600	Project plan coordination.

Requirement 36 CFR 219.27	Standards & Guides	Other Considerations
(9) Designate right-of-way corridors.	2700, 7700	Project plan coordination. Spatial assignment.
(10) Design roads for planned uses.	7700	Project plan coordination. Spatial assignment.
(11) Re-establish vegetation on temporary roads.	2500, 7700	Project plan coordination.
(12) Maintain air quality.	2100	Project plan coordination.
(b) Vegetation manipulation		
(1) Use prescriptions best-suited to multiple use.	All	Prescription development. Spectrum constraints.
(2) Assure adequate restocking.	2400	
(3) Choose prescriptions not primarily due to dollar return or greatest timber output.		Spectrum model includes vegetation management without financial returns or timber outputs.
(4) Consider effects of residual trees and adjacent stands.	2400	Project plan coordination.
(5) Protect site productivity.	2500, 3400	
(6) Provide desired effects.	2200, 2300, 2400, 2500, 2600	Structure of Spectrum model and objectives of alternatives.
(7) Be practical.	2400, 2700	Spectrum cost and yield data. Project plan coordination.
(c) Silvicultural Practices.		
(1) Limit timber harvesting on non-suitable lands.	2400, 2500, 2600	Management area standards and guidelines.
(2) Selected sale schedule		Spectrum yield-table development timber-demand projections
(3) Assure adequate restocking within 5 years.	2400	Project stocking surveys.
(4) Inclusion of cultural treatments	2400, 2600	Design of alternatives. Selection of management intensities.
(5) Decrease harvest levels if intensified practices cannot be completed.		Monitoring.
(6) Even-age harvest cut designed to protect other resource values	2300, 2400, 2500	Project plan coordination.
(7) Prevent pest organism damage	2100, 2300, 3400	Monitoring.
(d) Even-aged Management.		
(1) Locate openings to achieve desired multiple-use objectives	2200, 2300, 2400, 2500, 2600	Project plan coordination. Spatial assignment or practices.
(2) Limit size of clearcut openings.	2400	
(e) Riparian Areas	2500	Project plan coordination.
(f) Soil and Water	2500	
(g) Diversity	1900, 2600	Spatial assignment of management areas. Project plan coordination.

G. BENCHMARK ANALYSIS

A benchmark analysis provides baseline data to support formulation of alternatives and aids in defining the range within which alternatives can be constructed. Benchmarks estimate the Forest's physical, biological and technical capabilities to produce goods and services.

The planning regulations specify that, at a minimum, the analysis of the management situation shall include benchmark analyses that define: 1) the range within which alternatives can be constructed, 2) the minimum level of management needed to maintain

and protect the unit as part of the National Forest System, together with associated costs and benefits, 3) the maximum physical and biological production potentials of individual significant goods and services together with associated benefits and costs, and 4) monetary benchmarks that estimate the maximum present net value of those resources having established market value or an assigned value.

The PNV of all benchmarks are listed in Table B-3, along with the timber production associated with each. All PNV calculations share a common annual discount rate of 4 percent per year.

1. Benchmark 1—Minimum-Level

The regulations require identification of a minimum-level benchmark (minimum maintenance and protection of the Forest). This benchmark displays the results in vegetation change as a result of minimum-level management. Incidental outputs are permissible, but there can be no management related to timber or recreation outputs. Forest vegetation may be influenced by wind-throw or other natural events and will evolve through natural succession. The minimum-level benchmark represents the least amount of management needed to maintain and protect the Forest as part of the National Forest System (NFS).

a. Objectives

1. Protect the life, health and safety of forest users.
2. Conserve soil and water resources.
3. Prevent significant or permanent impairment of the land productivity.
4. Administer legally required special uses and mineral leases, permits, contracts and operating plans.
5. Prevent environmental damage to the land and resources of adjoining and (or) downstream lands under NFS or other ownership.
6. Perform facility maintenance only to support activities and use that cannot be reasonably discouraged (all other facilities are allowed to deteriorate).
7. Permit dispersed recreational use when and where control activities are not needed.
8. Protect critical habitat for threatened and endangered species.

b. Results

Timber harvesting and other vegetation management practices are not performed on the Forest, with a resulting loss of approximately 93,000 acres of the oak-hickory forest type, while the maple-beech forest type increases by over 130,000 acres. No openland habitat is maintained.

2. Benchmark 2—Maximum Timber

This benchmark provides a maximum timber-production capability reference. The maximum timber benchmark utilizes the maximum potential area of the Forest that can be classified as suitable for timber production. Forest land not considered suitable for timber production in this benchmark analysis includes non-forested land, land that is defined as

physically unsuitable for timber management (according to the regulations) and land removed through statute or administrative action (such as designated wilderness).

a. Objectives

In addition to the objectives for the minimum-management benchmark, this benchmark represents the highest possible timber-harvest volume consistent with the principles of non-declining flow and harvests that do not exceed the long-term sustained yield.

b. Results

The maximum timber benchmark provides the highest harvest volumes, with a total of 45,975 thousand cubic feet (Mcf) per decade of non-declining even flow. There is a long-term sustained yield of 66,071 Mcf in the 15th decade, or almost 40 million board feet (MMbf) per year. This is accomplished using even-aged management and the shelterwood harvest method. The PNV related to vegetation management under this benchmark is \$13.6 million for the first decade, \$28.8 million for the second, and 46.7 million for the fifteenth.

3. Benchmark 3—Maximum Oak-Hickory

This benchmark provides a reference for the maintenance of the oak-hickory forest type. Its purpose is to determine the maximum possible amount of oak-hickory forest that can be maintained on the Forest over the long term.

a. Objectives

In addition to the objectives for the minimum-management benchmark, this benchmark represents the highest amount of acreage being maintained in the oak-hickory forest type.

b. Results

The maximum oak-hickory benchmark provides the largest acreage of oak-hickory forest-type maintained in the long term. At 15 decades, over 233,000 acres would be maintained in the oak-hickory forest-type. The maple-beech type increases over 32,000 acres at 15 decades. This can be compared to the minimum-level management benchmark, which maintains about 119,000 acres of the oak-hickory forest-type and 131,000 acres of the maple-beech forest-type in the 15th decade.

4. Benchmark 4—Maximum PNV

This benchmark produces the most valuable mix of timber products on the Forest, as defined within a PNV calculation. Its purpose is to determine the level of production that is most efficient based on monetary values for vegetation management.

a. Objectives

This benchmark represents the highest value mix of vegetation treatments on the Forest consistent with the timber-harvest principles of non-declining flow and harvests that do not exceed the long-term sustained yield.

b. Results

This benchmark provides the highest PNV of the benchmarks. The overall economic PNV of this benchmark is \$21.5 million and the PNV of the maximum timber benchmark is \$13.6 million.

The results can appear contrary to what one might expect when looking at the costs and revenues generated in this benchmark compared to the maximum timber benchmark. Using constant dollars, on a purely cumulative basis, the sum of the costs and revenues is less than the sum of the costs and revenues in the maximum timber benchmark. The PNV calculation discounts future values estimated in constant dollars at the rate of four percent per year to convert them into present values. This process, in effect, causes values derived in the near term to have more worth compared to values derived at much later periods in time. The nearer-term values present in the stream of annual values used in the maximum PNV benchmark are greater than the values from the same period in the maximum timber benchmark, causing the PNV calculation to be greater in the maximum PNV benchmark than the maximum timber volume benchmark.

VII. FORMULATION OF ALTERNATIVES

A. INTRODUCTION

Alternatives are mixes of management prescriptions applied in specific amounts and locations to achieve desired conditions, goals and objectives. The planning regulations state the requirements for formulation of alternatives. The interdisciplinary planning team is required to employ NEPA procedures to formulate a broad range of reasonable alternatives and provide a basis for identifying the alternative that comes nearest to maximizing net public benefits.

The planning regulations further specify that the alternatives must: 1) Reflect a full range of major commodity and environmental-resource uses and values that can be produced on the Forest (alternatives distributed between the minimum and maximum resource potentials), 2) Facilitate an analysis of opportunity costs, resource uses and environmental tradeoffs among alternatives, 3) Facilitate the evaluation of PNV and the benefits and costs of achieving various monetary and non-monetary outputs and values, 4) Provide a variety of ways to address and respond to major public issues, management concerns and resource opportunities, 5) State the conditions and uses that will result from implementing alternatives, and 6) State the resource management standards and guidelines that will be used and the purpose of the management direction. Additionally, at least one alternative must reflect the Forest's current level of goods and services and the most likely level of future goods and services if current management direction were to continue. Each alternative must represent, to the extent practicable, the most cost-efficient combination of management prescriptions that satisfy the objectives of the alternative.

The notice of intent (NOI) to revise the Forest Plan, the analysis of the management situation documents, decision criteria, and public meetings all helped identify, define and develop the range of Plan revision alternatives. The NOI explained the need to change the Forest Plan. It displayed the nature and scope of the decisions to be made and provided a description of the issues and the changes that may result from Plan revision. It also

explained how the Forest would interact with individuals, organizations, tribes and government agencies and explained how the Forest would design a process for developing draft alternatives. Seven major revision topics were identified in the NOI.

The analysis of the management situation determined the ability of the Forest to respond to forest-planning problems, which are sub-categories of the seven primary issues to be addressed in the revision as per the NOI. Regulations require the Forest Service to establish planning criteria to guide the planning process. These criteria apply to the collection and use of inventory data and information, analysis of the management situation and the design, formulation and evaluation of alternatives. Planning criteria guide the overall planning process. They continue to evolve through the Plan revision process, aiding in alternatives design and providing the basis for evaluation of the net public benefits of the different alternatives.

Four alternatives were developed and analyzed in the FEIS. Alternative 1 is the no-action alternative and represents the 1992 Forest Plan. All others represent a set of changes addressing the NOI issues. The comparison of alternatives in Chapter 2 provides an excellent overview of how these alternatives vary from one another.

B. POTENTIAL RESPONSE TO NEED-FOR-CHANGE REVISION TOPICS

Benchmarks define upper and lower limits for the production of resources. These limits set the decision space for addressing issues, concerns and opportunities. The following relationships and response potential were determined through benchmark analysis and alternate ways to address the issues.

1. Watershed Resources

No benchmarks were run to determine the impact on resource production due to the guidelines being considered for riparian area and filter-strip management, water-supply watersheds and the Mississippi and Ohio Rivers floodplains. The primary issue relates to the impacts of management activities on riparian resources and not on the amount of timber production. All guidelines under consideration allow road and trail construction through filter strips. Riparian filter strip and floodplains and the water-supply watersheds and Mississippi and Ohio Rivers floodplains management areas are not part of the suitable timber base, but vegetation management, including timber harvesting is allowed for other resource management objectives. The conclusions of this analysis are that guidelines for riparian areas and filter strips, water-supply watersheds and the Mississippi and Ohio Rivers floodplains will not affect access to other areas of the forest and that timber production within these areas is generally not an over-riding issue.

2. Biological Diversity and Wildlife and Aquatic Habitat

No benchmarks were run specifically to determine tradeoffs between providing biological diversity and wildlife habitat, as opposed to providing other resources. A comparison of the population indices for the four alternatives is sufficient to realize these tradeoffs. Generally, there are wildlife species dependent on, or favoring, openland habitat and there are others

that prefer forest-interior conditions. Forest-interior habitat is not provided unless there are large tracts of land, greater than 500 acres, with a relatively unbroken forest canopy. Alternatives that maximize forest-interior habitat will adversely affect wildlife species that are dependant on openland. Conversely, maximizing openland or edge habitat will adversely affect forest-interior species.

Since the oak-hickory forest provides habitat for many species and enhances biological diversity, benchmarks were run to evaluate the maximum and minimum amounts of the oak-hickory type. There is a trade-off in the amount of oak-hickory forest that can be maintained over the long term if minimum levels of management are endorsed over active vegetation management. Demands for wildlife recreation related to waterfowl hunting and viewing can be enhanced by expanding the Oakwood Bottoms Greentree Reservoir. Management for the retention and enhancement of habitat for federally-listed and sensitive species is not seen as a tradeoff, but as a minimum management requirement.

3. Recreation Management

Benchmarks were not run related to recreation capacity. The demand for equestrian recreation on the forest is evidenced by the increase in user-developed trails, private equestrian campgrounds and resource damage related to equestrian use. Equestrian use presently taking place on user-developed trails can be accommodated on Forest system trails. The ability to satisfy the demand for either non-motorized or motorized recreation can be created, but not both in the same place.

This is a trade-off, since the potential supply of either motorized or non-motorized recreation is limited to what can be provided within wilderness, or the Camp Hutchins and Ripple Hollow areas. Supply potential is limited to these areas because there are too many existing county and state roads outside them. Since motorized use could not be restricted by the Forest Service on county and state roads, we could not manage for non-motorized use in other areas. There is demand for ATV/OHM recreation on the Forest as evidenced by the unauthorized use that is occurring. ATV/OHM use could be accommodated on existing system roads or on constructed ATV/OHM trails.

As with motorized versus non-motorized recreation, there is a trade-off between providing wilderness recreation and providing motorized recreation. The supply potential for wilderness recreation is limited to existing wilderness, as other areas on the Forest do not meet the roadless-area criteria.

4. Forest Ecosystem Health and Sustainability

The major issues dealing with forest ecosystem health and sustainability are related to the sustainability of the oak-hickory forest-type. Benchmarks were run to evaluate the maximum and minimum amounts of oak-hickory type over the long term. There is a trade-off in the amount of oak-hickory forest that can be maintained over the long term if minimum levels of management are endorsed over active vegetation management.

The maximum timber production benchmark shows that timber demands could easily be met if all lands not withdrawn from timber production were available for timber management. However, timber demands will not likely be met during the first decade and

may not be met during the next 50 years with timber harvested only from lands delineated as suitable for timber management. Demand may be met if timber is also harvested for reasons other than timber production, on lands that are not part of the suitable timber base. A sustained and predictable yield of timber can be achieved.

The ecological restoration of non-native pine plantations to native hardwoods will result in the depletion of the pine-timber supply within 40 years. Pine-timber production can meet expected demands in the first decade due to the limited pine market in the area. If a reliable supply of pine timber can be established, markets can develop to utilize the resource. It is assumed that it would take ten years to develop new markets for pine.

5. Mineral Resources

Management for wilderness, natural areas and other special features will impose restriction on mineral exploration and development.

6. Wilderness, Roadless Areas, Wild and Scenic Rivers

Wilderness management is compatible with all other benefits, except for the provision of timber, motorized recreation, mineral production, wildlife management for early-successional species, and natural areas management that requires mechanized use or extensive vegetative manipulation. No areas on the Forest were found to meet roadless-area criteria. However, the areas covered by the roadless area conservation rule and candidates for wild and scenic river study would not be suitable for timber management.

7. Land-Ownership Adjustment

There are no trade-offs related to this topic.

C. ALTERNATIVES

The seven need-for-change topics and associated issues, concerns and opportunities were the basis for formulating alternatives. Each alternative is a combination of purpose, goals and objectives designed to respond to the needs for change in a compatible manner. The four alternatives that were analyzed in detail are summarized below:

1. Alternative 1—No Action—Implement 1992 Forest Plan

Selection of Alternative 1 would continue management under the 1992 Plan. There would be minor changes, such as stipulating in the Plan the protection of listed threatened, endangered and sensitive species while removing the outdated species lists; updating the standards and guidelines for protection of threatened, endangered and sensitive species; and adopting a more focused list of MIS. The Plan would also be revised to eliminate the 5.2, special management, areas, both of which have been included in their adjacent wildernesses during the life of the 1992 Plan. The overall focus remains unchanged. This alternative provides a mix of products and uses, avoids sensitive areas and continues use at about the same levels as provided in the past.

Alternative 1 emphasizes a variety of motorized and non-motorized recreational opportunities, including ATV/OHM use on the up-to-286-mile travelway system. In addition, it includes provisions for use of ATVs during the firearms deer-hunting season. Most hardwood timber would be harvested through uneven-aged management. Areas managed for timber production would usually be harvested in small groups ranging from 2,000 to 26,000 square feet. The land-base classified as suitable for timber production is approximately 115,800 acres of upland hardwood-forest, and the amount of timber scheduled for harvest is 3,067 thousand cubic feet for the first decade. There is no scheduled timber harvest in the forest-interior management units, Cave Valley, Camp Hutchins, Burke Branch or Ripple Hollow. In addition, there would be no scheduled timber harvest in areas near lakes, streams, recreational areas, or other places identified as especially sensitive and popular for Forest users.

Under this alternative, pine and pin oak would not be part of the suitable timber base and would not be scheduled as part of the regular timber-sale program. However, pine timber could be available for harvest as a by-product of the restoration of pine-stands to natural ecosystems. Some pin-oak timber could also be available as a by-product of wildlife habitat work at the Oakwood Bottoms Greentree Reservoir. Ripple Hollow is recommended for wilderness study. Provisions for mineral development and oil and gas leasing are allowed, with special provisions in certain management areas.

2. Alternative 2—Selected Alternative

The purpose of Alternative 2 is to make identified changes in the 1992 Forest Plan. This alternative is based, for the most part, on the need-for-change document that resulted in the NOI to revise the 1992 Plan, scoping comments received regarding the NOI and public meetings convened to assist the planning team in the development of Plan-revision alternatives.

Alternative 2 offers additional emphasis and revised guidance on watershed protection, biological diversity, management of recreation resources, forest health and sustainability, minerals management, wilderness, roadless areas and candidate wild and scenic rivers, and land-ownership adjustment. Under Alternative 2, management for watershed resources is emphasized through the identification of water-supply watersheds—Kinkaid Lake, Cedar Lake and Lake of Egypt—and specifications for their management, management direction for the Mississippi and Ohio Rivers floodplains, and revised riparian filter-strip guidelines.

Biological diversity and wildlife and aquatic habitat would be enhanced through new standards and guidelines for the management of forest-interior habitat. Species that require large-openland habitat would benefit from the creation of a large-openland management prescription, while the number of the small wildlife openings would be reduced to a more manageable quantity than is specified in Alternative 1. Standards and guidelines for the management and protection of federally listed threatened and endangered, Regional Forester sensitive species, and species of concern would be revised under any alternative. Natural areas would be protected.

Proposed changes in standards and guidelines pertaining to pesticide-use would support the control of invasive species, further protecting and enhancing biological diversity. The opportunity for wetland and bottomland hardwood management at Oakwood Bottoms

Greentree Reservoir would be expanded through adjustment of the management-area boundary to include recently acquired adjacent land. As under all alternatives, the MIS list would be focused on five species of birds that represent openland and forest habitats; species of recreational interest would no longer be listed. The collection of plants would continue to be regulated through Forest Supervisor order or existing regulations.

Alternative 2 would restrict horseback-riding to designated system trails and allow the seasonal closure of equestrian trails not constructed for all-season use. It would emphasize the development of a mapped, marked and well-maintained trail system, and would direct the closure and rehabilitation of user-developed trails not designated into the trail system. The trail-corridor map from the 1992 Plan would be withdrawn, and trail-density standards and guidelines would be eliminated from all management areas. ATV and unlicensed OHM-use is prohibited forest-wide except for administrative use, or access by emergency vehicles or by permit or contract. Bicycles would be allowed on open roads and on system trails designated for bicycle use. Additional developed recreational sites would be allowed.

Forest ecosystem health and sustainability would be a goal, rather than the production of timber products. Maintenance of the oak-hickory forest-type within its natural range of variability is considered important for biological diversity and wildlife habitat. As a means of maintaining the oak-hickory forest-type, shelterwood harvest under even-aged management would be the probable silvicultural method. A variety of techniques for site-preparation, reforestation and timber-stand improvement would be allowed. Increased prescribed burning on a variety of scales would be an important tool for maintaining the oak-hickory forest-type and other vegetative communities. The ecological restoration of non-native pine stands to native hardwoods would be prioritized on historical oak-hickory sites.

The management prescription for Iron Mountain would be changed from heritage resource significant site (formerly management area 8.3) to mature hardwood forest (formerly management area 6.6) to facilitate additional vegetation management while continuing to protect heritage resources under forest-wide standards and guidelines. Since there are no suitable range allotments that do not conflict with wildlife-habitat objectives, the range-management objective is eliminated except for research purposes. All management areas except wilderness are identified as suitable for oil and gas leasing, but no surface-occupancy is allowed in certain areas. There are no other changes in minerals-management direction.

Alternative 2 addresses the management of wilderness and areas that were considered for wilderness-study recommendation but failed to meet the basic requirements. Of these areas, Camp Hutchins and Ripple Hollow (the former 9.3 wilderness study area) would be managed under the non-motorized recreation management prescription, and Burke Branch would continue to be managed under the mature hardwood forest management prescription. The standards and guidelines for wilderness management would be revised to eliminate trail densities and to allow non-native materials for trail-signing and maintenance. Group-size limits would be allowed in wilderness.

This alternative identifies the potential classification of the six streams eligible for study as part of the national wild and scenic river system, and revises the candidate wild and scenic river management prescription to reflect the results of the potential classification. It makes changes in land-ownership adjustment. The priority list for adjustment would be revised

and the consolidation map removed. A statutory adjustment of the proclamation boundary would be recommended in order to include areas within the Mississippi River floodplain. The standards and guidelines regarding acquisition of property rights would be changed to emphasize the acquisition of all available rights, while scenic and conservation easements would be acceptable when management objectives are met.

3. Alternative 3

The purpose of Alternative 3 is to emphasize preservation-management for mature and old-growth forest across the landscape, non-motorized recreation, additional restrictions on equestrian-use and additional habitat for forest-interior wildlife and plants. To avoid the environmental effects of timber sales and to address the below-cost timber sale issue, no land is classified as suitable for timber production. Watershed-resource proposals are the same as those under Alternative 2.

Under Alternative 3, there would be no large-openlands or wildlife-openings management and no pesticide use. There would be no cutting of trees for any reason except for human health and safety, personal-use firewood, natural area management outside of wilderness, or administrative needs (i.e., road maintenance, special use permits, etc). There would be no new road construction and no ATV or OHM access or travelways. Equestrian use of natural areas would be prohibited. Trail-density standards would be eliminated from all management areas except wilderness and densities would be calculated for each area.

Prescribed burning would be used infrequently and on small projects to maintain rare ecosystems and threatened, endangered and sensitive species. Federal minerals would be unavailable for leasing. Invasive species would be controlled only through manual, mechanical or limited biological methods, such as grazing. The lists of threatened, endangered and sensitive species and other species of concern would be revised or removed, as under all alternatives. The activities enjoined by the court ruling on the 1992 Plan are not implemented under this alternative.

4. Alternative 4

The purpose of Alternative 4 is to respond to issues related to providing more recreational opportunities than are offered under the other alternatives. It emphasizes motorized and non-motorized recreation, habitat for both game and non-game wildlife, and forest management to maintain the oak-hickory forest-type. Watershed resource proposals are the same as those proposed under Alternatives 2 and 3. Under Alternative 4, wildlife openings and openlands would be managed as under the 1992 Plan. Shelterwood harvest with reserves and prescribed burning would be used to favor large, mast-producing trees with open understories and to help maintain the oak-hickory forest type.

Trail management under Alternative 4 is similar to the 1992 Plan; however, it emphasizes a well-marked, mapped and maintained trail system and would remove the trail-corridor map. Additional trails would be allowed in natural areas, and equestrian and bicycle-use would be allowed on designated trails in natural areas. It would retain the 286-mile potential ATV trail corridor from the 1992 Plan and allow additional ATV/OHM opportunities, with use on up to 50 percent of the maintenance-level 1 and 2 roads, and

licensed vehicles on open roads. Trail-density standards are removed from all management areas.

As under Alternative 2, no new wilderness recommendations are made. The management prescription for Ripple Hollow and Camp Hutchins would be changed to mature hardwood forest (MH). Candidate wild and scenic rivers are managed as provided under Alternative 2. Minerals management would be the same as under Alternative 2 except that no surface-occupancy is stipulated Forest-wide.

D. CONSTRAINTS USED UNDER EACH ALTERNATIVE

1. The objective function is to maximize PNV.
2. All minimum standards of laws and regulations are met.
3. A non-declining yield is required, ensuring that total timber harvest in each decade will be greater than or equal to the harvest in the preceding decade.
4. The long-term sustained yield ensures that the timber harvest in the last period of the planning horizon is less than or equal to the sustained-yield level.
5. The ending inventory constraint ensures that total timber inventory volume at the end of the planning horizon equals or exceeds the volume that would occur in a regulated forest.
6. Rotations used for even-aged management prescriptions are at or above culmination of the mean annual increment. This ensures that timber stands have reached their greatest growth prior to final timber harvest.
7. Dispersion of created openings limits the maximum area that can be treated in a single entry into an individual stand and can ultimately limit overall levels of vegetation treatment across an entire Forest.

VIII. EFFECTS OF BENCHMARKS, CONSTRAINTS AND ALTERNATIVES

A. EFFECTS OF BENCHMARKS

The effects of benchmarks are presented in section VI of this appendix.

B. DISCRETIONARY CONSTRAINTS

1. Market Demand for Pine Volume

Based on the projected demand in the marketplace for pine volume and local milling capacity, an upper limit of 4.1 mmbf per year for decade 1 is imposed on pine harvest. After the first decade, it is assumed that additional markets would develop to utilize additional pine volume.

2. Controls on Management Actions

For a variety of reasons, specific types of management actions are sometimes limited, or required to occur at specified levels, under certain alternatives. For example, group selection in hardwood types is allowed only under Alternative 1. Additionally, management-action

options for openlands vary by alternative. As a consequence, constraints on management actions are used to help model the intent of a given alternative.

3. Sensitivity Analysis

A sensitivity analysis was not run on the selected alternative. It is reasonable to assume that if budgets do not provide for full Plan implementation, cuts would be made in facility construction and other activities. The exact areas of decrease would depend on the congressional allocation of funds.

4. Suitability Analysis

The timber suitability analysis is displayed in Plan Appendix Table C-1.

APPENDIX C

ROADLESS INVENTORY

I. INTRODUCTION

One of the elements of Plan revision is the roadless area inventory—identification of places on the Forest that meet roadless area characteristics—as required by 36 CFR 219.17(a)(b): “Unless otherwise provided by law, roadless areas within the National Forest System shall be evaluated and considered for recommendation as potential wilderness areas during the forest planning process...When revising the forest plans, roadless areas of public land within and adjacent to the forest shall be evaluated and considered for recommendation as potential wilderness areas...” Areas that are found to meet roadless characteristics are evaluated for potential recommendation as wilderness study areas.

In accordance with regulation and agency guidance, the Forest conducted a roadless area inventory during the planning process. The background for this inventory, and the conclusions, are presented here. All documents related to the roadless inventory conducted during the Plan revision process are available in the planning record.

II. BACKGROUND

A. NATIONAL ROADLESS AREA INVENTORIES

Inventoried roadless areas are undeveloped areas, typically larger than 5,000 acres, identified across the country over the past three decades during the Forest Service’s roadless area review and evaluation (RARE) process, subsequent large-scale assessments, or forest planning (USDA, 2000). The areas that were identified are displayed in the inventoried roadless areas maps in the November, 2000 FEIS on Forest Service Roadless Area Conservation (USDA, 2001).

The Forest Service initiated the RARE process in 1972 to identify areas suitable for inclusion in the national wilderness preservation system. A later, and final, review process in the late 1970’s (RARE II) resulted in a national inventory of roadless areas. Since that time, congress has designated some of the areas as wilderness. On the Forest, nine areas were included in the RARE II inventory: Bald Knob, Burden Falls (now known as Bay Creek), Burke Branch, Clear Springs, Garden of the Gods, Lusk Creek, Murray Bluff (now know as Burden Falls), Panther Den and Ripple Hollow.

The Forest Service published a final rule on inventoried roadless areas on May 13, 2005 that states that management requirements for inventoried roadless areas are to be guided by individual land management plans until and unless these management requirements are changed through a state-specific rulemaking. On July 1, 2005, 36CFR 294 was updated to allow individual states to submit a petition to the Secretary of Agriculture regarding management of and recommendations for inventoried roadless areas within their states.

B. 1986 FOREST PLAN

Based on the RARE II, the 1986 Plan identified seven areas for wilderness study: Bald Knob, Burden Falls (now Bay Creek), Clear Springs, Garden of the Gods, Lusk Creek, Murray Bluff (now Burden Falls) and Panther Den. The Plan prescribed non-wilderness management for the Burke Branch and Ripple Hollow areas.

C. ILLINOIS WILDERNESS ACT OF 1990

The Illinois Wilderness Act of 1990 directed wilderness management for the Bald Knob, Bay Creek (formerly Burden Falls), Burden Falls (formerly Murray Bluff), Clear Springs, Garden of the Gods, Lusk Creek and Panther Den areas. It also directed that a portion of the Garden of the Gods wilderness study area, known as Eagle Creek, and a portion of the Lusk Creek wilderness study area, known as East Fork, be managed under a special prescription that allowed prospecting and development of the mineral fluorite for a period of eight years.

D. 1992 AMENDED FOREST PLAN

The 1992 Plan included the seven wilderness and two special-management areas designated by the Illinois Wilderness Act. The two special-management areas were included in their respective wilderness areas in 1998 and are not part of this analysis.

The 1992 Plan identified the Ripple Hollow area for wilderness study on the condition that private mineral rights be acquired beneath approximately 1,000 acres of national forest surface. The Camp Hutchins area was identified as a special area for study; and the Burke Branch area was identified and managed as a dispersed recreation area. These three areas were considered to have the greatest potential for eventually meeting roadless criteria in order to be considered for wilderness recommendation.

III. FOREST PLAN REVISION PROCESS

A. FOREST ROADLESS INVENTORY

Included in one of the major need-for-change issues identified in the planning process is a review of inventoried roadless area criteria to determine if any areas on the Forest qualify for wilderness evaluation. The interdisciplinary planning team conducted a roadless area inventory in 2003 in compliance with regulations and under the guidance of Regional Forester Robert Jacobs, who issued direction (August 13, 1997) regarding roadless area review in Region 9 during the revision of forest plans:

Each forest undergoing Plan Revision is required to re-inventory all National Forest System lands and identify areas for possible inclusion into roadless area inventory...The inventory process includes a look at RARE II areas to see if they still meet roadless criteria, as well as a look at other essentially roadless areas that may not have been previously inventoried in RARE II (Jacobs, 1997).

1. Public Involvement

A general discussion of public involvement in the planning process can be found in Appendix A. In early 2003, as part of the development of alternative approaches to revising the Forest Plan, the planning team held several public meetings/workshops on the need-for-change issues, including one focused on recreation, wilderness, and wild and scenic rivers. The public's participation in these workshops helped refine the proposed alternatives. Although the roadless inventory analysis had not yet been conducted, the planning team received comments both in favor of, and in opposition to, the consideration of new areas for wilderness study.

On May 1, 2003, the Forest invited the public to an open-house meeting at the Supervisor's Office in Harrisburg to display the results of the planning team's evaluation of roadless area inventory criteria as they applied to the Burke Branch, Camp Hutchins and Ripple Hollow areas, and the rest of the Forest. Comments were invited through the DEIS comment period.

After publication of the DEIS and proposed Plan and receipt of public comment, the planning team observed that several newly recorded acquisitions adjacent to wilderness areas had been overlooked during the roadless inventory. These areas were evaluated for roadless characteristics and have been added to this discussion.

2. Inventory Criteria

Inventory criteria are located in the Forest Service Handbook 1909.12 –Wilderness Evaluation. Section 7.11b lists the special criteria for Roadless Areas in the East, or east of the 100th Meridian, as it is recognized that many areas in the eastern United States show some signs of human activity and modification (USDA, 1992). These criteria are:

- The land is regaining a natural, untrammeled (uncontrolled) appearance.
- Improvements existing in the area are being affected by the forces of nature rather than humans and are disappearing or muted.
- The area has existing or attainable National Forest System ownership patterns, both surface and subsurface, that could ensure perpetuation of identified wilderness values.
- The location of the area is conducive to the perpetuation of wilderness values. Consider the relationship of the area to sources of noise, air and water pollution, as well as unsightly conditions that would have an effect on the wilderness experience. The amount and pattern of Federal ownership is also an influencing factor.
- The area contains no more than a half-mile of improved road for each 1,000 acres and the road is under Forest Service jurisdiction.
- No more than 15 percent of the area is in non-native, planted vegetation.
- Twenty percent or less of the area has been harvested within the past 10 years.
- The area contains only a few dwellings on private lands and the location of these dwellings and their access-needs insulate their effects on the natural conditions of federal lands.

The August 13, 1997 Regional Forester letter, cited earlier, clarified the evaluation process. Four critical points in the letter (of the five listed) were important in the planning team's review of areas on the Forest. These points are:

- 1 A critical issue for roadless area inventories is the criterion from Forest Service Handbook 1909.12 (7.11b - 3) requiring that: "The area has existing or attainable National Forest System ownership patterns, both surface and subsurface, that could ensure perpetuation of identified wilderness values."

The 1964 Wilderness Act defines a number of wilderness values. Among these, Section 2(c)(2) of the Act states that wildernesses must have "outstanding opportunities for solitude or a primitive and unconfined type of recreation."

Remember that we are only doing an inventory at this step, not the evaluation of the quality of wilderness that would be provided, or the trade-offs with other uses. However, the idea of "solitude" is important because it adds "design" as a factor rather than mere "size."

To quantify the idea of "solitude," we use the Recreation Opportunity Spectrum (ROS), focusing on the land providing primitive and semi-primitive recreation. As defined in the 1982 ROS Book, recreational users in areas inventoried as semi-primitive non-motorized have a high to moderate "probability of experiencing isolation from the sights and sounds of humans, independence, closeness to nature, tranquility and self-reliance...in an environment that offers challenge and risk." Primitive and semi-primitive ROS lands provide the solitude, or potential for solitude needed to meet roadless area inventory criteria.

Lands providing "primitive" recreation also provide solitude that would meet the roadless area inventory criteria, but there are few areas in the eastern U.S. that qualify under the "primitive" ROS classification.

Lands that can provide primitive or semi-primitive recreation should generally satisfy the solitude qualities needed for inclusion in the roadless area inventory. To meet roadless area inventory criteria, the roadless area must be manageable for conditions that would be classed as primitive or semi-primitive non-motorized.

The ROS Book states that semi-primitive areas contain at least 2,500 acres (unless they are contiguous to primitive-class lands). This 2,500-acre minimum size will be used as a "coarse" screen to determine whether areas meet the solitude criteria for inclusion in the roadless area inventory. This 2,500-acre area screen does not apply to additions to existing wildernesses.

In addition to size, there are remoteness criteria of ½ mile away from improved roads (for semi-primitive areas managed for motorized recreation) and ½ mile away from all roads, powerlines and railroads (for semi-primitive areas managed for non-motorized recreation).

The semi-primitive size and remoteness criteria are not an absolute minimum or requirement. They are guides. Some areas mapped as having more or less than 2,500 acres of semi-primitive or primitive recreation may or may not provide solitude. For each area, one needs to look closely at topography, influences of water bodies, proximity to type and use of roads, population centers and other sights and sounds of human activity to determine if solitude and primitive and unconfined recreation could be experienced.

The idea is to screen out "amoeba"-shaped configurations that may meet the minimum acreage requirement, but could never be managed to provide the degree of solitude characteristic of wilderness.

- 2 The Forest Service Handbook 1909.12, says that the inventoried roadless areas in the east would have no more than a 0.5 mile of improved road for each 1,000 acres and the road is under Forest Service jurisdiction.

The definition of an improved road is critical to the roadless area inventory. An improved road is any constructed or existing feature or facility created on the land for the purpose of travel by passenger vehicles (four-wheeled, two-wheel drive), which are legally allowed to operate on forest roads or public roads and highways, and vehicles are greater than 50 inches in width. Said facility will have an area for vehicles to travel on and will incorporate some manner for disposal of surface runoff.

- 3 Road jurisdiction problems are sure to arise when considering forest roads. Normally roads under state, county, townships, or other ownerships cannot be included in a roadless area because the Forest Service does not have the authority to regulate use on those roads.
- 4 On the Forest, roads are categorized into maintenance-levels 1-5. Roads inventoried as level 3, 4 or 5 are either Forest Service improved roads or under non-Forest Service jurisdiction. Roads inventoried as level 1 or 2 are generally low-maintenance level roads and can also be unimproved roads.
- 5 Improvements not allowed in roadless areas include pipelines, transmission lines and utility corridors.

3. Inventory Process

The planning team not only evaluated the three areas of interest—Burke Branch, Camp Hutchins and Ripple Hollow—for meeting roadless area criteria, but also considered all other areas of the Forest. If an area were to meet the roadless area criteria, it could then be evaluated for its potential as wilderness.

A Forest-scale roads analysis was completed in October, 2002. Using GIS, the planning team located interior, core areas at least one-half mile from an improved road. Any area containing 2,000 acres or more in the interior was to be evaluated for meeting roadless inventory criteria, this acreage being within an acceptable range for the classification of semi-primitive, non-motorized areas in the Recreation Opportunity Spectrum.

In February, 2003 the planning team evaluated areas 2,000 acres or larger for meeting roadless criteria. Burke Branch was the only area outside of wilderness with a core area approaching 2,000 acres. There were no other areas on the Forest with a core area of this size. Two smaller areas, Camp Hutchins and Ripple Hollow, were evaluated because they had been identified in the notice of intent as desirable for wilderness study.

In addition, national forest lands adjacent to wilderness were evaluated for meeting roadless criteria. If there were no major barriers, such as roads, powerlines and major dwellings, separating these parcels from wilderness, they were to be evaluated for meeting roadless inventory criteria. Each of the parcels, however, was separated by major barriers or did not meet the evaluation criteria.

a. Inventory of Burke Branch, Camp Hutchins and Ripple Hollow

The following summarizes the planning team's review of the areas with the greatest apparent opportunity to meet the roadless criteria. Data is drawn from either the GIS or the Forest Land Status book.

i. Burke Branch

Table C-1 displays the findings of the review of the Burke Branch Area. In order to optimize the review, the team adjusted the area boundary to exclude most of the roads not under Forest Service jurisdiction.

Burke Branch has the highest value for mesic barrens on the Forest. Without fire, woody vegetation and non-native invasive species would encroach into the barrens community, affecting its unique value as a natural area. If the barrens area is to be maintained, roaded access for management is essential.

The Burke Branch area consists of a vegetative overstory of 18 percent non-native pine plantations, detracting from potential wilderness character. The lack of maintenance on unimproved roads is causing soil erosion. Unauthorized ATV use in certain areas is causing resource damage, such as gully erosion, soil compaction and vegetation removal. While policy and law enforcement must be addressed in this area, rehabilitation using motorized and other equipment would be necessary to "mute" or reduce the visual evidence of humans. The Burke Branch area does not meet the minimum criteria for a roadless area and, so, will not be evaluated for potential wilderness (USDA, 1992).

Table C-1. Burke Branch area roadless inventory findings.

Acres NF + Private	Improved road ¹ miles	Road (improved) density, units	Percent of non- native, planted vegetation	Percent of area harvested within the past 10 years	Outstandin g oil and gas rights, acres
6,776	0	0	18	0	0
Criteria			Does area meet criteria?		
The land is regaining a natural, untrammled appearance (applies to entire area)			NO. Seventeen miles of unimproved roads are utilized seasonally. Active gully erosion is prominent on most unmaintained roads.		
Improvements existing in the area are being affected by the forces of nature rather than humans, and are disappearing or muted (applies to entire area)			NO. Motorized use maintains an open condition on roads. Road scars would remain present until rehabilitation.		
The area has existing or attainable National Forest System ownership patterns (applies to entire area)			YES.		
The location of the area is conducive to the perpetuation of wilderness values (applies to entire area)			YES. Burke Branch contains a core area of 3,108 acres, sufficient to meet the ROS semi-primitive motorized criteria. Pine removal and road decommissioning and obliteration would be required to restore and enhance area resources.		
The area contains less than a half-mile of improved road for each 1,000 acres and the road is under Forest Service jurisdiction (applies to NFS only)			YES. However, the 0.4-mile segment of non-Forest Service jurisdiction road would need to be excluded for a wilderness study.		
Less than 15 percent of the area is non-native, planted vegetation (applies to NFS only)			NO. Burke Branch contains 18% non-native, planted pine.		
Less than 20 percent of the area has been harvested within the past 10 years (applies to NFS only)			YES. No harvest has occurred in the past 10 years.		
The area contains only a few dwellings on private lands and the location of these dwellings and their access-needs insulate their effects on the natural conditions of federal lands (applies to entire area)			YES. The existing dwellings in Burke Branch are on the perimeter of the area and do not affect the natural conditions.		

There are .4 miles of township/private road within the boundary requiring elimination in a wilderness study.

ii. Camp Hutchins

The area is primarily of the oak-hickory forest-type. Prescribed fire is an essential management tool in maintaining the oak-hickory community. Without fire, the area will eventually convert to a beech-maple forest-type, reducing the diversity of plant and animal species present.

Camp Hutchins meets all of the roadless area criteria except in regard to the size of its core area and remoteness. The small size and narrow shape of this area is not conducive for an outstanding opportunity for solitude, as directed in the Wilderness Act of 1964. The Camp Hutchins area does not meet the minimum criteria for a roadless area and, so, will not be evaluated for potential wilderness (USDA, 1992). Table C-2 displays the findings of the review of the Camp Hutchins area.

Table C-2. Camp Hutchins area roadless inventory findings.

Acres NF + Private	Improved road, miles	Road density, units	Percent of non- native, planted vegetation	Percent of area harvested within the past 10 years	Outstanding oil and gas rights, acres
4,166	0	0	0	0	0
Criteria			Does area meet criteria?		
The land is regaining a natural, untrammelled appearance (applies to entire area)			YES. The area is regaining an untrammelled appearance. The 3.2 miles of unimproved road are not used by vehicles.		
Improvements existing in the area are being affected by the forces of nature rather than humans, and are disappearing or muted (applies to entire area)			YES. The area is succeeding to a maple-beech forest.		
The area has existing or attainable National Forest System ownership patterns (applies to entire area)			YES.		
The location of the area is conducive to the perpetuation of wilderness values (applies to entire area)			NO. The core area for Camp Hutchins is 961 acres. It does not meet the minimum size for a semi-primitive, non-motorized experience in the ROS. The narrow and linear shape is not conducive for providing an outstanding opportunity for solitude.		
The area contains less than a half-mile of improved road for each 1,000 acres and the road is under Forest Service jurisdiction (applies to NFS only)			YES. However, the 0.5-mile private road leading to private land would need to be excluded in a wilderness evaluation.		
Less than 15 percent of the area is non-native, planted vegetation (applies to NFS only)			YES.		
Less than 20 percent of the area has been harvested within the past 10 years (applies to NFS only)			YES.		
The area contains only a few dwellings on private lands and the location of these dwellings and their access-needs insulate their effects on the natural conditions of federal lands (applies to entire area)			YES. The existing dwellings in Camp Hutchins are on the perimeter of the area and do not affect the natural conditions. Private land and a road separate this area from the Bald Knob and Clear Springs Wilderness.		

iii. Ripple Hollow

Table C-3 displays the findings of the review of the Ripple Hollow area. In order to optimize the review, the team adjusted the area boundary to exclude most of the roads not under Forest Service jurisdiction.

There is a large natural area frequently maintained by prescribed fire, an important tool in managing the native plant community. If the values of this natural area are to be maintained, road access for management is essential. The remaining area is primarily of the oak-hickory forest-type, which also requires fire for maintenance.

The Ripple Hollow area does not have a core area of minimum size to provide an outstanding opportunity for solitude. Additionally, the mineral estate beneath about 1,000 acres of national forest surface remains in the ownership of a private mineral company. Ripple Hollow does not meet the minimum criteria for a roadless area and, so, will not be evaluated for potential wilderness (USDA, 1992).

Table C-3. Ripple Hollow area roadless inventory findings.

Acres NF + Private	Improved road, miles	Road density, units	Percent of non- native, planted vegetation	Percent of area harvested within the past 10 years	Outstanding oil and gas rights, acres
4,159	0	0	0	0	1,000
Criteria				Does area meet criteria?	
The land is regaining a natural, untrammelled appearance (applies to entire area)				NO. Many of the old roads include large widths and gravel surfaces.	
Improvements existing in the area are being affected by the forces of nature rather than humans, and are disappearing or muted (applies to entire area)				NO. Road scars would remain until rehabilitation or reconstruction as trails.	
The area has existing or attainable National Forest System ownership patterns (applies to entire area)				NO. The Forest Service does not own 1,000 acres of mineral estate.	
The location of the area is conducive to the perpetuation of wilderness values (applies to entire area)				NO. Ripple Hollow has a core area of about 1,158 acres, which does not meet the ROS criteria for semi-primitive non-motorized.	
The area contains less than a half-mile of improved road for each 1,000 acres and the road is under Forest Service jurisdiction (applies to NFS only)				YES. However, in a wilderness evaluation, the 0.5-mile private road on the west side would need to be excluded.	
Less than 15 percent of the area is non-native, planted vegetation (applies to NFS only)				YES.	
Less than 20 percent of the area has been harvested within the past 10 years (applies to NFS only)				YES.	
The area contains only a few dwellings on private lands and the location of these dwellings and their access needs insulate their effects on the natural conditions of federal lands (applies to entire area)				YES.	

b. Inventory of Recent Acquisitions Adjacent to Wilderness Areas

Several recently acquired small parcels near existing wilderness areas were evaluated for roadless inventory criteria. None were found to meet them. Details of these evaluations are in the planning record.

B. REVISED FOREST PLAN

During the Plan revision, the Forest received and considered comments on the roadless inventory. These comments, while focused mainly on the Burke Branch, Camp Hutchins and Ripple Hollow areas, also addressed areas adjacent to current wildernesses. The planning team evaluated all the comments and reviewed the inventory process. No changes were recommended to the conclusion that there are no roadless areas on the Forest outside the wilderness areas.

The revised Plan would manage both Ripple Hollow and Camp Hutchins as non-motorized recreation areas and classify both areas as unsuitable for timber production. The Burke Branch area would be managed for motorized and non-motorized recreation. Timber harvests could occur only when required to meet objectives other than timber production (USDA, 2001).

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APPENDIX D

WILD AND SCENIC RIVER EVALUATION

I. INTRODUCTION

This appendix documents the determination of the classification of the six streams on the Forest identified as eligible for inclusion in the national wild and scenic rivers system. The streams are Bay Creek, Big Creek, Big Grand Pierre, Creek, Hutchins Creek, Lusk Creek and the Big Muddy River. The appendix also includes an evaluation of the eligibility of all perennial streams on the Forest. Eligible rivers are free-flowing streams that possess one or more outstandingly remarkable values.

II. BACKGROUND

The Wild and Scenic Rivers Act (PL 90-542) and amendments provide for a national wild and scenic rivers system. It directs that certain selected rivers of the nation which, with their immediate environments, possess outstandingly remarkable scenic, recreational, geologic, fish and wildlife, historic, cultural, or other similar values, shall be preserved in a free-flowing condition, and that they and their immediate environments shall be protected for the benefit and enjoyment of present and future generations. The Act and interagency guidelines¹ provide direction for establishing the classifications for eligible rivers.

A. CLASSIFICATION CRITERIA

- **Wild river:** Those rivers or sections of rivers free of impoundments and generally inaccessible except by trail, with watersheds or shorelines essentially primitive and waters unpolluted. These represent vestiges of primitive America.
- **Scenic river:** Those rivers or sections of rivers free of impoundments, with shorelines or watersheds still largely primitive and shorelines largely undeveloped, but accessible in places by roads.
- **Recreational rivers:** Those rivers or segments of rivers readily accessible by road or railroad that may have some development along their shorelines and that may have undergone some impoundment or diversion in the past.

Classification of an eligible river is based on the condition of the stream and adjacent lands at the time the study is conducted. Classification criteria for study rivers are displayed in Table D-1. Where levels of human activity vary within the study area, the study reach may be segmented into more than one class.

¹ "Department of the Interior and Agriculture Interagency Guidelines for Eligibility, Classification and Management of River Areas," published in the *Federal Register* (Vol. 47, No. 173: September 7, 1982, pp. 39454-39461).

Table D-1. Classification criteria for wild, scenic and recreational river areas.

Attribute	Wild	Scenic	Recreational
Water Resources Development	Free of impoundment.	Free of impoundment.	Existing impoundment or diversion. Presence of low dams, diversions, or other modifications of waterway is acceptable, provided waterway remains generally natural and riverine in appearance.
Shoreline Development	Essentially primitive. Little or no evidence of human activity. Presence of a few inconspicuous structures, particularly of historic or cultural value, is acceptable. Limited grazing or hay production acceptable. Little or no evidence of past timber harvest. None ongoing.	Largely primitive and undeveloped. No substantial evidence of human activity. Presence of small communities or dispersed dwellings or farm structures is acceptable. Presence of grazing, hay production, row crops is acceptable. Evidence of past timber harvest is acceptable, provided forest appears natural from riverbank.	Some development. Substantial evidence of human activity. Presence of extensive residential development and a few commercial structures is acceptable. Lands may have been developed for full range of agricultural and forestry uses. May show evidence of past and ongoing timber harvest.
Accessibility	Generally inaccessible except by trail. No roads, railroads or other provision for vehicular travel within river area. A few existing roads leading to boundary of river area is acceptable.	Accessible in places by road. Roads occasionally reach or bridge river. Existence of short stretches of conspicuous or longer stretches of inconspicuous roads or railroads is acceptable.	Readily accessible by road or railroad. Existence of parallel roads or railroads on one or both banks, as well as bridge crossings and other river-access points is acceptable.
Water Quality	Meets or exceeds federal criteria or federally approved state standards for aesthetics, propagation of fish and wildlife normally adapted to the habitat of the river, and primary-contact recreation (swimming), except where exceeded by natural conditions.	No criteria prescribed by the Act. Federal Water Pollution Control Act amendments of 1972 made it national goal that all waters of the United States be made fishable and swim-able. Therefore, rivers will not be precluded from scenic or recreational classification because of poor water quality at the time of their study, provided a water-quality improvement plan exists or is being developed in compliance with applicable federal and state laws and regulations.	

Source: <http://www.nps.gov/rivers/guidelines.html>

III. DETERMINATION OF ELIGIBILITY

Agencies are required to consider and evaluate rivers on lands they manage for potential designation into the national wild and scenic rivers system. Eligibility and classification follow an inventory of existing conditions. Eligibility is an evaluation of the free-flowing nature of a candidate river and the presence of one or more outstandingly remarkable values. If found eligible, a candidate river is analyzed at its current level of development and a recommendation is made that it be placed into one or more of three classes—wild, scenic, or recreational. Once the potential class is determined, management standards and guidelines would be developed to protect the values of the stream until a suitability study is conducted.

A suitability study provides the basis for determining the recommendation of a river to congress for inclusion into the national wild and scenic rivers system. It involves consideration of an entire river corridor. The Forest will protect river corridors to retain their classification potential and eligibility until a suitability study is conducted.

A. STREAM EVALUATION

The planning team followed the Wild and Scenic River assessment process identified in the Region 9 letter of March 29, 2002 and the guidance in the November 21, 1996 Washington Office letter, subject: Wild and Scenic River Assessment and the Forest Plan Revision Process. With the assistance of regional Forest Service personnel, the IDNR, the Lusk Creek and Bay Creek Conservancy Districts, and the public, the team evaluated the six Forest streams noted earlier, which are listed in the 1982 National Rivers Inventory (NRI).

The team utilized aerial photographs, maps, watershed reports or analyses, and/or field visits to evaluate and note the outstandingly remarkable values for each stream corridor, update the 1993 and 1995 submissions to the NRI, and determine the highest appropriate classification. Utilizing the same assistance and data, the team also conducted a Forest-wide analysis to identify other streams on the Forest potentially eligible for classification, including Barren Creek. No outstandingly remarkable values were identified during this evaluation.

B. CLASSIFICATION REPORT

Table D-2. Candidate wild and scenic river miles on Forest.

River	Total River Miles in Forest Boundary	River Miles Eligible for Classification	Classification
Bay Creek	30.8	13.6	Recreational
Big Creek	17	8.8	Recreational
Big Grand Pierre Creek	19.2	7.4	Recreational
Big Muddy River	21.3	16.1	Recreational
Hutchins Creek	13	4.8	Recreational
Lusk Creek	30.2	10.1/5	Scenic/Recreational

1. Bay Creek

The planning team evaluated approximately 31 miles of Bay Creek from the source near Highway 145, 1 mile south of Delwood (T11S, R6E, Sec. 18) to Reevesville (T13S, R5E, Sec 31). The stream corridor—1/4-mile on either side—consists of 8,308 acres. The Forest manages 13.6 river miles (44 percent) and owns 4,090 acres (49 percent). There are 17 miles of road, 6 miles of system trail and 1/2 mile of powerline within the stream corridor.

a. Background

The 1982 NRI report identified 34 miles of this stream as potentially eligible for inclusion into the National Wild and Scenic Rivers System (USDI, 1982). The 1986 FEIS on the Forest Plan identified 29 miles through the Forest as potentially eligible (USDA, 1986). The 1992 FEIS on the amended Plan identified 24 miles through the Forest as potentially eligible (USDA 1992). In 2003, the NRI website listed 34 miles (1982) and 8 miles (1982/1993) (USDI, 2002) as

eligible. The Bay Creek Conservancy was established under state law and has jurisdiction regarding certain decisions associated with this stream.

b. Wild and Scenic River Classification

Because Bay Creek is readily accessible by road and has private development along the shoreline, the Forest planning team considers Recreational to be the highest potential classification for which it would be eligible. This classification would apply to 13.6 miles of Forest Service-managed stream- corridor. The stream was not considered eligible for the Scenic classification north of the impoundment and within Bay Creek Wilderness and Bell Smith Springs Natural Area due to the impoundment, breaks in ownership with private lands, roads, and the level of development on private lands.

Table D-3. Bay Creek stream management (in miles).

Management Area	Forest Service	Private	Total
CR	7.9	16.3	24.2
RA	0.5	0.9	1.4
NA	3	0	3
WD	2.2	0	2.2
Total stream miles	13.6 (44 %)	172	30.8

The stream segment passing through wilderness is 2.2 miles and 3 miles through a natural area. Improved roads and private lands separate these segments. Many parcels of private land are interspersed with Forest Service ownership. The Bay Creek impoundment was constructed by the NRCS for flood control. It is jointly managed by the NRCS and the Bay Creek Conservancy District. The dam is about 30 feet tall, 20 feet wide and 100 yards long. A concrete ramp allows boat-launching. There is minimal Forest Service ownership below the impoundment. In addition to the impoundment, there are many miles of road and a powerline within the corridor.

Table D-4. Bay Creek area management (in acres).

Management Area	Forest Service	Private	Total
CR	2,247	4,155	6,402
RA	306	45	351
NA	796	18	814
WD	641	0	641
MH	100	0	100
Total stream acres	4,090 (49%)	4,218	8,308

The 2.2-mile stream segment in Bay Creek Wilderness is afforded a high degree of protection. Developments incompatible with wilderness would not be allowed within this corridor (USDAFS, 2005). The 3-mile segment passing through Bell Smith Springs National Natural Landmark would be managed to allow trail and/or road construction, if compatible with the protection of the area (USDAFS, 1992). Bell Smith Springs along Bay Creek was designated a national natural landmark in 1980, in recognition of its outstanding beauty and plant diversity (Mohlenbrock, 1971). More than 700 species of ferns and flowering plants have been cataloged at this location. It is a retreat for recreational enjoyment due to the sheer sandstone bluffs, cool pools of water and scenic qualities. Recreational uses include hiking, camping, fishing, wildlife enjoyment and nature study.

Table D-5. Bay Creek road and trail management (in miles).

Management Area	Roads	Trails	Powerline
CR (Levels 1-5)	14.2	0.3	
RA (Levels 1-5)	0.8	0	
NA (Levels 3-5)	1.2	6.1	
WD (Levels 1-2)	0.7	0	
Total	17.3	6.4	0.6

Table D-6. Bay Creek outstandingly remarkable values (ORVs).

ORV		Description
Scenic	X	Regionally significant, with scenic bluffs and outcrops.
Recreation	X	Hiking, camping, fishing, watching wildlife. Not floatable.
Geological	X	Sandstone outcrops
Fish		
Wildlife	X	River otter, red-shouldered hawk, ebony-shell (mussel), bird-voiced tree frog (Widowski and Fitch, 2000)
Historic	X	Millstone Bluff
Cultural		
Other	X	Remnant cypress-tupelo swamps (most-northern extent of natural range)

2. Big Creek

The planning team evaluated approximately 17 miles of Big Creek from its headwaters near Sparks Hill and Karber’s Ridge Road (T11S, R8E, Sec. 2) to the Forest boundary about 2 miles north of its confluence with the Ohio River (T12S, R8E, Sec. 21). The stream corridor—1/4-mile on either side—consists of 4,790 acres. The Forest manages 8.8 miles of the stream (52 percent) and owns 2,662 acres (56 percent). There are 21 miles of road, 1 mile of system trail and 1 mile of powerline within the stream corridor.

a. Background

The 1982 NRI report identified 20 miles of this stream as potentially eligible for inclusion into the National Wild and Scenic Rivers System (USDI, 1982). The 1986 FEIS on the Forest Plan identified 16 miles through the Forest as potentially eligible (USDA, 1986). The 1992 FEIS on the amended Plan identified 20 miles through the Forest as potentially eligible (USDA 1992). In 2003, the NRI website listed 20 miles (1982), 15 miles (1982/1993) and 9 miles (1995) (USDI, 2002) as eligible.

b. Wild and Scenic River Classification

Because Big Creek is readily accessible by road and has private development along the shoreline, the Forest planning team considers Recreational to be the highest potential classification for which it would be eligible. This classification would apply to 8.8 miles of Forest Service-managed stream corridor. The stream was not considered eligible for the Scenic classification due to the many miles of roads, numerous parcels of private land interspersed with Forest-owned lands, and a powerline.

The waters of Big Creek are included in the Illinois Natural Area Inventory and managed as a zoological area under the natural area management prescription. Big Creek is a spring-fed tributary of the Ohio River characterized by clear, aquatic environments. Rare and unique fauna include 59 native fish species, a diversity of plants, and possibly 15 mussel species (USDAFS, 2002). Big Creek also has the largest population of the crayfish, *Orconectes*

placidus, the state-listed endangered crayfish, *Orconectes kentukiensis*, and the Least brook lamprey (Widowski and Fitch, 2000).

The Illinois Iron Furnace was built in 1837 for the production of iron by the charcoal blast method (USDAFS, 2002). It has been listed in the National Register of Historic Places and serves as a historic landmark and picnic area.

Table D-7. Big Creek stream management (in miles).

Management Area	Forest Service	Private	Total
CR	7.4	8.2	15.6
RA	0.8	0	0.8
HR	0.6	0	0.6
Total stream miles	8.8 (52%)	8.2	17

Table D-8. Big Creek area management (in acres).

Management Area	Forest Service	Private	Total
CR	2,156	2,124	4,280
RA	420	1	421
HR	86	0	86
Total stream acres	2,662 (56%)	2,125	4,787

Table D-9. Big Creek road and trail management (in miles).

Management Area	Roads	Trails	Powerline
CR (Levels 1-5)	17.2	.4	
RA (Levels 1-5)	2.6	.4	
HR (Levels 1-5)	1.4	.1	
Total	21.2	0.9	1

Table D-10. Big Creek outstandingly remarkable values (ORVs).

ORV		Description
Scenic		
Recreation	X	Fishing, hiking, watching wildlife. Floatable near the Ohio River.
Geological	X	Karst topography
Fish	X	Two endangered crayfish, spring cavefish (rare), smallmouth bass (rare, only stream in Illinois)
Wildlife	X	River otter, red-shouldered hawk
Historic	X	Illinois Iron Furnace national historic register site
Cultural	X	Fluorspar mining
Other	X	One of the few remaining spring-fed streams in Illinois.

3. Big Grand Pierre Creek

The planning team evaluated 19.2 miles of Big Grand Pierre Creek from its source west of Wamble Mountain (T10S, R7E, Sec. 32) to its confluence with the Ohio River (T13S, R7E, Sec. 3). The stream corridor—1/4-mile on either side—consists of 5,723 acres. The Forest manages 7.4 miles of the stream (39 percent) and owns 2,156 acres (38 percent). There are about 22 miles of road and 2 miles of powerline within the stream corridor.

a. Background

The 1982 NRI report identified 20 miles of this stream as potentially eligible for inclusion into the National Wild and Scenic Rivers System (USDI, 1982). The 1986 FEIS on the Forest Plan identified about 18 miles through the Forest as potentially eligible (USDA, 1986). The 1992 FEIS on the amended Plan identified 20 miles through the Forest as potentially eligible (USDA 1992). In 2003, the NRI website listed 20 miles (1982) and 12 miles (1982/1993) (USDI, 2002) as eligible.

b. Wild and Scenic River Classification

Because Big Grand Pierre Creek is readily accessible by road and has private development along the shoreline, the Forest planning team considers Recreational to be the highest potential classification for which it would be eligible. This classification would apply to 7.4 miles of Forest Service-managed stream- corridor. The stream was not considered eligible for the Scenic classification due to the many miles of roads, numerous parcels of private land interspersed with Forest-owned lands, and a powerline.

Table D-11. Big Grand Pierre Creek stream management (in miles).

Management Area	Forest Service	Private	Total
CR	7.4	11.8	19.2
Total stream miles	7.4 (39 %)	11.8	19.2

Table D-12. Big Grand Pierre Creek area management (in acres).

Management Area	Forest Service	Private	Total
CR	2,155	3,567	5,722
NA	1	0	1
Total stream acres	2,156 (38%)	3,567	5,723

Table D-13. Big Grand Pierre Creek road and trail management (in miles).

Management Area	Roads	Trails	Powerline
CR (Levels 1-5)	21.7	0.1	
Total	21.7	0.1	2.1

Table D-14. Big Grand Pierre Creek outstandingly remarkable values (ORVs).

ORV		Description
Scenic		
Recreation	X	Fishing, hiking, watching wildlife, horse trail riding. Floatable seasonally or near the Ohio River.
Geological		
Fish	X	High diversity of fish, including least brook lamprey
Wildlife	X	River otter, bald eagle
Historic		
Cultural	X	Fluorspar mining
Other		

4. Big Muddy River

The planning team evaluated 21.3 miles (out of 154) of the Big Muddy River from near the town of Aldridge west of Highway 3 (T9S, R3W, Sec 5) to the town of Grimsby (T11S, R3E, Sec. 4). The stream corridor—1/4-mile on either side—consists of 6,300 acres. The Forest manages about 16 river miles and owns 4,333 acres (69 percent). There are about 20 miles of road, 1 mile of system trail and 3 miles of powerline within the river corridor.

a. Background

The 1982 NRI report identified 72 miles of two segments of this river as potentially eligible for inclusion into the National Wild and Scenic Rivers System (USDI, 1982). The 1986 FEIS on the Forest Plan identified about 25 miles through the Forest as potentially eligible (USDA, 1986). The 1992 FEIS on the amended Plan identified 21 miles through the Forest as potentially eligible (USDA 1992). In 2003, the NRI website listed 26 miles from the confluence with the Mississippi River to Sand Ridge and 46 miles from Highway 51 to Rend Lake (1982) as eligible. It also listed two repeated segments: 12 miles from Gorham to Murphysboro (1982) and 14 miles on the Forest (1982/1993).

b. Wild and Scenic River Classification

Because the Big Muddy River is readily accessible by road and the corridor holds many roads, a railroad, powerlines, ditches and levees, and cropland north of the Forest, the planning team considers Recreational to be the highest potential classification for which it would be eligible. This classification would apply to 16.1 miles of Forest Service-managed river corridor. The river is navigable for larger vessels up to Murphysboro. Much of the forested overstory within the corridor died in the 1993 flood. Many acres have been planted with bottomland tree species. Most of the corridor has been altered with levees.

Table D-15. Big Muddy River stream management (in miles).

Management Area	Forest Service	Private/Other	Total
CR	16.1	5.2	21.3
Total stream miles	16.1	5.2	21.3

Table D-16. Big Muddy River area management (in acres).

Management Area	Forest Service	Private	Total
CR	3,973	1,956	5,929
NA	321	0	321
MH	39	0	39
Total stream acres	4,333 (69%)	1,956	6,289

Table D-17. Big Muddy River road and trail management (in miles).

Stream Management	Roads	Trails	Powerline
CR (Levels 1-5)	18.8		
NA (Levels 1,2)	0.2	1.2	
MH (Levels 3,4,5)	0.2		
Total	19.9	1.2	3.2

Table D-18. Big Muddy River outstandingly remarkable values (ORVs).

ORV		Description
Scenic	X	Regionally significant, with scenic bluffs and outcrops.
Recreation	X	Fishing, boating, hiking, camping, watching wildlife. Floatable.
Geological	X	Horseshoe Bluff and Chalk Bluff significant. Changes from sandstone bluffs of Greater Shawnee Hills to Limestone bluffs in the Illinois Ozarks.
Fish	X	Lake sturgeon and high fish diversity up to Kincaid Lake
Wildlife	X	Red-shouldered hawk, bald eagle, Indiana bat, river otter, cerulean warbler, Mississippi kite and woodrat; timber rattlesnake, copperhead and cottonmouth snakes.
Historic	X	Prehistoric Native American rock-art sites and burial mounds, as well as habitation sites along length of channel.
Cultural		
Other		

5. Hutchins Creek

The planning team evaluated approximately 13 miles of Hutchins Creek from its source west of Alto Pass (T11S, R2W, Sec. 8) to its confluence with Clear Creek (T12S, R2W, Sec. 6). The stream corridor—1/4-mile on either side—consists of 4,103 acres. The Forest manages 4.8 miles of the stream (37 percent) and owns 1,907 acres (46 percent). There are about 16 miles of road, 4 miles of system trail and 1.3 miles of powerline within the stream corridor.

a. Background

The 1992 FEIS on the amended Plan identified about 7 miles of this stream through the Forest as potentially eligible for inclusion into the National Wild and Scenic Rivers System (USDA, 1992). In 2003, the NRI website listed 4 miles (1993) (USDI, 2002) as eligible.

b. Wild and Scenic River Classification

Because Hutchins Creek is readily accessible by road and has extensive private development along the shoreline, the Forest planning team considers Recreational to be the highest potential classification for which it would be eligible. This classification would apply to 4.8 miles of Forest Service-managed stream corridor. The stream was not considered eligible for the Scenic classification due to the high percentage of private ownership interspersed with Forest-owned lands and many miles of roads and powerline.

The 3.5-mile stream segment in Clear Springs and Bald Knob Wildernesses is afforded a high degree of protection since it is part of the wilderness. Developments incompatible with wilderness would not be allowed within this corridor (USDAFS, 1992).

Table D-19. Hutchins Creek stream management (in miles).

Management Area	Forest Service	Private	Total
CR	1	8.3	9.3
CH	0.3	0	0.3
WD	3.5	0	3.5
Total stream miles	4.8 (37%)	8.3	13

Table D-20. Hutchins Creek area management (in acres).

Management Area	Forest Service	Private	Total
CR	289	2,189	2,478
CH	324	5	329
WD	1,294	2	1,296
Total stream acres	1,907 (46%)	2,196	4,103

Table D-21. Hutchins Creek road and trail management (in miles).

Management Area	Roads	Trails	Powerline
CR (Levels 1-5)	13.6	0	
CH (Levels 1-5)	1.5	0	
WD (Levels 3,4,5)	0.4	3.8	
Total	15.5	3.8	1.3

Table D-22. Hutchins Creek outstandingly remarkable values (ORVs).

ORV		Description
Scenic		
Recreation	X	Fishing, hiking, camping, watching wildlife. Not floatable.
Geological	X	Illinois Ozarks
Fish		
Wildlife	X	Mississippi kite and timber rattlesnake
Historic		
Cultural		
Other		

6. Lusk Creek

The planning team evaluated about 30 miles of Lusk Creek from its source about 2 miles east of Delwood (T11S, R6E, Sec. 10) to its confluence with the Ohio River in Golconda (T13S, R7E, Sec 25). The stream corridor—1/4-mile on either side—consists of 8,617 acres. The Forest manages about 15 miles of the stream (50 percent) and owns 4,419 acres (51 percent). There are about 20 miles of road, 1.5 miles of system trail and 1.5 miles of powerline within the stream corridor.

a. Background

The 1982 NRI report identified 28 miles of this stream as potentially eligible for inclusion into the National Wild and Scenic Rivers System (USDI, 1982). The 1986 FEIS on the Forest Plan identified about 30 miles through the Forest as potentially eligible (USDA, 1986). The 1992 FEIS on the amended Plan identified 28 miles through the Forest as potentially eligible (USDA 1992). In 2003, the NRI website listed 28 miles (1982), 20 miles (1982/1993) and 5 miles (1995) (USDI, 2002) as eligible. The Lusk Creek Conservancy was established under state law and has jurisdiction regarding certain decisions associated with this stream.

b. Wild and Scenic River Classification

Because Lusk Creek north of the Eddyville blacktop is accessible by few roads, has regionally significant scenery and minimal shoreline development, the Forest planning team considers Scenic to be the highest potential classification for which this stretch of the stream would be eligible. This classification would apply to 10.1 miles of Forest Service-managed stream- corridor.

Because the stream corridor below the Eddyville blacktop has patchy national forest ownership, row-crop plantings on private land, the town of Golconda, a marina, homes, roads, powerlines and the Smithland Lock and Dam near the confluence with the Ohio River, the planning team considers Recreational to be the highest potential classification for which this stretch of the stream would be eligible. This classification would apply to about 5 miles of Forest Service-managed stream- corridor.

Table D-23. Lusk Creek stream management (in miles).

Management Area	Forest Service	Private	Total
CR	8.9	13.8	22.7
WD	6.2	1	7.2
Total stream miles	15.1 (50%)	14.8	29.9

The stream corridor north of the blacktop was not considered eligible for the Wild classification due to the road-crossings north and south of the wilderness and the private land in-holding and road passing within wilderness. The 6.2-mile stream segment in Lusk Creek Wilderness is afforded a high degree of protection regardless of the stream classification. Developments incompatible with wilderness would not be allowed within this corridor (USDAFS, 1992).

The waters of Lusk Creek have been included in the State of Illinois Natural Area Inventory and are managed as a zoological area under the natural area management Prescription. Lusk Creek has exceptional habitat conditions, such as clean, gravel riffles and cold springs that provide premium places for several uncommon and endangered fish, such as the black redhorse, least brook lamprey and northern hog-sucker (USDA, 2001).

Table D-24. Lusk Creek area management (in acres).

Management Area	Forest Service	Private	Total
CR	2,881	3,959	6,840
WD	1,538	239	1,777
Total stream acres	4,419 (51%)	4,198	8,617

Lusk Creek Canyon National Natural Landmark was designated by the US Park Service because of the area’s diverse plant communities and large expanse of exposed, vertical rock-wall about 100 feet above the clear waters. Rock shelters, such as Indian Kitchen, are an important aspect of the Lusk Creek watershed (USDA, 2001). These shelters provided cover and are characterized by projectile points, pottery fragments and lithic-waste products from tool manufacturing (USDA, 2001).

Table D-25. Lusk Creek road and trail management (in miles).

Management Area	Roads	Trails	Powerline
CR (Levels 1-5)	16.8	0	
CR (Levels 3,4,5)	2	0	
WD (Levels 1-5)	1.4	1.5	
Total	20.2	1.5	1.5

Table D-26. Lusk Creek outstandingly remarkable values (ORVs).

ORV		Description
Scenic	X	Regionally significant, with bluffs at Indian Kitchen and elsewhere.
Recreation	X	Fishing, hiking, horse-back riding, watching wildlife. Floatable seasonally or near the Ohio River.
Geological	X	Greater and Lesser Shawnee Hills/canyon walls/sandstone bluffs, and sandstone and limestone outcrops
Fish	X	Least brook lamprey
Wildlife	X	River otter, bald eagle
Historic	X	Known pre-historic occupation from 8000 BC along the entire corridor; early 19 th -century transportation routes.
Cultural		
Other	X	High-quality stream

C. ELIGIBILITY REPORT

1. Barren Creek

Following a review of the Barren Creek stream corridor, the team found no outstandingly remarkable values of regional or national significance. Resources that are present are currently protected by the management of riparian areas.

The team observed the following during the review:

- Total mileage of perennial stream is low (it is perennial only from Mill Spring).
- It is not scenic regionally.
- Recreational activities are primarily of local interest rather than regional.
- The creek is not navigable.
- There is some karst topography.
- There may be a high number of proposed threatened and sensitive mussels near the mouth of the Ohio River, as a result of the large river's influence.
- Cave and stream resources are protected adequately under the Cave Resources Act and management of riparian areas.
- There is evidence for the use of Brasher Cave, a bat-gated cave within the corridor, as an Underground Railroad hiding place.

2. Evaluation of Streams Not Identified as Eligible

The Forest planning team considered and evaluated the free-flowing condition and potential outstandingly remarkable values of several streams on the Forest. The results are noted in Table D-27.

Table D-27. Evaluation of eligibility for inclusion in national wild and scenic river system.

Stream	Comments	ORV Present?
Cedar and Sugar Creeks	Low FS ownership, Dixon Springs Station. Heavy modification.	No
Cedar Creek, west side	Cedar Lake dam	No
Clear Creek (also part of Hutchins)	Man-made ditch; high species diversity, flows into Mississippi	No
Dutch Creek	Low FS ownership	No
Dutchman Creek	Low FS ownership	No
Eagle Creek	Indiana crayfish (habitat good in upper end)	No
Hosick and Peters Creeks	Low FS ownership; Ohio River tributary	No
Indian Creek	Low FS ownership	No
Kinkaid Creek	Reservoir, <i>Plantago cordata</i> and <i>Lilium superbum</i> , karst formations, Ava cave near headwaters	No
Lick Creek	Low FS ownership	No
Little Grassy Creek	Low FS ownership	No
Mill Creek	Low FS ownership; intermittent tributary of Cache River, karst, bird-voiced treefrog, tripoli mines, Indiana bat, Native American habitation.	No
Sandy Creek	Cave anthropod, karst, mining	No
Lower S. Fork Saline River	Heavily mined, low FS ownership, Indiana crayfish	No

Stream	Comments	ORV Present?
Lower Saline River	Heavily mined, low FS ownership, Indiana crayfish	No
Massac Creek	Low FS ownership	No
Reeds and Degognia Creeks	Low FS ownership	No
Running Slough	Low FS ownership	No
Seven-Mile Creek	Low FS ownership	No
Upper Cache River	Low FS ownership	No
Upper S. Fork Saline River	Lake of Egypt reservoir	No
Wolf Creek	<i>Styrax grandifolius</i> and <i>Cladastris kentuckea</i> and zoological resources	No

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APPENDIX E

RESEARCH NATURAL AREA ANALYSIS

I. INTRODUCTION

During the Forest planning process, recommendations for the establishment of research natural areas (RNAs) may be made to the Chief of the Forest Service. Planning provides for identification of examples of important forest, shrubland, grassland, alpine, aquatic and geologic types possessing special or unique characteristics of scientific interest and importance and required to complete the national network of RNAs. The types required for the network are identified by the Chief of the Forest Service (36 CFR 219.25).

According to the Forest Service National Hierarchical Framework of Ecological Units (McNab and Avers, 1994), the majority of the Forest is located in the Eastern Broadleaf Forest Province and includes portions of the Ozark Highlands Section, Upper Gulf Coastal Plain Section, Interior Low Plateau, Shawnee Hills Section and Central Till Plains, Oak-Hickory Section. This part of southern Illinois remained unglaciated for, the most part, during the last ice age. Table E-1 displays the Forest Service National Hierarchical Framework of Ecological Units and Table E-2 the Ecological Units as they pertain to the Forest. Subsections are characterized based on geology, soils, vegetation, physiography (topography and land-form) and relief.

Table E-1. Forest Service National Hierarchical Framework of Ecological Units.

Planning and Analysis Scale	Ecological Units	Purpose, Objectives and General Use	General Size Range
Ecoregion Global	Domain	Broad applicability for modeling and sampling, strategic planning and assessment, and international planning	Millions to tens of thousands of square miles
Continental	Division		
Regional	Province		
Subregion	Section Subsection	Strategic, multi-forest, statewide and multi-agency analysis and assessment	Thousands to tens of square miles
Landscape	Land-type association (LTA)	Forest, area-wide planning and watershed analysis	Thousands to hundreds of acres
Land unit	Land-type (LT) Land-type phase	Project and management area planning and analysis	Hundreds to less than ten acres

Table E-2. Ecological classification hierarchy for the Forest.

Ecoregions of the United States (with four domains in the United States) 200 Humid Temperate Domain (with six divisions) 220 Hot Continental Division (with two provinces) 222 Eastern Broadleaf Forest (Continental) Province (with 13 sections) 222A Ozark Highlands Section (with 17 subsections) 222Ao Mississippi River Alluvial Plain Subsection 222Aq Illinois Ozarks Subsection 222C Upper Gulf Coastal Plain Section (with eight subsections) 222Ca Cretaceous Hills Subsection 222Ch Ohio and Cache River Alluvial Plain Subsection 222D Interior Low Plateau, Shawnee Hills Section (with ten subsections) 222Db Lower Ohio-Cache-Wabash Alluvial Plains Subsection* 222Dh Greater Shawnee Hills Subsection 222Di Lesser Shawnee Hills Subsection 222G Central Till Plains, Oak-Hickory Section (with five subsections) 222Gb Mount Vernon Hill Country Subsection* 222Gc Lower Wabash Alluvial Plain Subsection* 230 Subtropical Division (with three provinces) 234 Lower Mississippi Riverine Forest Province (with one section) 234A Mississippi Alluvial Basin Section (with 14 subsections) 234An North Mississippi River Alluvial Plain Subsection*

* Available information incomplete or lacking for this subsection.

II. ANALYSIS

The national hierarchical framework provides a scientific basis for regionalization of ecosystems into successively smaller, more homogeneous units. The section-level allows the study of management problems on a multi-forest and statewide basis. It also provides for the organization and interpretation of collected data among regions. A brief description of sections and subsections is presented below. More thorough descriptions can be found in McNab and Avers (1994) and Keys *et al.* (1995), supplemented by the most recent updates from NatureServe (2004).

In addition, the following areas on the Forest are separated into their respective subsections and are analyzed to determine if they are potential RNA-equivalents, other natural areas that can help meet the goals of the RNA network. The Forest areas analyzed are included in the Natural Area management prescription, which preserves, protects and/or enhances the unique scientific, educational or natural values found within RNAs, geological areas (GAs), zoological areas (ZAs), ecological areas (EAs), botanical areas (BAs) and national natural landmarks (NNLs), except for Lusk Creek NNL, which managed under the Wilderness management prescription. Areas within the Forest boundaries managed by North Central Experimental Station were also analyzed.

Other potential RNA-equivalents are Illinois nature preserves (state), preserves of The Nature Conservancy (TNC), certain lands under the management of the Forest Service Research Station, and privately owned natural areas designated for perpetual protection. Some of these areas have also been analyzed and are included in Table E-3. All potential RNA-equivalents are cross-referenced to alliances (natural communities) in order to fill gaps in the national network of RNAs. The majority of alliances for the Forest were originally determined and listed in Faber-Langendoen, Snow and Tyrrell (2000), but updates and changes are found in NatureServe (2004) as well as from specific Forest data.

Further analysis of Forest and non-Forest Service managed lands is required in order to complete the national network matrix for RNAs and RNA-equivalents.

Another consideration in this analysis is the map produced by Keys *et al.* (1995) depicting the ecological units of the eastern United States (first approximation). This map has been further refined by the Forest by overlaying it with the ground-truthed geological materials map produced by the Department of Energy and Natural Resources (1992). The results of the overlay changed some of the data found in Faber-Langendoen, Snow and Tyrrell (2000) and may also affect data currently found on NatureServe (2004).

A. SECTIONS, SUBSECTIONS, ALLIANCES AND POTENTIAL RNA-EQUIVALENTS

Map-unit descriptions for sections consider the geomorphology (landforms), lithology and stratigraphy (physical characters and arrangements of rocks), soil taxa (soil taxonomy developed by the NRCS), potential natural vegetation (defined by Küchler, 1964, as well as other sources describing potential natural communities, historic vegetation, or existing communities, which vary by region), fauna, climate, surface-water characteristics, disturbance regimes, land use (by humans) and cultural ecology (between humans and the natural landscape).

1. Ozark Highlands Section (222A)

This section is part of the Ozark Plateaus geomorphic province. Most of the section is equally divided between steep hills with local relief up to 1,000 feet and rolling hills with local relief between 200 and 500 feet. There are also gently rolling plains with local relief of less than 200 feet; also present is the flat, 6-mile-wide Mississippi River floodplain, composed of broad bottomlands with associated terraces, ox-bows and meander scars (McNab and Avers, 1994).

Küchler vegetation types are mapped as oak-hickory forest, oak-hickory-pine forest, mosaic of bluestem prairie and oak-hickory forest and cedar glades. Dry-upland sites include post oak-blackjack, oak-black hickory with lichen-moss groundcover and shortleaf pine-oak in areas of sandstone bedrock. Mesic slope-sites have white oak-northern red oak-bitternut hickory-flowering dogwood. Riparian sites have river birch-silver maple. Glades have little bluestem-baldgrass and eastern redcedar that have invaded these prairie sites as a result of fire suppression. The current trend is to characterize Ozark landscapes as woodland or savanna rather than forest, in recognition of the role of frequent, low-intensity fire (McNab and Avers, 1994). The subsections of this section are listed in Table E-3.

Table E-3. Subsections of the Ozark Highlands Section (222A).

222Ao Mississippi Alluvial Plain Subsection	
Clear Creek Swamp BA Greentree Reservoir BA	LaRue-Pine Hills/Otter Pond RNA and NNL (some here, most in 222Aq) Little Grand Canyon (minimal here, most in 222Dh)
<u>State, TNC and recognized private areas:</u>	
Backbone South GA Bake Oven-Backbone North GA Burnham Island Clear Creek Dongola Hollow GA Horseshoe Forest Horseshoe Lake	Horseshoe Lake Nuttall's Oak Site Horseshoe Lake South Lake Creek Lovet's Pond Mississippi River-Grand Tower Unity Area (minimal here, most in 222Ch)
222Aq Illinois Ozarks Subsection (All alliances in this subsection are represented in at least one RNA or potential RNA-equivalent.)	
Atwood Ridge RNA Bald Knob GA Big Brushy Ridge EA Clear Springs GA Dutch Creek Chert Woodland EA Hutchison ZA LaRue-Pine Hills/Otter Pond RNA and NNL	Opossum Trot Trail BA Ozark Hill Prairie RNA Provo Cemetery Barrens EA (most here, some in 222Ch) Pine Hills Annex EA Toothless ZA Wolf Creek BA
<u>State, TNC and recognized private areas:</u>	
Berryville Shale Glade (half here, half in 222Di) Black Powder Hollow GA Brown Barrens	McClure Shale Glade (most here, minimal in 222Di) Miller Creek Ozark Hills Thebes Area

2. Upper Gulf Coastal Plain Section (222C)

This section is in the Coastal Plains geomorphic province. The predominant landforms are irregular, shallow to moderately dissected plains of alluvial origin formed by the deposition of continental sediments onto a submerged, shallow continental shelf, which was later exposed by sea-level subsidence (McNab and Avers, 1994).

Küchler vegetation is classified as oak-hickory forest, blackbelt and a mosaic of bluestem prairie and oak-hickory forest. The predominant vegetation form is temperate-lowland and submontane broad-leaved cold-deciduous forest and cold-deciduous alluvial forest. The oak-hickory forest cover-type dominates this section. The oaks on drier sites include post, southern red, scarlet, chestnut and blackjack; on moister sites white, southern red and black predominate. Shortleaf pine is usually present. Hickories including pignut, mockernut, shagbark and bitternut, form a common, but minor component. Bottomland hardwoods occupy recent alluvium along major rivers. Many young stands are dominated by eastern cottonwood and black willow. Older stands include a mixture of species, including hackberry, sugarberry, American elm, boxelder, overcup oak, water hickory and green ash (McNab and Avers, 1994). The subsections of this section are listed in Table E-4.

Table E-4. Subsections of the Upper Gulf Coastal Plain Section (222C).

222Ca Cretaceous Hills Subsection	
Cretaceous Hills EA (most here, some in 222Di) Dean Cemetery East Barrens EA Dean Cemetery West Barrens EA (most here, some in 222Di) Dog Barrens EA (most here, some in 222Di) Kickasola Cemetery EA (most here, some in 222Di)	Massac Tower Springs EA Poco Cemetery East EA (most here, minimal in 222Di) Poco Cemetery North EA Snow Springs EA
<u>State, TNC and recognized private areas:</u>	
Badlands GA Britten Spring Chestnut Hills Fort Massac area (most here, minimal in 222Ch) Halesia (minimal here, most in 222Ch) Lino Laird Ravine Metropolis North GA Mounds West GA (most here, minimal in 222Ch) Ohio River-Hillerman (some on river)	Olmsted GA Post Creek Cutoff GA Post Creek Cutoff Site Round Pond Sielbeck Forest Tract Sielbeck Q. Ditch Area Silverbell Site Snow Springs Thorton Ravine
222Ch Ohio and Cache River Alluvial Plain Subsection	
Lusk Creek ZA (minimal here, most in 222Dh)	Provo Cemetery Barrens EA (some here, most in 222Aq)
<u>State, TNC and recognized private areas:</u>	
Cedar Lake Cypress Pond (half here, half in 222Di) Deer Pond (most here, minimal in 222Di) Fort Massac area (minimal here, most in 222Ca) Halesia (most here, minimal in 222Ca) Herman Hill Site (most here, minimal in 222Di) Homberg Spring (half here, half in 222Di) Indian Point (most here, minimal in 222Ch) Lewis Estate Lewis Estate North Lewis Estate South Little Black Slough-Heron Pond (most here, some in 222Di)	Little Grand Pierre South Glade (half here, half in 222Di) Lower Cache River Swamp (most here, some in 222Ca) Mermet Lake East Mermet Lake Flatwoods Mermet Swamp Mounds West GA (minimal here, most in 222Ca) Open Pond (most here, some in 222Di) Teal's Cave Thalia Site Unity Area (most here, minimal in 222Ao) Werner Tract (most here, some in 222Di) West Vienna Woods (half here, half in 222Di)

3. Interior Low Plateaus, Shawnee Hills Section (222D)

This section is part of the Interior Low Plateaus geomorphic province. Extensive sandstone bluffs, cuestas, rise up to 100 feet above the terrain in front of them and dip gently down the back-slope. Other landforms include steep-sided ridges and hills, gentler hills and broader valleys, karst terrain, gently rolling lowland plains, and bottomlands along major rivers, with associated terraces and meander-scars (McNab and Avers, 1994).

Küchler vegetation-types include oak-hickory forest in the uplands and oak-gum-cypress in the bottomlands. Uplands are dominated by the white oak-black oak-shagbark hickory community; the blackjack oak-scarlet oak-pignut hickory community occupies drier sites; and the beech-yellow poplar-bitternut hickory-sugar maple-white ash community occupies deep, mesic ravines. The southern floodplains along the Ohio and Wabash Rivers are dominated by the sycamore-Kentucky coffeetree-sugarberry-honeylocust community, with local tupelo and cypress-swamp communities (McNab and Avers, 1994). The subsections of this section are listed in Table E-5.

Table E-5. Subsections of the Interior Low Plateaus, Shawnee Hills Section (222D).

222Db Lower Ohio-Cache-Wabash Alluvial Plains Subsection	
<p>There are no known areas of this subsection on the Forest in a protected status that could be potential RNA-equivalents.</p> <p><u>State, TNC and recognized private areas:</u> Black Lake Saline Landing (minimal here, most in 222Dh)</p>	
222Dh Greater Shawnee Hills Subsection	
<p>Ava ZA Bear Creek Relict Site BA Bell Smith Springs EA and NNL Bulge Hole EA Cane Creek BA Caney Branch Barrens EA Cave Hill RNA (some here, most in 222Di) Chimaphila Site BA Crow Knob EA Dennison Hollow RNA Double Branch Hole EA East Fork Oxalis Site BA Fink Sandstone Barrens EA Fountain Bluff GA Garden of the Gods EA Gibbons Creek EA Gyp Williams Hollow EA (some here, most in 222Di) Hayes Creek-Fox Den EA Jackson Hole EA Jackson Hollow EA Keeling Hill North EA Little Grand Canyon EA and NNL (most here, minimal in 222Ao)</p>	<p>Lusk Creek North EA Lusk Creek Canyon EA Lusk Creek ZA (most here, minimal in 222Ch) Martha's Woods EA Odum Tract EA Panther Hollow RNA Pine Hollow EA Pounds Hollow EA Rich's ZA Reddick Hollow BA Reid's Chapel EA Russell Cemetery Barrens EA Saltpeter Relict BA Sand EA Schwegman EA Simpson Township Barrens EA (most here, some in 222Di) Silvey Pond BA Split Rock Hollow EA Stoneface RNA (most here, some in 222Di) Sulfur Springs BA Teal Pond BA</p>
<p><u>State, TNC and recognized private areas:</u> Abbot GA Black Cave Camp Ondessonk Cedar Bluff (most here, minimal in 222Di) Cedar Bluff Cave Draper's Bluff (most here, minimal in 222Di) Eagle Creek-Robinette Creek (some) Fern Rocks Flick Hill (half here, half in 222Di) Frieze Cave Giant City State Park GA Goreville GA Goreville Interchange GA</p>	<p>Guthrie Cave Kinkaid Bluff Lick Creek GA Little Saline River Old Zion Cemetery GA Reeds Creek Canyon East Reeds Creek Canyon North Rock Creek Round Bluff Scout Cave Sugar Creek Thomas Cemetery Site West Ridge</p>
222Di Lesser Shawnee Hills Subsection	
<p>Barker Bluff RNA Big Creek ZA Brown's ZA Burke Branch RNA Cave Hill RNA (most here, some in 222Dh) Copperous Branch Barrens EA Cretaceous Hills EA (some here, most in 222Ca) Dean Cemetery West Barrens EA (some here, most in 222Ca) Dog Barrens EA (some here, most in 222Ca) Grantsburg Swamp EA Gyp Williams Hollow EA (most here, some in 222Dh)</p>	<p>Kaskaskia Woods EA Keeling Hill South EA Kickasola Cemetery EA (some here, most in 222Ca) Leisure City Barrens EA Millstone Bluff EA Pleasant Valley Barrens EA Poco Cemetery East EA (minimal here, most in 222Ca) Robnett Barrens EA Simpson Township Barrens EA (some here, most in 222Dh) Whoopie Cat Mountain RNA and EA</p>

<u>State, TNC and recognized private areas:</u> Archimedes Cave Big Sink Limestone Glade Brownfield Bluff Cache Valley GA Cave Creek Barrens Cave Spring Cave System Collier Limestone Glade Cypress Pond (half here, half in 222Ch) Deer Pond (minimal here, most in 222Ch) Dongola North GA Draper’s Bluff (minimal here, most in 222Dh) Ethridge Limestone Glade Firestone Creek Cave Flick Hill (half here, half in 222Dh) Frailey’s Landing GA Haney Creek (most here, some in 222Ch) Griffith Cave Hick’s GA	Hick’s Dome Plug GA Homberg Spring (half here, half in 222Ch) Hosick Creek Indian Point (most here, minimal in 222Ch) Layoff Cave Little Black Sough-Heron Pond area (some here, most in 222Ch) Mason Cave McClure Shale Glade (minimal here, most in 222Aq) Melcher Hill Limestone Glade Open Pond (some here, most in 222Ch) Orr’s Landing GA Roaring Spring Area Simmons Creek-Hurricane Hollow area Soward Limestone Glade Weaver’s Woods Werner Tract (some here, most in 222Ch) West Vienna Woods (half here, half in 222Ch) White Hill Cave
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4. Central Till Plains, Oak-Hickory Section (222G)

This section forms part of the Central lowlands geomorphic province. The northern half is characterized by relative flatness and shallow entrenchment of drainages due to thick till deposits (50 to 100 feet) that mask the topographic expression of the bedrock. Till is thinner (6 to 50 feet) in the southern half, allowing the topography to be controlled by the relief on the deeply eroded bedrock (McNab and Avers, 1994).

Küchler indicates that the uplands support oak-hickory forest and the bottomlands along the Ohio and lower Wabash Rivers support oak-gum-cypress; elm-ash-cottonwood forest grows along the upper Wabash. Historically, 40 percent of the uplands in this section were tall-grass prairie, not forest. The dominant forest community is post oak-black oak-shingle oak-mockernut hickory-shagbark hickory. Forests on the drier, southern and western slopes are of the white oak-shingle oak-black oak community; the white oak-white ash-basswood-sugar maple- slippery elm community dominates more-mesic sites. The flatwoods community is post oak-swamp white oak-blackjack oak-pin oak. Forests in the broad floodplains are predominantly silver maple, willow, sycamore and American elm nearest the rivers, with pin oak, white oak, hickory, ash, hackberry and honeylocust on heavier soils farther from the riverbanks. Pin oak occasionally grows in pure stands (McNab and Avers, 1994). The subsections of this section are listed in Table E-6.

Table E-6. Subsections of the Central Till Plains, Oak-Hickory Section (222G).

222Gb Mount Vernon Hill Country Subsection
There are no known areas of this subsection on the Forest in a protected status that could be potential RNA-equivalents. No state, TNC or other recognized private areas were analyzed due to incomplete data.
222Gc Lower Wabash Alluvial Plain Subsection
There are no known areas of this subsection on the Forest in a protected status that could be potential RNA-equivalents. No state, TNC or other recognized private areas were analyzed due to incomplete data.

5. Mississippi Alluvial Basin Section (234A)

This section is in the Coastal Plains geomorphic province. The predominant landform consists of flat, weakly to moderately dissected alluvial plains. The plains were formed by the deposition of continental sediments into a submerged, synclinal trough, which was later exposed by sea-level subsidence. Elevation ranges from 0 to 660 feet. Local relief in most of the section ranges from 0 to 100 feet, but it can range from 100 to 300 feet, such as the bluffs bordering the Mississippi River (McNab and Avers, 1994).

Küchler classified the vegetation as southern floodplain-forest and oak-hickory forest. The predominant vegetation form is cold-deciduous, alluvial broadleaf-forest, with small areas of cold-deciduous, broad-leafed forest on upland sites. The main cover-type is oak-gum-cypress, where the main species are Nuttall's oak, water oak, laurel oak, cherrybark oak, cottonwood, sycamore, hackberry, red and silver maple, and bald cypress. The oak-hickory cover-type consists of post oak, bur oak, northern red oak, black oak and white oak (McNab and Avers, 1994). The subsection of this section is listed in Table E-7.

Table E-7. Subsection of the Mississippi Alluvial Basin Section (234A)

234An North Mississippi River Alluvial Plain Subsection
There are no known areas of this subsection on the Forest in a protected status that could be potential RNA-equivalents.
No state, TNC or other recognized private areas were analyzed due to incomplete data.

B. RESULTS

Forty-eight alliances (natural communities) have been identified within the ten subsections related to the Forest. Alliance information is incomplete or lacking for four of the subsections, so the analysis focused on the remaining six. Current information was used, but ground-truthing is required to complete it. The analysis is expected to be ongoing until appropriate representatives have been selected as potential RNA-equivalents. The results of the analysis are displayed in Table E-8.

Table E-8. Community alliances categorized by The Nature Conservancy and their occurrence in subsections on or near the Forest.

Subsections:

222Ao (MR)=Mississippi River Alluvial Plain	222Dh (GSH)=Greater Shawnee Hills
222Aq (IO)=Illinois Ozarks	222Di (LSH)=Lesser Shawnee Hills
222Ca (CH)=Cretaceous Hills	222Gb (MV)=Mount Vernon Hill Country
222Ch (OC)=Ohio and Cache Rivers Alluvia Plain	222Gc (LW)=Lower Wabash Alluvial Plain
222Db (LO)=Lower Ohio-Cache-Wabash Alluvial Plains	234An (NM)=North Mississippi River Alluvial Plain

Within each community alliance/subsection combination “cell,” an established RNA is denoted by a “1,” a Forest Service potential RNA-equivalent by a “2,” and areas under other management/ownership that are potential RNA-equivalents by a “3.” The three-letter codes within the cells denote the confidence or probability that a particular community alliance occurs within a particular province, section and subsection (for example, under 222Ao regarding Alliance 227, CPP explains that we are confident (C) that this alliance occurs within the Eastern Broadleaf Forest Province, it is probable (P) that it occurs within the Ozark Highlands Section and it is probable (P) that it occurs within the Mississippi River Alluvial Plain Subsection). Below the confidence/probability codes, an “F” denotes that alliance is believed to occur on the Forest and an “X” that the alliance is believed to occur on non-national forest lands.

Community Alliances Reported from on and near the Forest	222Ao (MR)	222Aq (IO)	222Ca (CH)	222Ch (OC)	222Db* (LO)	222Dh (GSH)	222Di (LSH)	222Gb** (MV)	222Gc** (LW)	234An* (NM)
I. Forest (I.B.2.N.a) Lowland or submontane cold-deciduous forest										
1. A.227 American Beech-Sugar Maple Forest Alliance	CPP	1 Atwood 1 LaRue 1 Ozark CPP F	CCP F	CCP F	CCC X	CCP F	2 Kaskaskia 3 Heron P CCC F	F	CCC F	3 Horseshoe CCP X
2. A.1911 Black Oak-White Oak Forest Alliance		1 Atwood 1 LaRue 1 Ozark F	CCC F			1 Cave H 1 Dennison 1 Panther 1 Stoneface CCP F	1 Barker 1 Burke 1 Whoopie CCP F	3 Red Hills CCC X		
3. A.251 Northern Red Oak Forest Alliance	3 Schnabel CCC X	3 E. Dora CCC X			CCC X	CCC X				
4. A.253 Post Oak-Blackjack Oak Forest Alliance		1 LaRue CCC F	CPP F	X	CCP	1 Cave H 1 Dennison 1 Panther 1 Stoneface CCC F	1 Barker 1 Burke CCC F			
5. A.261 Post Oak Flatwoods Forest Alliance			CP?		CCC X	CCP	CCP	3 Posem CCC X	CCC X	CC?
6. A.248 Rock Chestnut Oak Forest Alliance		1 Atwood CCC F			CCC X	1 Dennison CCP F				

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Community Alliances Reported from on and near the Forest	222Ao (MR)	222Aq (IO)	222Ca (CH)	222Ch (OC)	222Db* (LO)	222Dh (GSH)	222Di (LSH)	222Gb** (MV)	222Gc** (LW)	234An* (NM)
7. A.239 White Oak Forest Alliance	CCC X	1 LaRue 1 Ozark CCC F	2 Cretaceous	CCC X	CCC X	1 Cave H 1 Dennison 1 Panther 1 Stoneface CCC F	1 Barker CCC F	2 Grants- burg CCC	3 Beall CCC X	
8. A.241 White Oak Forest Alliance			CCP F	C?? ?F ?X		CCC	1 Burke CCP F			
I.B.2.N.d. Temporarily Flooded Cold-Deciduous Forest										
9. A.291 Sweetgum Temporarily Flooded Forest Alliance	1 LaRue CCP F		CCC F	3 Sielbeck CCC F	CCC X		1 Burke CCC F		3 Beall CCC X	3 Horseshoe CCC X
10. A.284 American Beech Temporarily Flooded Forest Alliance					2 Marthas CCC X				CPP X	???
11. A.278 Boxelder Temporarily Flooded Forest Alliance				CC?	CC?					CCC
12. A.293 Bur Oak-Swamp White Oak Temporarily Flooded Forest Alliance								CCC X		
13. A.286 Green Ash-American Elm Temporarily Flooded Forest Alliance	1 LaRue CCP F		CCP	CCP			CCP F			CCC X
14. A.280 River Birch Temporarily Flooded Forest Alliance			CCP X? F?	CCP X? F?						
15. A.279 Silver Maple Temporarily Flooded Forest Alliance	2 Clear Cr CCC	CCC		CCC X	CCC X			CCC X	CCC F	CCC X
16. A.302 Sugar Maple-Bitternut Hickory Temporarily Flooded Forest Alliance	CCP F	1 LaRue CCP F	CP?	CP?		CCC F	CCC F	CCC X		
I.B.2.N.e. Seasonally Flooded Cold-Deciduous Forest										
17. A.328 Overcup Oak Seasonally Flooded Forest Alliance				3 Section F	X		3 Heron P X			CCC X

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Community Alliances Reported from on and near the Forest	222Ao (MR)	222Aq (IO)	222Ca (CH)	222Ch (OC)	222Db* (LO)	222Dh (GSH)	222Di (LSH)	222Gb** (MV)	222Gc** (LW)	234An* (NM)
18. A.329 Pin Oak Seasonally Flooded Forest Alliance	1 LaRue CCP F			3 Section CCC X	CCC X		3 Deer P CCC F	CCC X	3 Chauncey CCC F	3 Horseshoe CCC X
19. A.316 Red Maple-Green Ash Seasonally Flooded Forest Alliance	1 LaRue CPP F		CPP	CPP	CCC X					CCP
I.B.2.N.f. Semipermanently Flooded Cold-Deciduous Forest										
20. A.346 Bald-cypress Semipermanently Flooded Forest Alliance	2 Clear Cr F		X	3 Section CCC F	CCC X		2 Grants-burg X		CCP X	3 Horseshoe CCC X
21. A.345 Water Tupelo Semipermanently Flooded Forest Alliance				3 Round P F					F	CCC
I.B.2.N.g. Saturated Cold-Deciduous Forest										
22. A.348 Red Maple-Blackgum Saturated Forest Alliance			CC?							
I.C.3.N.a. Mixed Needle-Leaved Evergreen-Cold-Deciduous Forest										
23. A.394 Shortleaf Pine Forest Alliance		1 LaRue CCC F								
II. Woodland (II.B.2.N.a) Cold-Deciduous Forest										
24. A.621 Chinquapin Oak Woodland Alliance	CCC X									
25. A.625 Post Oak – Blackjack Oak Woodland Alliance		1 Atwood 1 LaRue CCP F	CCC F	CCP F	CCP ?X	1 Cave H 1 Dennison 1 Stoneface CCC F	1 Cave H CCP F	CCC F	CCP F	
26. A.613 White Oak-Post Oak-Black Oak Woodland Alliance	CCP	1 LaRue 1 Ozark CC? F	F				3 Cave Cr CPP X	CCC X		

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Community Alliances Reported from on and near the Forest	222Ao (MR)	222Aq (IO)	222Ca (CH)	222Ch (OC)	222Db* (LO)	222Dh (GSH)	222Di (LSH)	222Gb** (MV)	222Gc** (LW)	234An* (NM)
III. Shrubland (III.B.2.N.e) Seasonally Flooded Cold-Deciduous Shrubland										
27. A.990 Swamp-Loosestrife Seasonally Flooded Shrubland Alliance	1 LaRue									CCC
III.B.2.N.f. Semipermanently Flooded Cold-Deciduous Woodland										
28. A.1011 Buttonbush Semipermanently Flooded Shrubland Alliance	1 LaRue F	CCC		3 Section F	X	2 Grants-burg X	3 Heron P F	3 Miller CCC X	F	3 Horseshoe CCC X
29. A.1012 Swamp Privet Semipermanently Flooded Shrubland Alliance				CCC	CCC					CCC
V. Herbaceous Vegetation V.A.5.N.a. Tall Sod Temperate Grassland										
30. A.1191 Big Bluestem Herbaceous Alliance	CCC X							CCC X		
31. A.1192 Big Bluestem Herbaceous Alliance	CCC X	1 Ozark	2 Dean East					CCC X		
32. A.1198 Little Bluestem–Yellow Indiangrass Herbaceous Alliance	CCC F	1 Ozark 1 Atwood 1 LaRue CCC F	2 Dean East CC? ?F ?X			1 Cave H 1 Stoneface CPP F		3 Lake Mur. CCC X		
V.A.5.N.j. Temporarily Flooded Temperate or Subpolar Grassland										
33. A.1347 Prairie Cordgrass Temporarily Flooded Herbaceous Alliance				CCC X						
34. A.1343 Switchgrass Temporarily Flooded Herbaceous Alliance				CP?	CPP X		CPP			

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Community Alliances Reported from on and near the Forest	222Ao (MR)	222Aq (IO)	222Ca (CH)	222Ch (OC)	222Db* (LO)	222Dh (GSH)	222Di (LSH)	222Gb** (MV)	222Gc** (LW)	234An* (NM)
V.A.5.N.k. Seasonally Flooded Temperate or Subpolar Grassland										
35. A.1394 Cattail species Seasonally Flooded Herbaceous Alliance	3 Fults CPP X				CCC X			CCC X		
36. A.1387 River Bulrush Seasonally Flooded Herbaceous Alliance									3 Chauncey CCC X	
V.A.5.N.m. Saturated Temperate or Subpolar Grassland										
37. A.1451 Fringed Sedge-Royal Fern Species-Peatmoss species Saturated Herbaceous Alliance		CC? ?X	2 Dean West 2 Cretaceous 2 Kickasola CCC F		CC? ?X	CCC F			CCC X	
V.A.6.N.c. Tall Temperate Grassland with Sparse Cold-Deciduous Tree Layer										
38. A.1491 Bur Oak Wooded Herbaceous Alliance								CPP X		
V.A.6.N.q. Bedrock Temperate or Subpolar Grassland with Sparse Tree Layer										
39. A.1919 (Eastern Redcedar)-Little Bluestem-(Sideoats Grama) Wooded Herbaceous Alliance		1 Atwood 1 LaRue CCC F				CCC F	1 Burke 1 Whoopie CCC F			
40. A.1920 Little Bluestem Oatgrass species Deciduous Wooded Herbaceous Alliance		1 LaRue CCC F	CCC F		CCC X	1 Cave H 1 Dennison 1 Stoneface CCC F	CCC			
V.B.2.N.e. Semi-permanently Flooded Temperate Perennial Forb Vegetation										

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Community Alliances Reported from on and near the Forest	222Ao (MR)	222Aq (IO)	222Ca (CH)	222Ch (OC)	222Db* (LO)	222Dh (GSH)	222Di (LSH)	222Gb** (MV)	222Gc** (LW)	234An* (NM)
41. A.1669 Pickerelweed-Green Arrow-arum Semipermanently Flooded Herbaceous Alliance				CCC X	CCC X					CCC X
V.B.2.N.f. Saturated Temperate Perennial Forb Vegetation										
42. A.1694 Skunk Cabbage-Yellow Marsh-marigold Saturated Herbaceous Alliance									CCC X	
V.B.2.h. Seasonally Flooded Temperate Perennial Forb Vegetation										
43. A.1881 Smartweed Species Seasonally Flooded Herbaceous Alliance				CCC					CCC X	CCC
V.C.2.N.a. Permanently Flooded Temperate or Subpolar Hydromorphic-Rooted Vegetation										
44. A.1671 American Lotus Permanently Flooded Temperate Herbaceous Alliance				CCC X	CCC X					CCC X
45. A.1754 Pondweed Species-Coontail Species-Waterweed Permanently Flooded Herbaceous Alliance	1 LaRue CCP F			CPP F					CPP F	CCC
46. A.1984 White Waterlily-Yellow Pond-Lily Species Permanently Flooded Temperate Herbaceous Alliance				CCC X	CCC X				C?? X?	CCC X
VII. Sparse Vegetation VII.A.1.N.a. Cliffs with Sparse Vascular Vegetation										
47. A.1836 Open Cliff Sparse Vegetation		1 LaRue CCC				1 Stoneface CCC F	CCP	CCC	CCC	

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Community Alliances Reported from on and near the Forest	222Ao (MR)	222Aq (IO)	222Ca (CH)	222Ch (OC)	222Db* (LO)	222Dh (GSH)	222Di (LSH)	222Gb** (MV)	222Gc** (LW)	234An* (NM)
		F					F	X	X	
VII.B.1.N.a. Lowland or Submontane Talus/Scree										
48. A.1847 Lowland Talus Sparsely Vegetated Alliance								CCC X		

* Alliance data is incomplete or lacking for these subsections.

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APPENDIX F

WILDLIFE AND BIOLOGICAL DIVERSITY ANALYSIS

I. SELECTION OF MANAGEMENT INDICATOR SPECIES (MIS)

The 1992 Plan identified 18 MIS to monitor the effects of management practices on native and desired non-native vertebrate species within the Forest planning area. The selected species were: northern bobwhite, eastern wild turkey, yellow-breasted chat, prairie warbler, gray squirrel, Kentucky warbler, worm-eating warbler, white-tailed deer, scarlet tanager, cerulean warbler, wood duck, American redstart, pine warbler, pileated warbler, wood thrush, prothonotary warbler, great-crested flycatcher and rainbow darter.

During the Plan revision process, the list of MIS was reviewed and revised to focus monitoring resources on species that best reflect proposed management and are associated with credible monitoring protocol. Threatened, endangered and sensitive species were considered as appropriate, as were species that play an important ecological role and represent changes in other species with similar habitat requirements.

With these goals in mind, we met with representatives of the IDNR in August, 2003 to refine the MIS list. The IDNR was one of the original partners on both the 1986 and 1992 Plans that helped select the original MIS list. Five MIS were selected as a result of this meeting and subsequent review: northern bobwhite, yellow-breasted chat, worm-eating warbler, scarlet tanager and wood thrush. The five MIS are focused mainly on openlands and early-successional and mature, deciduous forests. They are species that have been and will continue to be monitored as part of bird-monitoring point-counts across the Forest. They are not habitat generalists, but rather habitat specialists that should be indicators of management as well as habitats. Four of the five species have declining population-trends regionally and in Illinois and were included as species with viability concerns on both the Hoosier and the Shawnee National Forests.

A. NORTHERN BOBWHITE

This is a species of openland habitats, including oldfields and grasslands and early-successional hardwood forest and pine plantations. Bobwhite nesting habitat-quality depends on vegetation canopy coverage and height and grass composition (Schroeder, 1985). They most commonly nest in fields where plant succession has progressed at least one year following disturbance (Dimmick, 1972). They nest on the ground and usually within 15-20 meters of openings such as fields, disked strips, or roads. They are almost always found on areas partially covered with standing vegetation less than 45 centimeters tall (Brennan, 1999). Dead vegetation (usually grass or pine needles) from previous year is used (Dimmick, 1972). In the Midwest and Northeast, northern bobwhite is associated principally with heterogeneous, patchy landscapes comprised of moderate amounts of row crops and grasslands and abundant woody edge (Roseberry and Sudkamp, 1998). This is typical of the large openlands on the Forest. Open-canopy (less than 50 percent) pinelands

and mixed pine-hardwood forests that have diverse groundcover vegetation provide ideal habitat in the South (Brennan, 1999; DeVos and Mueller, 1993) and in some areas of the Forest as well. Data indicate that the species has always been a resident in the planning area and had its greatest abundance in the southern portions of the range.

Bobwhites rely heavily on seeds from forest, agricultural and rangeland vegetation, especially understory plants and plants along field margins (Brennan, 1999). They take in vegetation, primarily seeds and some parts (especially leaves) of succulent green plants. In areas of extended snow-cover, they seek patches of bare ground, usually in and around brushy areas (Brennan, 1999). Literature indicates it is a highly opportunistic feeder. In general, seeds of legumes predominate in fall and winter, along with ragweed, pine and oak mast (Rosene and Freeman, 1988).

In forest habitats, this bird shows a clear preference for early-successional vegetation created by disturbances from fire, agriculture and timber harvesting (Brennan, 1999). Agricultural fields and grasslands, open, park-like pine and mixed pine-hardwood forests and grass-brush rangelands all provide high-quality habitat and can produce fall/early-winter densities of 2.2-4.4 birds per hectare, depending on numerous factors, such as frequency and intensity of disturbance and size of disturbance patches (Brennan, 1999).

Bobwhites in southern Illinois require early-successional habitats that can exist across a wide variety of vegetation types (Roseberry and Klimstra, 1984). In agricultural regions, heterogeneous landscapes consisting of moderate amounts of row crops and grasslands, along with abundant woody edge provide optimum habitat (Roseberry and Sudkamp, 1998). Optimum habitat has been described as consisting of 30-40 percent grassland, 40-60 percent cropland, 5-20 percent brushy cover and 5-40 percent woodland cover (Johnsgard, 1973). In addition to grassland habitats for nesting, fallow areas that provide weed seeds over winter and shrubs to provide escape and thermal cover are often neglected habitat components (McCreedy, 2001). Frequent habitat disturbance (e.g., soil disturbance, fire) is essential to prevent loss of preferred early-successional habitats (NaturServe, 2001). In rangeland habitats, low-to-moderate-intensity grazing is beneficial, especially during years of good rainfall (Guthery, 1986).

On the continental scale, this species is declining significantly in most states in the U.S. (Brennan, 1991). In Illinois, call-counts were conducted in June, 2001 to get the breeding-population indices. The call counts were 23 percent below those conducted in 2000, 23 percent below the average of the previous five years, and 44 percent below the 1975 to 2000 average. Biologists conducting the North American Breeding Bird Survey reported a 22 percent decrease in bobwhite observations over 2000 in Illinois (Cole, 2001). Kleen *et al.* (2004) report that northern bobwhite populations have declined slightly in Illinois over the last 22- and 34-year periods (USFWS, Breeding-Bird Survey; Kleen *et al.*, 2004), down 1.5 percent per year and 1.9 percent per year, respectively. They are also declining throughout the Hoosier-Shawnee ecological area (down 3.1 percent per year for the Highland Rim) during the last 34 years (McCreedy *et al.*, 2004).

Population declines are attributed primarily to habitat loss from changing land uses in agriculture, forestry and expanding suburbanization. Recently, the value of agricultural fields as bobwhite habitat has become limited because of increased field size, removal of hedgerows and fence-lines and the applications of pesticides that directly and indirectly

suppress arthropod populations needed by bobwhites as food (Brennan, 1999). Habitat loss is due to fragmentation associated with changing land use, particularly clean farming techniques, single crop production, plantation forestry, fire suppression, replacement of native grass pasture with tall fescue and over-grazing by cattle (Barnes *et al.*, 1995; Brennan, 1991; Brennan, 1999; Roseberry and Klimstra, 1984). Due principally to habitat alteration, only about 24 percent of the state contains suitable habitat at the landscape level (Roseberry and Sudkamp, 1998).

The lack of prescribed fire (especially for management of upland pine forests) is also responsible for widespread losses of bobwhite habitat (Brennan, 1999). Frequent vegetation disturbance (every 1-5 years) from prescribed fire and/or mechanical disturbances is essential for maintaining abundant populations (at or greater than 6.6 bobwhites per hectare) (Landers and Mueller, 1986) in forest habitats. Prescribed fire increases arthropod abundance and facilitates the travel of chicks through groundcover vegetation (Hurst, 1972). Fire also reduces woody encroachment and promotes the sun-loving groundcover species essential for food and cover (Platt *et al.*, 1988; Waldrop *et al.*, 1992).

Habitats for the species on the Forest include early-successional hardwood and pine forests; open, mature pine and oak-hickory woodlands; and large oldfields and grasslands (openlands). The highest populations of the species on the Forest are associated with large (100 acres or larger), managed oldfields and grasslands, such as the former Pennant Bar ranch in west-central Pope county. The species has responded well to management in a number of large openlands or openland complexes on the Forest that have been intensively managed with fire and mechanical disturbances to maintain early-to-mid-successional grassland and oldfields. These same, managed grasslands and oldfields on the Forest are also habitat for other rare or declining grassland and shrubland birds, including Henslow's sparrow, loggerhead shrike, yellow-breasted chat, prairie warbler, blue-winged warbler and American woodcock (Robinson *et al.*, 1999).

B. YELLOW-BREASTED CHAT

In the eastern and Midwestern U.S., habitat for yellow-breasted chats is low, dense deciduous vegetation; e.g., early second-growth forest and shrubs in abandoned agricultural fields, clear-cuts, powerline corridors, fencerows, forest edges and openings, and near streams, pond-edges and swamps (Eckerle and Thompson, 2001). Tolerates areas of open grass if dense shrubs are nearby. Classified as an open-canopy obligatory species (i.e., prefers open overstory and brushy understory), with population-densities directly related to shrub-density to a height of 4.5 meters (Crawford *et al.*, 1981). The species was present in 3-to-12-year-old mixed-oak stands in Virginia (Connor and Adkisson, 1975), where high densities exist in a heavily wooded, partly swampy, floodplain forest with closing canopy (Dennis, 1958 in Eckerle and Thompson, 2001).

Parnell (1969) analyzed habitat relations and habitat-niche usage in North Carolina and concluded that this species prefers dense thickets in upland and floodplain habitats.

According to The Nature Conservancy (2001), the species prefers early-successional stages of forest regeneration; commonly in sites close to human habitation. It nests in bushes, brier tangles, vines and low trees, generally in dense vegetation less than 2 meters above the ground (The Nature Conservancy, 2001). In Missouri, it is equally abundant in cedar glades

and shrubby savannahs as it is in clearcuts (1-8 years). It is also found in shrubby areas with small trees and in oldfields (SVE Panel, 2002). The higher the shrub-patch density, the better the nesting success (SVE Panel, 2002).

In Indiana, several oldfield types provided adequate habitat, but not brushy fields with saplings shading 50 percent of the ground, or nearly continuous stands of large, dense hawthorn (Kahl *et al.*, 1985). According to The Nature Conservancy (1998), clearcuts are probably the best way to create new habitat. Selective logging in the form of either single-tree selection or group selection does not create openings large enough to attract chats. It is important that shrubs are left after clear-cutting, so clear cuts should not be burned or treated in any way that results in the total loss of shrubs (The Nature Conservancy, 1998).

While chats will tolerate considerable amounts of open grass, dense shrubbery is essential. Grazing among bushy patches does not seem to deter chats (The Nature Conservancy, 1998). Similarly, management of powerline rights-of-way should not discourage the development of dense shrubs. Prairie maintenance and restoration efforts that encourage a shrubby transition to surrounding forest (in contrast to a sharp transition) provide suitable chat habitat. In the west, the chat is clearly dependent on shrubby riparian habitat, so maintenance and restoration of riparian areas are essential (The Nature Conservancy, 1998).

The species is adapted to exploiting patchy, short-lived habitats. In eastern, Midwestern and southern parts of breeding range, agricultural set-aside programs that allow succession to occur over several years will create habitat for this species (Eckerle and Thompson, 2001). Wherever marginal cropland is abandoned, the species will benefit until canopy closure. If trees are regularly removed from powerline corridors, suitable habitat can be maintained indefinitely (Eckerle and Thompson, 2001).

Yellow-breasted chat populations have declined slightly in Illinois over the last 22- and 34-year periods (USFWS, Breeding Bird Survey; Kleen *et al.*, 2004), down 2.9 percent per year and 3.4 percent per year, respectively, and throughout the Hoosier-Shawnee ecological area (down 2.5 percent per year for the Highland Rim) during the last 34 years (McCreedy *et al.*, 2004). Populations of the species in southern Illinois and throughout the state have declined slightly since 1993. Within the Central Hardwoods, populations of the species have also declined during that time. It is considered a species of concern in the Central Hardwoods Bird Conservation Region.

Threats to the species include habitat loss and decline in habitat quality. The species is very sensitive to successional changes in the vegetation in its habitat. Species is common in oldfields and grasslands and abandoned, large wildlife openings. However, only small acreages of these will be managed to maintain early-successional habitats in the future. The species is a Neotropical migrant and is also affected by similar threats on the wintering grounds.

C. SCARLET TANAGER

Scarlet tanagers are considered a common summer resident and migrant in the Shawnee Hills and slightly less abundant resident in the Floodplains and Till Plains of southern Illinois (Robinson, 1996). Scarlet tanagers use mature, upland and bottomland hardwoods. They nest and feed primarily in deciduous forest and mature, deciduous woodland, including deciduous and mixed-swamp and floodplain forests and rich, moist, upland forests; and prefer oak trees (Bushman and Therres, 1988). They nest less frequently in mixed forest (Hamel *et al.*, 1982; Hamel, 1992). They are most common in areas with a relatively closed canopy, a dense understory with a high diversity of shrubs and scanty groundcover; and able to breed successfully in relatively small patches of forest (Bushman and Therres, 1988). They also sometimes nest in wooded parks, orchards and large shade trees of the suburbs (Isler and Isler, 1987; Senesac, 1993). They breed in various forest stages, but are most abundant in mature woods (according to some sources, they prefer pole-stands). In New England and southern Illinois they nest mainly in sawtimber hardwoods.

Nests are placed in trees, commonly oak, 2-23 meters above the ground. Typical nests are placed in a leaf-cluster, or with at least several shading leaves, on a nearly horizontal tree branch with a clear unobstructed view of the ground and with flyways from adjacent trees to the nest (Senesac, 1993). In winter, the species primarily uses the forest canopy, forest edges and tall second-growth (Isler and Isler, 1987). In migration, the species occurs in more-open habitats, such as woodlands, parks and gardens, as well as forests (Isler and Isler, 1987).

The species eats insects and other invertebrates and various fruits, including moths, bees, caterpillars, larvae of gall insects, wood- and bark-boring beetles, click and leaf-eating beetles, crane flies and all stages of gypsy moths, except the eggs. Nestlings are fed insects and fruit. The species forages primarily at mid-canopy (6-18 meters off the ground). It occasionally descends to the ground or ascends to the topmost branches. It searches for insects on leaves, twigs and branches, examining the substrate in a leisurely fashion., often picking at dense leaf clusters at the outer tips of limbs (Isler and Isler, 1987). It chases aerial insects (Bushman and Therres, 1988), but may feed on ground-dwelling prey (e.g., grasshoppers, ground beetles, earthworms) during periods of persistent rainfall and/or low temperatures when flying insects are inactive (Zumeta and Holmes, 1978). These authors suggested that severe cases of inclement weather could contribute to a significant several-year reduction in local scarlet tanager breeding populations.

The scarlet tanager population has declined slightly in Illinois over the last 22- and 34-year periods (USFWS, Breeding Bird Survey; Kleen *et al.*, 2004), down 1.1 percent per year and 2.5 percent, respectively. However, the species has increased slightly on the Forest (1999–2003, planning record) and throughout the Hoosier-Shawnee ecological area (up 2.9 percent year for the Highland Rim) during the last 34 years (McCreeley *et al.*, 2004). The species has increased slightly in the Central Hardwoods Region in that same time period.

The greatest threat to the species is the continuing loss and fragmentation of breeding and wintering habitat. Specific effects caused by habitat alterations are not clearly understood. Possible effects include increased nest-predation by edge species (e.g., raccoons, domestic cats, etc.) and increased cowbird parasitism. Little is known of the relationship between the

tanager and its habitat features, especially where habitat manipulations are occurring. Identifying specific threats affecting this species is difficult due to this lack of information. They are a common host to the brown-headed cowbird, and the most parasitized of the tanager family. Adult tanagers seem to recognize female cowbirds as enemies and usually attack them on sight (Terres, 1980; Prescott, 1965). Friedmann (1963) stated that this tanager is not among the primary cowbird hosts.

Like the wood thrush and worm-eating warbler below, the best habitats for the species on the Forest are the largest contiguous blocks of hardwood forest. Approximately 100,000 acres of the Forest is in contiguous blocks of forest habitats over 500 acres in size. These occur on both the east and west sides of the Forest and include the seven wildernesses.

D. WOOD THRUSH

Wood thrushes use deciduous and mixed forests, bottomland hardwood forests, pine forests with deciduous understory, and wooded residential areas (Roth *et al.*, 1996; NatureServe, 2001). Found in both young and old hardwood forests that range from highly contiguous to highly fragmented, this species is common in 11- and 20-year clearcuts. They can be abundant in older sapling/young pole timber-stands. It is considered a strictly successional species further south (SVE Panel, 2002). Breeding populations are more likely to be found in larger tracts, but they also use small fragments (1 hectare or smaller) (Roth *et al.*, 1996). Vertical exposure of the nest (visibility of the nest from above and below) significantly influences nesting success (Hoover and Brittingham, 1998). Nests are usually shaded, placed in the crotch or fork of a tree or shrub, below the forest canopy (Brackbill, 1958; Roth *et al.*, 1996).

Wood Thrushes forage in leaf-litter or on semi-bare ground, almost always under the forest canopy (Holmes and Robinson, 1988), and in a dry place (SVE Panel, 2002). Their diet consists mainly of soil invertebrates (larval and adult insects, millipedes and isopods), but their use of fruit increases from late summer to late winter. In Illinois, from August to November, they fed mainly on fruit in forest gaps (Hoppes, 1987; Malmborg and Wilson, 1988). There is a shift to high lipid fruits during post-breeding and pre-migration (Roth *et al.*, 1996).

The wood thrush tends to use habitats with small streams and springs associated with dense understory in dark, dense woodlands (Pinkowski, 1991). It will also use any dense, thick, shrubby areas, including riparian zones, clearcuts and barrens-regenerated areas (SVE Panel, 2002). In southern Ohio, wood thrushes had general microhabitat preferences and were widely distributed, using areas where slopes were relatively steep and moisture levels intermediate (Dettmers and Bart, 1999). In floodplain habitat, it is only found where natural levees occur (SVE Panel, 2002). Primary habitat features are a shrub-canopy layer, shade, moist soil and leaf-litter within deciduous and mixed forests, bottomland hardwood forests, pine forests with deciduous understory, and wooded residential areas (Roth *et al.*, 1996)

Wood thrushes are common throughout the Forest. Populations have decreased slightly in Illinois over the last 22- and 34-year periods (USFWS, Breeding Bird Survey; Kleen *et al.*, 2004), down 2.3 percent year and 1.3 percent per year, respectively. The species appears to

be stable on the Forest (1999-2003, planning record), but has decreased slightly throughout the Hoosier-Shawnee ecological area (down 0.7 percent per year for the Highland Rim) during the last 34 years (USFWS, Breeding Bird Survey). The species shows decreasing population-trends regionally in the Central Hardwoods. It is considered a species of concern in the Central Hardwoods Bird Conservation Region.

The major reasons for the decline of the species are loss of habitat and decline in habitat-quality due to forest fragmentation (SVE, 2002). Cowbird parasitism and predation also contribute to declines in populations. Since the species is a Neotropical migrant, loss of habitat in the wintering grounds is an additional threat for the species. On the Forest, the best habitats for the species are the largest contiguous blocks of hardwood forest. Approximately 100,000 acres of the Forest is in contiguous blocks of forest habitats over 500 acres in size. These occur on both the east and west sides of the Forest and include the seven wildernesses.

E. WORM-EATING WARBLER

Worm-eating warblers are found in deciduous woodlands and in mixed deciduous and coniferous areas (Mumford, 1984). In eastern North America, worm-eating warblers nest in large tracts where deciduous and mixed forests overlap, with moderate to steep slopes, ravines and patches of dense, understory shrubs (Dunn and Garrett, 1997; The Nature Conservancy, 1998), such as mountain laurel and rhododendron (Hanners and Patton, 1998). Oak leaf-litter appears to be beneficial for nesting purposes as the removal of leaf-litter could adversely affect this species by reducing the number of nesting sites (SVE Panel, 2002). They also nest in low-elevation, coastal forests (The Nature Conservancy, 1998), less frequently in swampy and drier, mixed, lowland forests (Dunn and Garrett, 1997).

The species breeds mainly on heavily wooded deciduous slopes in the Appalachian region and locally in hilly areas of the southern states (Dunn and Garrett, 1997). Moderate to steep slopes are common characteristics of habitat throughout the breeding range (Mengel, 1965; Wenny *et al.*, 1993; Gale *et al.*, 1997; Faaborg *et al.*, 1998); and the species is almost always associated with hillsides (Bushman and Therres, 1988 in Hanners and Patton, 1998). It is very dependent on topography, i.e., it requires steep (35-44 percent) slopes (SVE Panel, 2002).

Worm-eating warblers primarily forage in the understory and probe into suspended dead leaves looking for caterpillars, insects and spiders (Dunn and Garrett, 1997; Hanners and Patton, 1998). Studies suggest, however, that foraging behaviors and substrates vary by season (Greenberg, 1987). On their breeding grounds, they are primarily arboreal live-foliage gleaners (Bennett, 1980; Greenberg, 1987) and occasionally investigate dead leaves and bark, (Greenberg, 1987). Dunn and Garrett (1997) have also mentioned that they usually forage around 3-15 feet from the ground, occasionally higher, but rarely on the ground. In Tennessee, foraging heights range from 1 to 11 meters, but most commonly are from 3 to 5.5 meters (Bennett, 1980). In the wintering grounds, they are highly specialized in searching dead leaves and bark in the understory of tropical forests: they hang and remove prey from leaf curls, holes and crevices (Greenberg, 1987).

Worm-eating warbler populations have declined slightly (down 0.6 percent per year) in Illinois over the last 22 years (USFWS, Breeding Bird Survey) and increased over the last 34

years (up 4.6 percent) (Kleen *et al.*, 2004). Local trends (1999-2003) indicate that populations are increasing (planning record). They have declined slightly in the Central Hardwoods Region. It is considered a species of concern in the Central Hardwoods Bird Conservation Region.

In the larger Hoosier-Shawnee ecological area (Highland Rim), worm-eating warbler populations have declined slightly (down 1.6 percent per year) during the last 34 years (USFWS, Breeding Bird Survey). This latter trend maybe more reliable as a population-trend indicator for the species since it is based on more samples. The population in southern Illinois is estimated at 100,000 territories over several million acres (ca. 1 per 10 acres) (SVE Panel 2002). Worm-eating warblers are considered a common summer residents in the Shawnee Hills and a rare migrant and summer resident in the Floodplains and Till Plains of southern Illinois (Robinson, 1996).

Threats to the species and its habitat are loss of habitat and forest fragmentation. Associated with the latter threat, the species is also threatened by cowbird parasitism and predation. Since the species is a Neotropical migrant, losses and modifications of its habitats on the wintering grounds are also threats to the species and affects breeding populations. Like the wood thrush, the best habitats for the species are the largest contiguous blocks of hardwood forest. Approximately 100,000 acres of the Forest is in contiguous blocks of forest habitats over 500 acres in size. These occur on both the east and west sides of the Forest and include the seven wildernesses.

II. HABITAT SUITABILITY INDEX (HSI) MODEL AND HABITAT-MODELING

Habitat modeling was used in the Forest Plan revision analysis to evaluate the effects of each alternative on MIS. A Windows-based, updated version of the HSI model used for analysis and comparison of MIS in the analysis of 1992 Plan (1992 DEIS Appendix H) was used for MIS analysis and comparison in 2004 for the EIS for the revised Forest Plan. Using a model created by the Missouri Department of Natural Resources and based upon USFWS HSI models, we were able to predict the effects of different management activities on the MIS and their habitats selected for analysis in the Forest Plan revision.

The program assigns scores to habitat variables that are preferred or avoided by MIS. High scores are given for preferred habitat conditions and lower scores for sub-optimal conditions. The model also assigns scores to the type, diversity and abundance of vegetation, distance to water, distance to agricultural land, amount of fragmentation in the area and several other characteristics that may be important to the species. This model predicts the quality (HSI) and quantity (acres available) of habitat available to these MIS in a measure of habitat capability ($HC = HSI \times \text{acres}$).

III. PRESENT CONDITION

The present condition was based on a stratified random sample of 263 sites across the Forest. The Forest was divided into small stands based on the age and type of habitat. Every stand was assigned a chronological number and a random number generator was used to randomly select the sample sites. Habitats were broken into four types: Bottomland forest, upland forest, oldfield and grassland. A 95-percent confidence interval was used to choose the number of sample sites for each habitat. The sampling was conducted in the fall of 2003 by trained field observers.

IV. PREDICTED EFFECTS

The predicted effects of each of the four management alternatives analyzed in the EIS are based on the typical response of the habitats to each of the management activities. These predictions were made based on the professional experience of a team of wildlife biologists with over 20 years of experience on the Forest.

V. SPECIES VIABILITY EVALUATION (SVE)

The NFMA charged all national forests with providing for the diversity of plant and animal communities based on the suitability and capability of the specific land areas in order to meet overall multiple-use objectives of a land management plan. The 1982 implementation regulations (219.9) directed the Forest Service to maintain viable populations of existing native and desired non-native vertebrates in the planning areas.

For planning purposes, a viable population is regarded as one that has the estimated numbers and distribution of reproductive individuals to ensure its continued existence and is well distributed in the planning area. In order to ensure that viable populations will be maintained, habitat must be provided to support at least a minimum number of reproductive individuals, and that habitat must be well distributed so that those individuals can interact with one another in the planning area.

To meet the requirements of the NFMA and planning regulations, the Forest has provided for viable populations and the habitats they depend on under each of the alternatives. On the Forest, a coarse-filter–fine-filter approach (also called ecosystem diversity-species diversity approach) was used as a strategy to provide for the conservation of biodiversity. Since it is an impossible task to ensure viability on a species-by-species basis, the conservation of habitats for species is central to providing for viability. The coarse and fine filters begin as parallel efforts, but soon merge as an integrated analysis for two reasons: 1) to ensure that the ecological communities defined in the coarse filter are useful in tracking habitat trends of species and 2) the fine filter catches species that “fall through the cracks” of the coarse filter. The philosophy of applying a coarse filter in species assessments is described by Haufler *et al.* (1999).

The Hoosier and the Shawnee National Forests coordinated their analyses and adopted the coarse-filter–fine-filter approach, well established in conservation biology literature. Conserving adequate representation of plant and animal communities is viewed as an efficient approach to conserving biological diversity that protects 85-90 percent of all

species (TNC, 1982). This is done by managing dynamic landscapes for the adequate representation of ecological land units, considering the historic range of variability based upon an understanding of natural-disturbance regimes (Haufler *et al.*, 1999). The complementary fine-filter approach focuses on conserving individual rare or specialized species that pass through the coarse filter.

We identified rare, declining, or threatened ecosystems/habitats and identified measures to conserve and/or restore them. We also looked at species as required in 219.19. We used the Regional Forester sensitive species (RFSS) list and information gathered during scoping to focus on a subset of species that could potentially be affected by Forest activities. As part of the RFSS process, the Forest Service periodically screens potential sensitive species, including state and other lists, using a risk evaluation that addresses abundance, distribution, population-trends, habitat integrity and population vulnerability. The public, organizations and other agencies are involved in reviewing the updated criteria and proposed lists. The RFSS process is used to focus on species for which conservation assessments have been or are in the process of being developed.

Conservation assessments have been prepared for these RFSS animals and plants on the Forest, and this information was consulted during the SVE process: subtle cave amphipod, Indiana crayfish, Kentucky crayfish, bigclaw crayfish, bluehead shiner, Henslow's sparrow, cerulean warbler, Eastern woodrat, southeastern myotis, *Asplenium bradleyi*, *Asplenium resiliens*, *Bartonia paniculata*, *Berberis Canadensis*, *Calamagrostis porteri insperata*, *Dodecatheon frenchii*, *Festuca paradoxa*, *Gentiana alba*, *Lonicera flava*, *Lonicera dioica var glaucescens*, *Lysimachia fraseri*, *Polytaenia nuttallii*, *Silene ovata*, *Trichomanes boschianum*, *Vaccinium stamineum*, *Waldensia fragarioides*. Where necessary, we also identified additional specific conservation measures for species with viability concerns, including the bald eagle and its recovery plan, the gray bat and its recovery plan, the Indiana bat and its recovery plan, and Mead's milkweed and its recovery plan. The SVE process discussed in detail below was also used here.

Each of the alternatives was designed in a multiple-use context and each provides for viable, well-distributed populations within ecological constraints. Current and proposed revised Plan Forest-wide standards and guidelines include fine-filter species requirements common to all alternatives. These contribute to the conservation of viable populations.

The SVE process for both the Hoosier and Shawnee National Forests began in 2001 with the planning and preparation of an ecological assessment. In cooperation with representatives of the Forest, individuals from Purdue University, Southern Illinois University, the Indiana Department of Natural Resources Division of Nature Preserves, Indiana University, The Nature Conservancy of Indiana, State and Private Forestry, and the North Central Experiment Station conducted an ecological assessment. The editors documented and published the analysis in 2004 (Thompson, ed., 2004). The ecological assessment encompassed southwest and south-central Indiana, southern Illinois and western Kentucky. It included information on current and historic vegetation, terrestrial and aquatic animal species, plant species, aquatic resources, exotic species and soils.

The two Forests, with professors from Southern Illinois University and a botanist from the Indiana Division of Nature Preserves, generated lists of terrestrial, aquatic and plant species within the ecological analysis area. The list of species met one or more of the following

criteria: They are 1) federally listed threatened and endangered species; 2) species with viability concern; 3) species associated with rare habitats; 4) species for which there is high management and public interest, e.g. Neotropical migratory bird species, cavity nesters and game species; 5) overabundant species, or 6) cave species. The ecological analysis addressed these lists, which include approximately 500 species.

From these lists, the evaluation team next developed an initial list for in-depth SVE. Biologists from the two Forests developed a list of habitat-types found on both Forests and made a list of species using those habitat types. Some of the criteria used to screen the list of 500 species included: the availability of literature on a species, species distribution, presence on national forest system land (instead of just within the ecological analysis area), occurrence within the last 25 years, federal listing of a species, and representation of all habitat-types on both Forests.

The team proposed 54 species for the viability evaluations and coordinated with three universities to complete literature searches on these species:

- Purdue University: Terrestrial animal literature searches—21 species
- Butler University (Indianapolis): Plant literature searches—25 species
- Southern Illinois University: Aquatic species searches—8 species

Literature searches were conducted in lieu of completed conservation assessments prior to the evaluation meetings. The biologists presented the proposed list of species to their respective Forest leadership teams. The principal comment was a request that the RFSS were addressed either in conservation assessments or as part of the SVE process. During a meeting of the two forest supervisors, it was decided that all literature summaries would be completed of all RFSS not addressed in a conservation assessment or as part of the SVE process.

Following further review of the literature summaries, screens were used by both Forests to further reduce the list of species considered. At this step, the screening criteria included threats to the species, those potentially affected by management activities or lack of management. The list of species selected to undergo expert panel reviews was 20 plants and 16 animals. The Forests generated a list of Midwest scientists considered by their peers to be experts in various resource areas (Table F-1 below) and invited them to participate in the SVE. The species were grouped as follows: bald eagle, early-successional birds, forest birds and game birds; fish and crayfish; Indiana bat and other mammals; reptiles; and dry and moist plants. Each habitat-grouping required a minimum of three species experts for the evaluation.

Table F-1. Animal species listed following May, 2002 SVE panel.

Forest birds	
<ul style="list-style-type: none"> • cerulean warbler • wood thrush • worm-eating warbler • red-headed woodpecker (SNF only) 	
Early-successional birds	
<ul style="list-style-type: none"> • Henslow’s sparrow • yellow-breasted chat 	
Threatened bird	
<ul style="list-style-type: none"> • bald eagle (drop) 	
Game birds	
<ul style="list-style-type: none"> • ruffed grouse (HNF only) • northern bobwhite • American woodcock 	
Reptiles and amphibians	
<ul style="list-style-type: none"> • timber rattlesnake • gray treefrog (drop) 	
Endangered mammal	
<ul style="list-style-type: none"> • Indiana bat 	
Other mammals	
<ul style="list-style-type: none"> • eastern woodrat (SNF only) • river otter • bobcat (drop) 	
Aquatic species	
<ul style="list-style-type: none"> • Indiana crayfish • rainbow darter (drop) • northern cavefish (HNF only) • spring cavefish (SNF only) 	
Dry species	
<ul style="list-style-type: none"> • purple fiveleaf orchid (SNF only) • barren strawberry (drop) • soft thistle • Nuttall’s prairie parsley • Mead’s milkweed (SNF only) • Porter’s reedgrass (SNF only) • plain gentian 	<ul style="list-style-type: none"> • rough white lettuce (drop) • early azalea (SNF only) • shortleaf pine (SNF only) • climbing milkvine • procession flower (SNF only) • buffalo clover (SNF only)
Moist forest species	
<ul style="list-style-type: none"> • Appalachian bugbane (SNF only) • Illinois wood-sorrel • ovate catchfly (SNF only) • American ginseng (drop) • large yellow lady-slipper (drop) • Fraser’s loosestrife (drop) • Bradley’s spleenwort (drop) 	<ul style="list-style-type: none"> ▪ French’s shooting-star ▪ epiphytic sedge (SNF only) ▪ New York fern (SNF only) ▪ small green woodland orchid (drop) ▪ heartleaf plantain (SNF only) ▪ Turk’s-cap lily (SNF only)

SVE PANEL PARTICIPANTS

Individuals from the following universities, agencies and organizations attended or provided input to the SVE animal panels:

- American Bird Conservancy: Dr. Jane Fitzgerald
- Butler University: Dr. Rebecca Dolan
- Environmental Solutions and Innovations: Dr. Virgil Brack
- Franklin College: Dr. Alice Heikens
- Hoosier National Forest: Kelle Reynolds and Kirk Larson
- Illinois Department of Natural Resources: Scott Ballard, Larry David, Joe Kath and Bob Bluett.
- Illinois Natural History Survey: Drs. Chris Philips, Jeff Hoover, Chris Taylor, Joyce Hoffman, Rick Phillippe, John Taft and Steven Hill.
- Indiana Department of Natural Resources Division of Fish and Wildlife: Dr. John Castrale, Clark McCreedy, Steve Bachs, Katie Gremillion-Smith, Brant Fisher, Jim Bess, Scott Johnson and Dr. Mike Homoya
- Indiana State University: Drs. Marion Jackson and John Whitaker
- Indiana University: Mike Ewert
- North Central Research Station: Drs. Frank Thompson and Dirk Burhans
- Purdue University: Drs. Harmon “Mickey” Weeks, John “Barney” Dunning and Arwin Provonsha
- Ruffed Grouse Society:
- Shawnee National Forest: Steve Widowski, Mike Spanel, Steve Olson and Elizabeth Shimp
- Southern Illinois University: Dr. Allen Woolf and John Roseberry, Drs. George Feldhamer, Timothy Carter, Ronald Brandon, Brooks Burr, Ginny Adams, Reed Adams, Jim Garvey and Matt Whiles.
- US Fish and Wildlife Service: Joyce Collins, Mike Thompson, Tom Simon and Scott Pruitt
- US Forest Service Regional Office: Norm Weiland, Steve Mighton, Chris Frisbee and Ted Schenk.
- University of Illinois: Dr. Scott Robinson
- University of Louisville: Indiana Bat Expert
- University of Missouri: Fish Biologist-Crayfish Expert

Our joint SVE process with the Hoosier National Forest considered available scientific information and dealt with scientific criticisms. As part of the process, we solicited peer reviews from the state, USFWS and other wildlife experts and have identified information and research needs to help focus the Forest monitoring programs and research needs.

VI. COORDINATION WITH NATIONAL PLANS FOR MIGRATORY AND RARE AND DECLINING BIRDS

The Forest has assisted and coordinated with the Central Hardwoods Bird Conservation (BCR) regional planning efforts, including the Central Hardwoods joint venture concept plan (Fitzgerald *et al.*, 2003). The Central Hardwoods BCR is fully coordinated with priority species and their conservation needs identified by the Partners in Flight, United States Shorebird Conservation Plan, the North American Waterbird Conservation Plan and the North American Waterfowl Management Plan.

The Central Hardwoods joint venture concept plan identified Mississippi River bottoms and hills, Big Muddy bottoms, Inahgeh wetlands, Cave Valley, Bluff Lakes, and Grantsburg/Reevesville Swamps as wetland focus areas, Illinois “Source Forest” west and east as forest focus areas, Shawnee openlands and Illinois barrens as grass-shrubland focus areas (Fitzgerald *et al.*, 2003). These same areas have been given management consideration in the revised Plan to benefit migratory and rare and declining bird species through a variety of management strategies, including their identification as management areas (CV, LO, MO, NA and OB), forest-interior management guidelines and riparian filter-strip guidelines.

Many of the priority species identified in the above national plans and in the Central Hardwoods joint venture concept plan were reviewed as part of the SVE process and are included in the revised Plan as MIS, federally listed threatened and endangered species, RFSS, or species with viability concerns. Species lists were also reviewed in conjunction with the Hoosier-Shawnee ecological assessment (McCreedy *et al.*, 2004).

VII. GIS ANALYSIS OF INDIANA BAT HABITAT ON THE FOREST

Tables F-2 and F-3 display data regarding the Indiana bat on the Forest.

Table F-2. Landscape data for Indiana bats associated with known hibernacula and maternity colonies on the Forest.

Known hibernacula and maternity colonies	Forest Acreage	Private/Other Ownership	Forested Acreage on SNF	Forested Acreage on Private/Other Ownership
Within 2.5 miles of known hibernacula	42,322	78,071	40,466	32,668
Within 5.0 miles of known hibernacula	106,853	257,799	100,564	87,668
Within 2.5 miles of known maternity colonies	23,334	12,809	20,921	4,641
Within 5.0 miles of known maternity colonies	44,205	80,486	40,546	23,323
Total bat zones (no overlap) within 2.5 miles	58,452	88,249	54,613	35,660
Total bat zones (no overlap) within 5.0 miles	115,720	301,400	108,712	97,405

Table F-3. Acreage in each management area of non-overlapping Indiana bat zones associated with known hibernacula and maternity colonies on the Forest (in acres).

<u>Management Area</u> Bat Zone	CR	CV	EH	HR	LO	MH	MM	MO	NA	NM	OB	RA	WD	WW
Within 2.5 miles	4,817	1,581	28,028	137	430	6,505	3,244	3,248	3,184	2,309	3,606	0	1,358	0
Within 5 miles	7,860	2,007	59,081	2,708	580	8,857	4,098	4,809	6,076	3,433	4,697	1,262	8,903	1,343

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APPENDIX G

OIL AND GAS RESOURCES MANAGEMENT

I. INTRODUCTION

This appendix contains an evaluation of the reasonably foreseeable development scenario for oil and gas resources under the Forest. Lease-specific oil and gas notifications and stipulations, which may be added to the standard BLM lease terms for specific parcels that might be leased on the Forest, are listed in Appendix G of the proposed Plan.

II. REASONABLY FORESEEABLE DEVELOPMENT SCENARIO FOR OIL AND GAS

Increased national demand for energy has increased the price that producers receive at the wellhead. Consequently, there could be interest in drilling wells on the federally owned surface of the Forest. This federally owned surface overlies a mix of mineral estate that is classified as either federal, reserved, outstanding, or a combination thereof. Based on the knowledge of historic oil and gas exploration activity and the lack of recent activity, it is impossible to project the number of wells that might be drilled, the miles of road that may be required, or the amount of Forest acreage that might be disturbed.

Federally owned minerals constitute about 87 percent of the minerals ownership on the Forest. The significance of the amount of federal minerals lies in the fact that it represents the only class of mineral estate over which the Forest Service has control, to the extent that the agency determines the availability of land for oil and gas development.

A reasonably foreseeable development scenario for oil and gas was described in the 1992 FEIS on the Forest Plan and the subsequent record of decision on oil and gas leasing. The reasonably foreseeable development scenario indicated that 10-20 acres of national forest surface, involving four to eight drill sites, could be directly affected by oil and gas activities.

The BLM administered the lease of an area of federally owned minerals beneath the Forest—estimated at 16,726 acres—in 1994. Revenue generated from this lease involved bonus bids of \$57,984.00 and rents of \$26,314.00. Due to court orders, the majority of this revenue was returned to the lessees; however, prior to the revenue return, the number of applications for permission to drill had been negligible. No earth-disturbing actions have occurred based on the 1992 leasing decision.

The steps of the development scenario for federally owned oil and gas resources are:

- The revised Plan identifies federal mineral lands available for oil/gas leasing, subject to standard lease terms and special stipulations as identified in Plan Appendix G.
- Industry reviews the available federal minerals.
- If interest exists, industry representatives submit to BLM an “expression of interest” to lease minerals for oil/gas.

- BLM notifies the Regional Forester of industry interest. Officers of the Forest conduct a review and analysis of the federal mineral lands for compliance with the Forest Plan.
- If review concludes that leasing is appropriate, the Forest would recommend that the Regional Forester grant consent to the BLM to lease the federal mineral lands with the appropriate stipulations identified in the Plan. If the review concludes that leasing would have adverse effects on Forest resources, the SNF would not recommend that the Regional Forester consent to lease.
- If consent is granted, the BLM would offer the SNF federal mineral lands for competitive lease sale, subject to appropriate lease terms and stipulations.
- The purchaser of the competitive lease (or lessee) would have the right to explore and develop the oil/gas resources. Prior to any drilling, an Application for Permit to Drill (APD) must be approved by the BLM. The Surface-Use Plan, which is part of the APD, describes the activities that will take place on SNF lands and must be approved by the Forest.
- The APD and Surface-Use Plan would be subject to site-specific environmental analysis.

The development scenario considers the unconsolidated ownership of the Forest. Technology would allow exploration of nearly all federally owned oil and gas resources beneath the Forest from adjacent, privately owned land. Additionally, deed stipulations and other written agreements provide for surface occupancy to reach privately owned oil and gas resources that may exist beneath the Forest surface.

If resource prices, especially those of oil and gas, remain high, there is a possibility that the Forest surface resource could be disturbed by oil and gas exploration. Development scenarios are not currently foreseeable because there is no history of oil and gas development with the Forest proclamation boundary.

A. PETROLEUM GEOLOGY OF THE FOREST

On the Forest, neither the petroleum geology nor its interpretation has changed since it was described in the 1992 Forest Plan. Seismic exploration, which customarily precedes exploration, will continue. Sporadic oil and gas exploration and limited production has occurred on privately owned land south of the Cottage Grove and Shawneetown Fault Systems. This area is expected to continue to be of interest.

B. MINERAL OWNERSHIP AND LEASING

Presently, of the approximately 284,000 acres of surface management by the Forest, about 13 percent of the mineral estate is privately owned and 87 percent federally owned. The percentages of mineral ownership on the Forest will change over time as some mineral rights revert from private to federal ownership, and as new mineral estates are acquired by the Forest Service. While the Forest Service has complete discretion over most surface-disturbing activities on federal surface/federal minerals, it is restricted in its ability to control when and where mineral development can occur on federal surface/ private minerals. Regardless of the degree of Forest Service authority over the two basic types of mineral ownerships, the projections of new drilling activity contained in this appendix are made without regard to

mineral ownership. For both federal and private minerals, a lease is generally the legal instrument that conveys the right to drill on a tract of land.

1. Well-Spacing

The State of Illinois has rules governing the location of wells, or “spacing.” These are found in Chapter I, part 240, of the Illinois Oil and Gas Act. Spacing requirements only become important if a large resource pool is discovered. They establish how many wells can be drilled within a given field or pool. Subpart D (Spacing of Wells), section 240.47 identifies spacing requirements for known pools, with a minimum of 10 acres...It is unlikely that well-spacing will become an issue on the Forest.

2. Directional/Horizontal Drilling

Directional/horizontal drilling is covered by Subpart D, sections 240.45 and 240.455 of the Illinois Oil and Gas Act. These are appropriate methods of exploring the federal mineral estate, especially when the no-surface-occupancy provisions apply.

3. Typical Surface Disturbance

a. Access Roads

New access roads may be required for some exploratory activities, but the existing road system is expected to be adequate for most activities. Adequate access can be provided by using existing roads, some of which may require upgrading, constructing a new road, or a combination of both. Based on the fact that the Forest has no history of oil/gas production, it is assumed that during the exploratory operation, operators tend to seek surface locations that would minimize the amount of access roads required.

b. Well-Pads/Production Facilities

Typically, if a new well is drilled on the Forest, it would require (on average) the clearance of a 0.69-acre well-pad area. Wells drilled to formations over 5,000 feet deep use a larger drill rig and require the clearance of a 1.1-acre well-pad area.

If commercial quantities of oil and/or gas are discovered, an approximately 50-by-50-foot portion of the disturbed well-pad is used to set up the piping, tanks and production equipment necessary to produce the well. Additional area of the pad would also be used as a turnaround area for inspection and maintenance vehicles/equipment.

c. Dry Holes

If oil and gas are not found in commercial quantities, the drilled wellbore is plugged with cement. The well-pad and access road are restored to original contour and all disturbed areas re-seeded. The operator must ensure that vegetation is satisfactorily established over the affected areas to stabilize the soil and prevent erosion.

4. Typical Oil and Gas Operations

a. Seismic Exploration

Initially, seismic exploration will precede earth-disturbing activities. In most cases, seismic exploration would involve vehicular use of existing roads and no earth-disturbing actions.

b. Drilling Operations

Initially, heavy earthmoving equipment could be used to build or improve the access road and construct the well-pad. Topsoil is stockpiled for use in reclaiming areas not needed during the production phase. A large “reserve” pit is dug on the well-pad. Material excavated from the pit during construction is stockpiled on-site to backfill the pit when drilling is complete.

The majority of wells will be drilled by a rotary rig. Less commonly, wells will be drilled by a cable-tool rig. Both types of rigs are powered by diesel engines. During drilling, the mast of a rotary rig extends from 80 to 100 feet in height. Since drilling is a continuous operation until the total depth of the well is reached, the lights and engine noise from the rig are evident throughout the day and night. It is expected that a rotary rig would take about 3 to 5 days to drill a typical well on the Forest.

Cable-tool rigs use a weighted tool that chips away at the rock as the percussion tool is moved up and down on the end of a steel cable. A small amount of water is poured into the hole to suspend the cuttings while drilling progresses. After about five feet of hole have been drilled, the bit is pulled to the surface and a “bailer” is lowered to the bottom of the drilled hole to remove the cuttings, which are dumped into the reserve pit. Cable-tool rigs use less equipment than rotary rigs and can operate in about half the space as a rotary rig. Cable-tool rigs take over four times as long to drill a well as a rotary rig, which is why their use is not common.

Rotary rigs use a toothed, tricone, cutting bit mounted on successive lengths of rotating drill pipe to drill the hole. Either a water-based mud (with additional conditioning agents as needed) or compressed air is used as the circulating agent. In a mud-based system, pumps direct mud down the drill pipe, back up the hole, and out to the reserve pit where the rock fragments will settle. In a compressed-air system, air compressors direct air down the drill pipe, thereby forcing the rock cuttings up the well-bore and into the reserve pit. The air compressors are either self-contained as part of the drill rig, or a separate, independently powered component. Even with air-drilling systems, the operator will keep drilling-clay (i.e., bentonite) and a tank of water at the drill-site in case conditions require conversion to a mud-based system.

As the well is deepened using one of the above methods, steel pipe called casing will be periodically cemented into the hole along its length to seal the rock formations and their native fluids from the drilling (and later producing) environment. Federal regulations require casing to be installed in a manner that will protect freshwater zones and isolate other zones that contain oil, gas and water. Casing is also used to seal off potentially valuable minerals, such as coal seams and other underground features, such as caves, vugs, or large fractures. Federal regulations require that the rigs be equipped with blowout

preventers that are capable of preventing an uncontrolled flow in case a high-pressure zone is encountered.

During drilling and immediately after total depth is reached, a variety of testing devices are placed down the hole on a wire cable. These are used to determine rock characteristics and to ascertain the presence of hydrocarbons. In the event of a commercial discovery, the drill rig is moved from the site and a smaller, truck-mounted rig and two to three 400-barrel tanks are moved onto the site to begin the completion phase.

c. Production Operations

The typical, producing oil well and its associated production facility consists of one or two 100-barrel, steel, oil/water storage tanks surrounded by an earthen dike, a pump-jack and motor to bring the oil to the surface, and electric line to power the motor, a separator—a vessel that separates the raw well-stream into oil, gas and water—and, if gas is being produced with the oil, a gas meter. If an electric source isn't readily available, pump-jack motors can be run by natural gas drawn off the well.

Hydrocarbons are transported from the wellbore to the production equipment by means of varying lengths of 2-inch diameter pipe. Where feasible, pipelines are buried at least 245 inches below the ground surface. There may be a permanent flare to dispose of small quantities of natural gas that are not economic to sell. When natural gas can be marketed, gathering pipelines transmit the gas from the production facility to secondary collector lines and on to main transmission lines.

Water produced along with the oil and gas is generally salty and sometimes sulfurous. Federal and state regulations require that this saltwater, or brine, be properly disposed of. The most common method of disposal in Illinois is to truck the brine to a state-licensed disposal well.

Access to the site will probably be through a locked gate located at the start of the lease access-road. The company employee, called a "pumper," regularly inspects and maintains the well and facility. Tanker trucks will pick up oil and/or saltwater from the production tanks on a schedule determined by the volumes produced.

Occasionally, producing oil and gas wells experience mechanical problems in the wellbore that require a process called a "workover." A workover involves bringing a smaller service rig to the location to perform any required service on the well. Workovers are done on the existing well-pad and sometimes require a small pit to contain any fluids circulated from the wellbore. After the workover is complete, any fluids remaining the pit are vacuumed out and disposed in accordance with state requirements. The pit is then backfilled and revegetated as appropriate.

d. Abandonment and Final Reclamation

Permanent abandonment of depleted producing wells is required by both state and federal regulations to occur quickly after oil and gas operations have ceased. If there will be an excessive interval time between one phase of activity and another, federal and state regulations require that the well be temporarily plugged.

Typically, well-plugging operations can be completed within three days. Activity at the site will entail use of a smaller, truck-mounted service rig and several large trucks that will be used for the retrieval of well-casing and the placement of cement plugs and hydrostatic mud in the bore-hole. All horizons of hydrocarbon occurrence, unusual water flows and freshwater zones will be sealed from the bore-hole by the cement plugs. Remaining surface equipment is removed at this time. Surface restoration and reclamation should be completed within one year of well-abandonment.

e. Production History and Life-Expectancy of Producing Fields

The lack of a past production history makes it impossible to project if exploratory activities would be successful or, if discoveries are made, what the life-expectancy of the field would be.

5. General Development Trends

Representatives of the oil and gas industries have been leasing privately owned oil and gas rights in the northeastern portion of the Forest, specifically in Gallatin, Hardin, Pope and Saline Counties. This leasing action has not resulted in exploration or development actions, but is a definite trend expressing interest in resources within this region.

APPENDIX H

BIOLOGICAL EVALUATION OF REGIONAL FORESTER SENSITIVE SPECIES

The biological evaluation of the Regional Forester sensitive species is filed in the planning record and posted on the Forest's website: www.fs.fed.us/r9/forests/shawnee. It is also available on request from the Forest Supervisor's Office in Harrisburg, Illinois.

APPENDIX I

RESPONSE TO COMMENTS

I. COMMENT-REVIEW PROCESS

During public review of the revised Plan and the DEIS, the Forest received 2,315 distinct comments from 1,471 individual commentators from 35 states and the District of Columbia. Most of the commentators (1,003, or 68 percent) were from Illinois:

Table H-1. Distribution of commentators by location.

AL 3	FL 3	MD 1	MT 6	ND 1	SC 1
AZ 2	IL 1,003	MA 1	NB 1	OH 29	TN 7
AR 13	IN 70	MI 14	NJ 1	OK 3	VA 13
CA 9	IA 6	MN 4	NM 2	OR 3	WA 6
CO 5	KS 3	MS 2	NY 6	PA 7	WV 8
DC 1	KY 33	MO 157	NC 6	RI 2	WI 5

Comments addressed all seven of the topics outlined in the Forest’s Need-for-Change document in Appendix A of the FEIS. Over one-third of the comments addressed the topics of biological diversity and sustainability (39 percent).

Table H-2. Distribution of comments by issue area.

Need for Change Issue	Number	Percent
Watershed Resources	114	5
Biological Diversity, Wildlife and Aquatic Habitat	448	19
Recreation Management	520	22
Forest Ecosystem Health and Sustainability	466	20
Mineral Resources	47	2
Wilderness, Roadless Areas, Wild and Scenic Rivers	269	12
Land-Ownership Adjustment	43	2
Other topics	409	18
Total	2,315	100

METHODOLOGY

As we received comment letters, we read them, coded them and sent them to a content analyst for identification of discernible, distinct comments. The process methodology is described here:

- Commentator data (letter number [form letter number if any], name, address, affiliation if any) were entered into a database. Each unique commentator received a unique identifying number. Illegible names or addresses were noted as such; related persons having the same address were entered as one commentator.
- Commentators who sent one or more letters in addition to, or in place of, one or more form letters, were treated by the software as unique commentators and assigned unique identification numbers.
- Each letter was then reviewed and substantive comments were hand-coded, with each distinct comment numbered and assigned a code relating to subject. A substantive

comment was defined as containing 1) specific environmental, social or economic data or 2) a request for a specific action on the part of the Forest Service related to the Plan revision.

- Comment topic codes are generally the same as those used to code public comments during the scoping process and are related to the resource areas analyzed in the EIS.
- Comment data (letter number, comment number, topic, comment code, comment content) were then entered into the database. Each unique comment received an identifying number.
- Comments that duplicated those already coded from form letters were marked as similar, and not coded again.
- The plan-revision interdisciplinary team reviewed the coded letters for appropriate identification of comments and the coded comments for appropriate coding.
- Comments were reviewed by interdisciplinary team members, grouped by specific topics and, in most cases, summarized and re-phrased into objective statements.
- The resource specialists on the interdisciplinary team then prepared responses to the comments.

II. COMMENT LETTERS RELATED TO PLAN REVISION OR THE DEIS FROM FEDERAL, STATE AND LOCAL AGENCIES

In compliance with CEQ regulations, we provide here copies of comment letters on the Plan revision or DEIS that we received from federal, state and local agencies. These agencies are: US Department of the Interior (USDI) Office of Environmental Policy and Compliance, USDI Fish and Wildlife Service, USEPA Region 5, United Keetoowah Band of Cherokee Indians in Oklahoma, Illinois Nature Preserves Commission, IEPA, IDNR and the Pope County Clerk.



United States Department of the Interior
OFFICE OF THE SECRETARY
Office of Environmental Policy and Compliance
Custom House, Room 244
200 Chestnut Street
Philadelphia, Pennsylvania 19106-2904

IN REPLY REFER TO:

ER OS/231

June 15, 2005

Mr. Randy Moore,
Regional Forester
Eastern Region Office
US. Forest Service.
626 East Wisconsin Avenue,
Suite 800 Milwaukee, Wisconsin 53202

Dear Mr. Moore:

The Department of the Interior (Department) has reviewed the January 2005 Draft Environmental Impact Statement (DEIS) and Draft Proposed Land and Resources Management Plan (Proposed Plan) for the Shawnee National Forest (Forest); Alexander, Gallatin, Hardin, Jackson, Johnson, Massac, Pope, Union, and Williamson Counties, Illinois. The Department offers the following comments and recommendations for your consideration.

GENERAL COMMENTS

The US. Forest Service has done a commendable job in developing an array of alternatives that address a range of resource management issues, including the interests and needs of the public user. In general, the DEIS provides an adequate overview of each of the alternatives with sufficient information provided to allow the reader to understand the components of each of the proposals. Our general comments are provided below and specific comments on the DEIS and Proposed Plan are provided in Enclosure 1 of this letter.

In several places within the D.EIS (vegetation treatments and integrated pest management), reference is made to analyses conducted for other actions. However, the referenced information is not summarized or discussed, nor is information provided as to where such information can be accessed. The referenced information should be summarized and applied to the effects analysis in the EIS.

Appendix H of the Proposed Plan contains specific oil and gas lease stipulations for each management area. However, these stipulations are not entirely represented in the standards and guidelines for the management areas. The standards and guidelines should be revised to reflect these specific stipulations.

With additional land acquisition proposed in the floodplain of the Mississippi and Ohio Rivers, opportunities for habitat restoration will be expanded. This includes the restoration of floodplain/river connectivity, restoration of backwaters and sloughs, and vegetation restoration. These activities would benefit a variety of

migratory birds (waterfowl, shorebirds, wading birds and neotropical songbirds) and federally listed threatened and endangered species. Other fish and wildlife species will also benefit from these habitat improvements, including game fish and mammals. The Department supports the land-ownership adjustment as described in the Proposed Plan. We recommend the Forest Service work with the U.S. Fish and Wildlife Service (USFWS), the Army Corps of Engineers, and the Illinois Department of Natural Resources to ensure restoration actions are compatible with current planning objectives for the area.

Threatened and Endangered Species

Based upon a review of their files, the USFWS concurs that the federally listed species identified in the DEIS constitute an accurate listing of species known to be present within the action area.

Overall, the evaluation of direct, indirect, and cumulative effects on federally listed threatened and endangered species is very general and inadequate for assessing impacts to listed species for purposes of Section 7 consultation under the Endangered Species Act. Specific comments on the analysis are provided in the attachment. Many of the management activities proposed (individually or in combination) are likely to adversely affect the endangered Indiana bat (*Myotis sodalis*) and threatened Mead's milkweed (*Asclepias meadii*). Therefore, the Forest Service, Shawnee National Forest, should initiate formal consultation with the USFWS in order to determine if the Proposed Plan is likely to jeopardize the continued existence of these species. As part of the consultation package, a Biological Assessment should be submitted to the USFWS and should include the following information:

- A description of the proposed action, including any changes/modifications since issuance of the DEIS and consideration of comments on the DEIS.
- A description of the manner in which the proposed action, including all management activities, may affect any listed species (individuals and populations) and an analysis of cumulative effects. For purposes of the Indiana bat, this should include the
- following biological considerations: life cycle, vital statistics, and demographics; physiological and behavioral responses to changes in homeostasis; population abundance; site fidelity; disturbance unrelated to habitat manipulation (e.g., disturbance at hibernacula, summer roost disturbance due to recreational activities, etc.); inter- and intra-specific competition that may result from habitat or prey base changes; migration; home range; permanency and intensity of impacts to habitat (including roosting habitat for maternity colonies and males, foraging habitat, and travel corridors); prey base (composition and abundance); swarming/staging habitat; hibernacula; and, contaminants considerations (e.g., integrated pest management). Where direct biological information on Indiana bats is lacking, ecological surrogates should be utilized to assist in the analysis of impacts. For the Mead's milkweed, the analysis should include impacts likely to occur as a result of prescribed burns conducted during the growing season. Cumulative effects are those effects of future State or private activities, not involving Federal activities, that are reasonably certain to occur within the action area of the Federal action subject to consultation.
- Other relevant reports or analyses prepared on the proposed action and any other relevant studies or other biological information available on the proposed action or the affected listed species.
- Analysis of alternative actions that may provide conservation measures. This may include standards that have been developed to minimize impacts to listed species.

Migratory Birds

According to Executive Order 13186 (dated January 10, 2001), among other things, Federal agencies shall "support the conservation intent of the migratory bird conventions by integrating bird conservation principles, measures, and practices into agency activities and by avoiding and minimizing, to the extent practicable, adverse impacts on migratory bird resources when conducting agency actions." The proposed timber management practices discussed in the Proposed Plan and the normal operating season in the standards and guidelines for these activities will result in the loss of migratory bird nests and/or young. This will impact migratory birds that nest in the canopy, sub-canopy and ground layers of the forest. Direct loss may occur due to death of individuals. In addition, sub-canopy and ground-layer nesting species may be impacted either directly or indirectly through changed habitat characteristics that may alter foraging habitats or influence nest predation. According to the DEIS (Table 3-9), approximately 585 acres of hardwood timber and 445 acres of pine timber will be harvested each year in the first 10 years. In addition, approximately 2,700 acres of hardwood thinning, 11,800 acres of timber stand improvements and 6,300 acres of reforestation would occur in the first 15 to 20 years. These acreages represent a relative small percentage of the more than 284,000 acres administered as part of the Forest. The mix of shelterwood, shelterwood with reserves, and intermediate treatments with the use of forest-interior management standards and guidelines should result in a mix of habitat types for migratory birds, including early successional and forest interior habitats.

The proposed landscape-level prescribed burning is of concern. A normal operating season for prescribed burning is not indicated in the standards and guidelines. In addition, Appendix E of the Proposed Plan indicates an "open-ended" burning season for Natural Areas. The Proposed Plan states that "generally fire will be prescribed for autumn or spring, however, during the height of a drought cycle prescribed fire applied in late summer would be optimal in simulating pre-settlement occurrence." Such burns would be as hot as possible. Burning during the nesting period can have very detrimental impacts to migratory birds, as well as many other species, particularly if done on a landscape scale with several thousand acres impacted. Assuming such burns would be a rare event, most migratory bird populations should be able to sustain these losses. However, specific criteria should be developed that would dictate the timing and frequency of growing season burns to ensure that the impacts are minimized.

Management of large openlands will provide long-term habitat for grassland nesting birds. However, the Proposed Plan calls for mowing for hay to assist in openland management. Mowing from April to August will impact ground-nesting grassland birds. We recommend a standard be included in the Proposed Plan that would prohibit mowing in openland areas prior to August 1 in any given year.

Finally, we support the implementation of forest interior management standards and guidelines in order to manage for this unique type of habitat to benefit migratory birds. However, we recommend a "no-surface-occupancy" stipulation for minerals management be included as part

4of managing forest interior habitat. This would further reduce the potential for certain management practices to adversely impact forest interior migratory birds.

Management for openlands, as proposed under several of the alternatives including the Proposed Plan, might help restore Bachman's sparrow (*Aimophila aestivalis*), a species that formerly occurred on the Shawnee National Forest or adjacent lands as recently as 1975 (W. Douglas Robinson in *Southern Illinois Bird*, 1996, Carbondale). The recent rediscovery of a small colony of breeding Bachman's sparrows on Fort Campbell, Kentucky, less than 100 straight-line miles from the southeastern area of the Forest may be indicative of a small population recovery in this species with the potential to expand back into southern Illinois, well within the historic boundaries of the breeding range of this species. In describing the habitat for this species, Robinson notes that the "choicest locations are about 50 to 100 yards down from the ridgetops in old deserted fields. A typical territory is a circle 150 feet each way from an eroded gully, which has healed and is now well-covered with miscellaneous trees, shrubs, and particularly blackberry brambles. The territory is more attractive after about 5% of the open grass land adjacent is dotted with blackberry briars.. .."

Should this species recolonize southern Illinois, the USFWS believes that the Forest would not provide enough openings to support a viable, population of this species. However, it could add a number of breeding pairs, providing some genetic diversity at the edge of this species' range. The importance of such an edge population is exemplified by the Swainson's warbler, as discussed in the well-prepared comments in the DEIS on that particular species.

The DEIS provides no references to or recognition of the four national bird plans and their regional components (the North American Waterbird Conservation Plan, the U.S. Shorebird Conservation Plan, the North American Management Plan, and the North American Landbird Conservation Plan). These plans were developed with the cooperation of numerous state, federal, and nongovernmental agencies over a period of years. They represent a unified recognition of priority landscapes and regionally or nationally important species which should augment any Forest Service priority or management species identified by a particular national forest. There is also no mention of the USFWS' s Birds of Conservation Concern, an additional and regionalized effort to point out species that require conservation efforts in the Midwest, including southern Illinois.

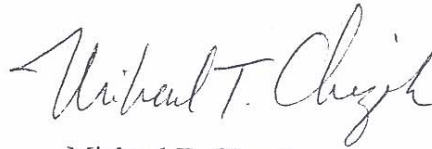
The Important Bird Areas Program is a national effort of the National Audubon Society to identify state-by-state areas of particular importance to breeding and/or migratory birds. Two areas on the Shawnee have been nominated, the LaRue Springs-Pine Hills Ecological Station for Kentucky warbler and worm-eating warbler and Oakwood Bottoms for waterfowl, shorebirds, and yellow-crowned night heron. We recommend that the Forest Service coordinate with the Audubon Society in this Important Bird Areas Program and, if appropriate, provide some additional discussion of the two nominated areas in the Final EIS. Brief descriptions of the four bird conservation plans and links to them, as well as links to other regional planning and management resources related to birds, can be found in Enclosure 2 of this letter.

The Department has a continuing interest in working with the Forest Service to ensure that project impacts to resources of concern to the Department are adequately addressed. For matters related to fish and wildlife resources and federally listed threatened and endangered species,

please continue to coordinate with Ms. Joyce Collins, Assistant Field Supervisor, Marion, Illinois Field Office, U.S. Fish and Wildlife Service, 8588 Route 148, Marion, IL 62959, telephone (618) 997-3344, ext. 340.

We appreciate the opportunity to review the document and provide comments.

Sincerely,



Michael T. Chezik
Regional Environmental Officer

Enclosures (2)

cc w/enclosures:

✓ Hurston A. Nicholas, Forest Supervisor, Shawnee National Forest, 50 Hwy. 145 South Harrisburg, Illinois 62946

Enclosure I

SPECIFIC COMMENTS

PROPOSED LAND AND RESOURCE MANAGEMENT PLAN

Page II-2, Table 2-1 - The amount of pine proposed to be harvested in the revised plan (3.6 MMBFNr.) exceeds the identified Maximum Supply Potential of 3.3 MMBFNr. This possible discrepancy should be explained or corrected.

Page II-3, last paragraph - The discussion of timber that will be available each year as a byproduct of wildlife habitat improvement practices should be moved to the section in which timber is discussed. It appears to be out of place in the discussion of Energy and Minerals.

Page IV-I, B. Ecosystem Management - Management for recovery of federally listed threatened and endangered species should be identified as one of the areas of focus.

Page IV-4, K. Forest Ecosystem Health and Sustainability, last paragraph - The types of integrated pest management techniques proposed to be used should be identified.

Page IV-5, M. Wildlife and Fish Management, last paragraph - Actions should be taken to promote recovery of endangered and threatened species, not just to ensure their continued existence.

Page IV-9, Table 4-2 Scheduled Management Practices Forestwide, All Management Areas – The summary totals reported in this table for Wildlife Habitat Improvement Practices, Timber Stand Improvement, and Prescribed Burning are not the same as the sum for all the individual management areas (Table 4-3 through Table 4-17). These discrepancies should be corrected or explained. .

Page V-2, FW21.1 (G) Pesticides and Biological Treatments - We recommend this Guideline be revised to include minimization of environmental harm as well as meeting management objectives.

Page V -2, FW22.2 (G) Mowing and Sale of Hay - This section should include a standard that prohibits mowing prior to August 1 in order to provide protection to nesting migratory birds.

Page V-II, FW24.5 (G) Normal Operating Season - Timber harvest conducted during the normal operating season will impact both the endangered Indiana bat (*Myotis sodalis*) and many species of nesting migratory birds. Following completion of Section 7 consultation under the Endangered Species Act, all reasonable and prudent measures developed during preparation of the Biological Opinion and Incidental Take Statement should be included as standards to be implemented during timber harvest operations.

Page V-14, FW26.1 (S) Federally-Listed Threatened and Endangered Species - Federal agencies are required to consult with the USFWS to ensure their actions are not likely jeopardize the continued existence of federally listed species. This requirement should be included in this paragraph. In addition, the "best commercial and scientific data available" should be utilized when completing Section 7 consultation and when implementing recovery actions for listed species. While species recovery plans reflect the best information available at the time of their development, many recovery plans are out of date and do not reflect more recent information.

Therefore, this paragraph should be modified to reflect the requirement to utilize the best information available.

Page V-17, FW26.6 (G) Forest-Interior Habitat - This paragraph should identify that "shelterwood with reserves" is the only type of timber practice proposed in forest-interior habitat areas.

Page V -21, FW51.2 (G) Prescribe Fire - A normal operating season for prescribed fire should be identified, as burning during the growing season has the potential to adversely affect many species of plants and wildlife. Specific criteria should be developed for deviations from the normal operating season.

Page V-30, CV28 (2800) Minerals Management - This section should include a "no-surface-occupancy" stipulation for all minerals, not just oil and gas leasing.

Page V -35, EH26.1 (G) Forest Interior Habitat - The referenced forest-interior management standards and guidelines should be included in this section.

Page V-35, EH28 (2800) Minerals Management - Minerals development in forest-interior habitat areas would create forest openings that would promote cowbird parasitism. For this reason, a "no-surface-occupancy" special stipulation should be included for forest-interior habitat areas.

Page V-35, EH28 (S) Minerals Management - The reference to Appendix I should be changed to Appendix H.

Page V-40, LO19 (G) Land and Resource Management - The reference to Appendix H is incorrect.

Page V -40, LO22 (G) Range Management - A standard should be included to prohibit mowing for hay prior to August 1 to protect nesting migratory birds.

Page V -41, LO28 (S) Minerals Management - This special stipulation is not indicated for this management area on page H-6 in Appendix H.

Page V -43, MH22 (G) Range Management - A standard should be included to prohibit mowing for hay prior to August 1 to protect nesting migratory birds.

Page V-44, MH26.1 (G) Forest Interior Habitat - The referenced forest-interior management standards and guidelines should be included in this section.

Page V -44, MH28 (S) Minerals Management - Page H -6 in Appendix H indicates Special Stipulations 5 and 7 apply to this management area. These should be listed in this section. We support these stipulations to protect nesting migratory birds. In addition, the "no surface occupancy" stipulation should be applied to forest-interior habitat areas.

Page V-49, MO25.2 (G) Floodplain Management - The focus of this guideline should be expanded to not only include vegetation restoration, but also restoration of floodplain connectivity. Historically, the floodplains of the Mississippi River and Ohio River were connected to the river by seasonal flood cycles. Such flooding provided valuable nutrient exchange between the river and floodplain habitats, as well as allowing fish access to floodplain habitats for spawning purposes. Restoration of this connectivity should be a focus of future management in these floodplain areas where appropriate.

Page V-50, MO26.3 (G) Fisheries Management - This section should be expanded to include aquatic habitat restoration for large river fish that historically benefited from floodplain habitats and connectivity. For example, restoration of backwaters and sloughs should be considered along with restoration of connectivity to the Mississippi and Ohio Rivers where appropriate.

Page V-50, MO26.4 (G) Waterfowl Management - Many species of migratory birds historically utilized habitats in the Mississippi River and Ohio River floodplains. This guideline should be relabeled "Migratory Bird Management" and the focus broadened to include all migratory birds not just waterfowl. This would be more in accordance with the broad ecosystem management and biodiversity management goals discussed in Chapter IV of the Proposed Plan.

Page V-50, MO28 (S) Minerals Management - According to Appendix H, Page H- 7, Standard Stipulations 1 through 3 and Special Stipulations 5 and 6 also apply. These should be included in this section.

Page V-53, NA28 (2800) Minerals Management - According to Appendix H, Page H-8, Special Stipulation 4, No-Surface-Occupancy for the protection of Natural Area values applies. This should be included in this section.

Page V-53, NA28.2 (S) Mineral Exploration, Leasing and Development - The reference to Appendix I should be changed to Appendix H.

Page V -61, RA28 (S) Minerals Management - Appendix H does not identify any special stipulations for this management area. Those that are to be applied should be identified. The reference to Appendix I should be changed to Appendix H.

Page V -62, WW22 (G) Range Management - Mowing for hay should not occur before August 1 to protect nesting migratory birds.

Page V-63, WW28 (2800) Minerals Management - According to Appendix E, Special Stipulations 4 and 5 apply to this management area. These should be identified in this section.

Page VI-12, Table 6-2 Monitoring Matrix - The monitoring frequency for federally listed threatened and endangered species should be "as needed" according to the Biological Opinion and Incidental Take Statement for the Forest Plan, as well as in support of recovery plans.

Page VI-18, Table 6-2 Monitoring Matrix - The Activity/Output Monitored for "Response to

Revision Topic 4" is incomplete and should be corrected.

Appendix D, Page D-5, Shelterwood Method - Since this is the primary silvicultural management practice to be utilized in the future, this section should be expanded to include some discussion of the time period that is likely to occur between successive harvest treatments.

Appendix E, Pages E-8 through E-47, Management Objectives for Natural Areas - This appendix primarily identifies that the burning season for prescribed fire will be open-ended. "Generally fire will be prescribed for autumn or spring, however, during the height of a drought cycle prescribed fire applied in late summer would be optimal in stimulating pre-settlement occurrence. In order to accomplish management objectives the burn should be as hot as possible while having as rapid a rate of spread that burning safety will allow." The normal operating season for prescribed fire should be identified in the standards and guidelines. Deviations from this normal operating season should only occur based on specific criteria to be developed due to the potential to harm many species of plants and animals. Such deviations would require specific environmental analyses to identify the environmental consequences of growing season burns.

Appendix H, Page H-I, Appendix H Federal Mineral Resource Management, Description of Oil and Gas Standards Lease Terms and Stipulations - While assumptions can be made, this section should specifically identify which stipulations qualify as "standard" and which stipulations are "special. "

Appendix H, Page H-4 - Stipulation 4 is missing from this page.

Appendix H, Pages H-5 through H- 7, Summary of Oil and Gas Lease Stipulations by Management Prescription - The specific stipulations identified for each management area should be included in the standards and guidelines for these management areas. There should be consistency between the information in the standards and guidelines and the information in Appendix H.

Appendix I, Page 1-3, Regional Forester's Sensitive Species, Plants - The information for Bradley's spleenwort and black spleenwort is duplicated.

DRAFT ENVIRONMENTAL IMPACT STATEMENT FOR THE PROPOSED LAND AND RESOURCE MANAGEMENT PLAN

Page II-4, top of page - Fountain Bluff is still listed as part of Heritage Resource Significant Site Management Area., but elsewhere the DEIS indicates that Fountain Bluff is to no longer be considered as part of that management area.

Page II- 7, 8. Threatened, Endangered, Sensitive SPI1cies - This section references standards and guidelines will require review of all surface-disturbing projects by qualified professionals prior to implementation to determine whether any threatened, endangered or sensitive species or habitat will be affected. The Proposed Land and Resource Management Plan standards and guidelines did not include the standards and guidelines referenced in this section. These standards and guidelines should be provided in the Biological Assessment for the Proposed Plan during Section 7 consultation

with the USFWS.

Page II-9, Selection of Management Prescriptions, first paragraph - The reference to Table 2-1 should be changed to Table 2-2.

Page II-14, Table 2-3, Forest Interior Habitat - A reference should be provided for the location of the forest-interior habitat management guidelines within the DEIS. This table also references land areas at least I-mile diameter in size while the Proposed Plan references contiguous forest areas greater than 500 acres (Page V-17, FW26.6 (G)). Although essentially equivalent in size, consistency in use between the EIS and Proposed Plan should be followed.

Page II-IS, Table 2-3, Wildlife Openings - The 1992 Plan guidelines should be provided in the Final EIS for the Proposed Plan.

Page III-28, a. Shelterwood Harvest - The number of years between re-entries associated with the shelterwood harvest method should be identified.

Page III-30, 7. Vegetation Treatments - While it is appropriate to incorporate information by reference in the EIS, the information in the referenced documents should be summarized. In addition, it is appropriate to include information in the EIS that would enable the reader to access the referenced documents (e.g., literature references, web links, etc.).

Page III-33, 9. Integrated Pest Management - While it is appropriate to incorporate information by reference in the EIS, the information in the referenced documents should be summarized. In addition, it is appropriate to include information in the EIS that would enable the reader to access the referenced documents (e.g., literature references, web links, etc.).

Page III-36, 12. Minerals Management, i. Brine Spills, 3rd paragraph - To minimize potential impacts associated with brine-spills, dikes should be required around the drill pads.

Page III-37, 12. Minerals Management, ii. Oil Spills - The dikes constructed around drill pads and storage tanks would minimize impacts associated with oil spills. It is assumed that the Shawnee National Forest has oil spill contingency plans to address potential oil spills. Information regarding such plans should be referenced in the EIS.

Page III-39, 12. Minerals Management, b. Water Quality, 2nd paragraph - As mentioned above, dikes should be required to be constructed around drill pads, regardless of the distance from perennial or intermittent streams.

Page III-49 - The information on this page indicates that the maple-beech community increased from 2 percent of the Forest in 1962 to 26 percent in 1985 but as since declined to 16 percent by 1998. The Final EIS should provide some discussion of possible reasons for this recent decline.

Page III-50, d. Other Hardwoods - This paragraph states that "Past cutting practices have resulted in these types being composed of mostly low-value species." The Final EIS should indicate the basis

for this valuation. We assume it is of low value from a timber products perspective but that it does not necessarily mean it is of low value to wildlife.

Page III-55, Table 3-8 - The acres burned in 2003 and 2004 should be included in this table.

Page III-68, Table 3-9 - The "shelterwood with reserves" acreage for pine (Alt. 2) does not correspond with the amount in Table 4-2 of the Proposed Plan. This should be corrected.

Page III- 74, 7. Vegetation Treatments, a. Alternatives 1,2 and 4, 3rd paragraph - While it is appropriate to incorporate information by reference in the EIS, the information in the referenced documents should be summarized. In addition, it is appropriate to include information in the EIS that would enable the reader to access the referenced documents (e.g., literature references, web links, etc.).

Page III - 78, 9. Integrated Pest Management - The Final EIS should provide some information on the types of pesticides that may be used and the environmental impact associated with these pesticides.

Page III-I 06, 6. Cultural Communities - Pine plantations harbor species unique to this type of habitat (e.g., pine warblers). The loss of this habitat over time would actually reduce overall biodiversity as species of plants and animals unique to this habitat type are lost. Therefore, the discussion of effects of the various management actions should focus on "native" biodiversity, which should benefit from the management actions. The USFWS supports alternatives that provide for the vast array of habitats native to this region and the migratory, breeding, and wintering birds associated with these habitats.

Page III-I09, a. Habitat Suitability Index (HSI) Model- This paragraph references Appendix F for more information on the HSI Model utilized. However, the information in Appendix F is also sparse. A literature citation or reference for the HSI model should be provided or, alternatively, information on the model and model questions can be provided as an appendix.

Page III-I 13, Table 3-15 - This table references Habitat Indicators from Table 3.37. This should be corrected to Table 3-14. In addition, the acreage figures for Alternative 1 do not entirely correspond to the information in Table 3-14.

Page III-114, ii. Mature-Forest MIS, I st paragraph - According to the Proposed Plan standards and guidelines, the Normal Operating Season for timber harvest is April 1 to November 30 for uplands and May 1 to September 30 for bottomlands. The impact of timber harvest on Mature Forest MIS should be evaluated based on impacts occurring during the nesting season. In addition, sub-canopy and ground nesting species are also likely to be affected through either direct loss of nests or through habitat alterations that may impact nesting success (e.g., changes in forage insects and/or temperature or increased predation)..

. Page III-I 14, ii. Mature-Forest MIS, 3rd paragraph - The Proposed Plan standards and guidelines do not provide a Normal Operating Season for prescribed fire. In addition, Appendix E states that the

burning season for Natural Areas will be open-ended. The Proposed Plan standards and guidelines should be modified to identify a normal operating season for prescribed fire and specific criteria for conducting prescribed fire outside of this season. In lieu of these modifications, the Final EIS should describe the impact of conducting prescribed fire during the growing season on management-indicator species.

Page III-115, b. Alternative 2, i. Early-Successional MIS, 1st paragraph - See comment above concerning prescribed fire.

Page III-115, b. Alternative 2, i. Early-Successional MIS, 1st paragraph, last sentence Table 3-15 does not reflect a reduction in grassland and old field habitat acres.

Page III-116, b. Alternative 2, i. Early-Successional MIS, 2nd paragraph, 1st sentence - This sentence would appear to contradict the last sentence of the previous paragraph.

Page III-116, b. Alternative 2, i. Early Successional MIS, top of page - The last sentence of this paragraph indicates early successional habitat would increase over time, however, Table 3-15 indicates this habitat type would decline over the long term.

Page III-116, b. Alternative 2, i. Early Successional MIS, 1st paragraph - The changes in habitat capability over time for early successional species can be misleading. While the habitat capability will increase over the current condition, there will be a decrease from short-term habitat changes (e.g., 10 years) to long-term changes (e.g., 50 years). These trends should be reflected in the discussion.

Page III-116, b. Alternative 2, ii. Mature-Forest MIS - See previous comments regarding timber harvest during the nesting season.

Page III-117, b. Alternative 2, ii. Mature-Forest MIS, 1st paragraph, 1st sentence - This sentence indicates that prescribed burns would occur in early spring and late fall, outside the MIS nesting season and after seasonal migration. However, this is not reflected in the Proposed Plan standards and guidelines for fire management or in Appendix E of the Proposed Plan, which indicates an open-ended burning season.

Page III-119, c. Alternative 3, ii. Mature-Forest MIS, 1st paragraph - The last sentence in this paragraph, which states that the overall quality of mature forests would decline without management, is out of place in this discussion. With regard to habitat quality for management indicator species, habitat quality would essentially remain the same or show minor increases over time under Alternative 3.

Page III-121, 3. Aquatic Resource Management and Mineral Resources Management - This paragraph states that direct and indirect adverse effects could occur, however, the effects are not identified. The effects of the action should be identified. For example, not all the management areas have special stipulations on timing for minerals management. This could result in adverse effects to

nesting migratory birds.

Page III-121, 4. Land-Ownership Adjustment - Over the long-term, this action should result in positive benefits for a variety of species as habitats are restored.

Page 111-122, Tables 3.16 and 3.17 - It is assumed that the habitat capability units (HCD' s) in these tables are based on the acreage figures reported in Table 3.15. If this is the case, this presents a problem with the reliability of the reported HCD's. This is due to the differences in time period utilized for making predictions for habitat changes (20 years and 100 years) and the time periods for predicting changes in HSI's (10 years and 50 years). While it is unlikely that significant habitat changes would occur from year 10 to year 20, the longer term changes from year 50 to year 100 are likely to be much more significant. Therefore, this table and the information in the previous section on management-indicator species should be corrected to account for habitat changes at Year 50 instead of Year 100.

Page III -126, Table 3-18 - This table should identify that these are predicted short-term effects on management-indicator species. The long-term effects can be substantially different depending upon species and alternative. For example, under Alternative 3, the yellow-breasted chat is predicted to experience a 60 percent decline in HCD's.

Page 111-127, Table 3-19 - The status listed for some species are incorrect. The Indiana bat is federally listed as endangered and Mead's milkweed is federally listed as threatened. The worm-eating warbler, short-leaf pine, wood thrush, and Northern bobwhite are not federally listed species.

Page 111-128, Table 3.20 - The reference to Table 3.37 should be changed to Table 3.14. In addition, the acreage figures reported in this table do not entirely correspond to the data in Table 3.14.

Page 111-129, 1. Red-Headed Woodpecker- While standards and guidelines protect standing dead trees, it should be expected that some of these would be lost due to timber management and prescribed burning in areas with dead trees. In addition, growing season bums could impact nesting red-headed woodpeckers. However, opening of the understory by prescribed burning in oak forest areas would benefit this species.

Page 111-136, Federally Listed Threatened and Endangered Species, 3rd paragraph - This paragraph should also identify that the Forest Service is required to ensure that its actions do not jeopardize the continued existence of federally listed threatened and endangered species.

Page III-136, Federally Listed Threatened and Endangered Species, last paragraph - This paragraph references Forest-wide standards and guidelines for each species, however, these standards and guidelines-were not listed iI). the Proposed Plan.

Page 111-137/138, i. Indiana bat - Over the long-term, as the Forest in restrictive management areas matures to old-growth conditions and trees die from age and/or disease, roosting and foraging habitat for Indiana bats would likely increase.

Page 111-140-141, Least tern, Pallid sturgeon, Fanshell mussel, Fat pocketbook pearly mussel, Pink mucket pearly mussel, Orange-footed pearly mussel- Many of the benefits described in this paragraph are economic in nature and are not benefits to biodiversity. Flooding (e.g., flood pulse) and low-flow periods are natural attributes of riverine systems and provide many benefits to the species adapted to these systems. For example, flooding provides for nutrient exchange between the river and the floodplain, which is important for invertebrate and fisheries production. Alternatively, low-flow periods provide shallow water habitats important for larval fish. Finally, the contribution of floodplain food sources would only occur if important habitats are reconnected to the river.

Page III-I43, 2. Roads and Trails Management, i. Indiana bat 1st paragraph - The effects of roost tree removal depends upon the time of year the trees are removed and whether maternity colony roost trees are removed. The removal of a known maternity colony, regardless of when removed, could have significant adverse affects.

Page III-I43, 2. Road and Trails Management, i. Indiana bat, 2nd paragraph - While the effect of 95 miles of road construction may individually be minor, these effects have to be considered in conjunction with the effects of all other management activities.

Page III-I47, 4. Dispersed Recreational Use and 5. Developed Recreational Site Use - Indiana bats could be directly impacted by this activity should it become necessary to remove roost trees (particularly maternity roost trees) for human health and safety.

Page III-I48, 6. Timber Harvest Methods and Other Vegetation Treatments, Indiana bat Overall, the discussion of effects to the Indiana bat under all alternatives is lacking. As timber harvest is proposed during the maternity season and swarming season, Indiana bats are likely to experience direct mortality of individuals. With the exception of roosting and foraging habitat, the impacts of the management activities on Indiana bat prey base and other life history characteristics have not been discussed. We disagree that the overall effect of these activities on the Indiana bat would be minor, beneficial, and indirect. A Biological Assessment should be prepared which fully discusses the effects of the proposed management activities, individually and cumulatively, on the Indiana bat.

Page III-I48, 6. Timber Harvest Methods and Other Vegetation Treatments, a. Alternative 1, i. Indiana bat, - The first sentence states that timber harvest and other vegetation treatments have had relatively no overall direct or indirect effects on Indiana bats to date. Some information, including references, should be provided to support this statement. We disagree that the various actions would have no measurable effect on Indiana bats. At a minimum, various acreages of Indiana bat habitat will be affected and can be measured.

Page III-ISO, b. Alternative 2, i. Indiana bat, I st paragraph - The reference to uneven-aged group selection harvest should be changed to more accurately represent this alternative (e.g., even-aged shelterwood harvest). The amount of hardwood timber harvest identified in this paragraph appears to be significantly lower than the amount in Table 4-2 of the Proposed Plan. We disagree with the last sentence that the actual effects on local populations would be small and most likely not

measurable in the short term. Many factors would determine the overall effect of the activity on Indiana bats, both locally and rangewide. These include the locations and size of the timber cuts, length of rotations, intra- and inter-specific competition, impact on travel corridors and foraging habitat, and impacts to prey base to name a few.

Page III-150, b. Alternative 2, i. Indiana bat, 2nd paragraph - The information in this paragraph does not appear consistent with data in Table 3-11.

Page III-150 to III-151, b. Alternative 2, i. Indiana bat - As mentioned above, we disagree that the overall effect of the proposed activity on the Indiana bat would be minor, beneficial, and indirect.

Page III-152, c. Alternative 3 - With this alternative, the forest will mature into more old-growth timber. As a result, over the long-term as trees die from age or disease, more roosting habitat would become available. Foraging habitat would also improve with a more open canopy.

Page III-152, d. Alternative 4, i. Indiana bat, 2nd paragraph - The information presented in this paragraph does not appear consistent with data presented in Table 3-11. A Biological Assessment should be prepared which fully discusses the effects of the proposed management activities, individually and cumulatively, on the Indiana bat.

Page III-154, last paragraph - According to Table 2-3, Forest-wide standards and guidelines for threatened and endangered species would be revised for all alternatives. However, these standards and guidelines do not appear to be in the Proposed Plan or elsewhere in the DEIS. Therefore, it is unclear what Forest-wide standards and guidelines are being referred to in this paragraph.

Page III-155, b. Alternative 2, i. Indiana bat, gray bat, bald eagle - The information in this section is insufficient in describing the effects of fire management on listed species. In particular, prescribed fire can have direct and indirect effects on Indiana bats. The specific fire protocols (e.g., time of year, burn unit size, burn frequency, juxtaposition of burn units, intensity of burns, etc.) to be used are the most influential factors in determining the extent and magnitude of effect of fire on Indiana bats. Depending upon when, where, and how burns are conducted, exposed Indiana bats may express a continuum of responses ranging from avoidance to death. Prescribed fires may benefit bats by improving foraging habitat and increasing arthropod prey abundance. Conversely, prescribed fires may be detrimental to bats by impacting roost trees, causing abandonment of young, causing direct death of bats through smoke inhalation or carbon monoxide poisoning, or adversely affecting the available prey base. Burns conducted near hibernacula in the fall could affect Indiana bats that are swarming and change the relative abundance of prey during this critical time. The creation of fire lines and the method of ignition may also adversely affect bats.

Page III-156, b. Alternative 2, ii. Mead's milkweed - According to Appendix E in the Proposed Plan, the burning season for sensitive areas, including natural areas with Mead's milkweed, will be open-ended. Growing season burns would adversely impact this species through the loss of individual plants.

Page III-157, 8. Integrated Pest Management - The information in this section is insufficient to determine the impacts of integrated pest management on federally listed species. Some information should be provided regarding the type_ of herbicides/pesticides that might be expected to be used on the forest and specific requirements that would be implemented to minimize the potential impacts to listed species. For example, some herbicides have a high potential to impact aquatic insects which are part of the food chain for Indiana bats. Establishing a buffer area to prohibit aerial applications within 300 feet and ground applications within 10 feet of any waterbody would reduce the potential for impacts.

Page III-159, 10. Aquatic Resources Management, Indiana bat, gray bat, bald eagle, last paragraph - This paragraph belongs in the next section.

Page III-160, 11. Minerals Management _ The scope of potential impacts to listed species associated with mineral development would largely depend on the scope of development. Mining of some minerals could result in loss of roosting and foraging habitat. In addition, oil and gas development could adversely affect listed species if spills occur. As previously no tee dikes or berms should be required around all drill pads and tanks. In addition, an oil spill contingency plan should be in place to minimize potential impacts to listed species as a result spills and clean-up operations.

Page III-160, 12. Land-Ownership Adjustment - With this management action, the Forest

Service has the opportunity to benefit listed endangered species that depend on riverine habit In particular, opportunities may exist for floodplain restoration, including reconnection with I river, and backwater/slough restoration. Such actions would provide the beneficial exchange nutrients with the river and allow riverine fish access to the floodplain for spawning purposeE Such actions that increase invertebrate and fish production would benefit pallid sturgeon, lea_ terns, and bald eagles. The addition of organic matter would benefit listed mussel species.

Page III -172, Cumulative Effects, 3rd paragraph - In the first sentence, the species being discussed needs to be identified.

Page III-179, Henslow's sparrow and Migrant loggerhead shrike - The literature cited in this section is not included in the References.

Page III-179, Henslow's sparrow and Migrant loggerhead shrike, 2nd paragraph - Unless a "r surface-occupancy" stipulation is applied, minerals management activities have the potential adversely impact these species through loss of habitat.

Page III-179, Henslow's sparrow and Migrant loggerhead shrike, 3rd paragraph - The first sentence in this paragraph regarding short-term management actions is confusing. Actions t1 inhibit succession to young hardwoods would be a benefit to these species.

Page III-183, Cerulean warbler and Swainson's warbler, last paragraph - It is unclear whether special

stipulations for "no-surface-occupancy" would be applied in forest-interior management areas occurring in the Even-Age Hardwood and Mature Hardwood Management Areas. If special stipulations are applied, then we would agree that impacts to these species would be unlikely. However, if surface occupancy for mineral extraction is allowed in forest-interior areas, then openings with short-grass vegetation may be created that would impact nesting success of cerulean warblers and other forest-interior species.

Page III-1 84, Cerulean warbler and Swainson's warbler, 4th paragraph - According to Appendix E of the Proposed Plan, the burning season would be open-ended for sensitive areas: allowing for growing season burns during a drought cycle. Burning during the growing season would impact nesting migratory birds either directly through loss of nests or indirectly by affecting insect prey abundance or predation rates.

Page III-188, Northern copperbelly watersnake, 2nd paragraph - The typographical error should be corrected (ot to of).

Page III-190, top of page - The typographical error should be corrected (slightly to slightly).

Page III-197, Southeastern myotis - The literature cited in this section is not listed in the References.

Page III-198, Southeastern myotis, 1st paragraph - The specific Forest-wide standards and guidelines should be listed.

Page III -198, Southeastern myotis, 4th paragraph - Information in the Proposed Plan indicates that prescribed burning could occur during the growing season. Such burns have the potential to adversely impact this bat species. See above comments regarding prescribed burning and Indiana bats.

Page III-200, Carinate pillsnail, 2nd paragraph - The typographical error should be corrected (know to known).

Page III-225, Forest Interior Management standards and guidelines, top of page - "Shelterwood with reserves" should be identified as the preferred timber harvest method in forest-interior habitat areas. In addition, a "no-surface-occupancy" stipulation for minerals management should be added as a standard to reduce the potential for impacts in forest-interior habitat areas.

Page III- 231, 9. Integrated Pest Management - There is so little information provided in the DEIS regarding integrated pest management that it is difficult to determine whether adverse effects are likely to occur. In general, some information should be provided regarding the types of pesticides that may be utilized and best management practices that would be implemented to minimize harm to the environment (e.g., buffer areas, restrictions during certain environmental conditions, etc.).

Page III-232, 12. Minerals Management - A "no-surface-occupancy" stipulation should be applied to

forest-interior habitat areas. Developments for certain types of minerals could involve long-term occupancy in these areas, therefore, the impacts could be very detrimental to migratory birds that require forest-interior habitat for successful nesting (e.g., cowbird parasitism could impact nest success).

Appendix F, Page F-9, 1st paragraph - The last two sentences of this paragraph need to be revised/clarified. In addition, a reference for the habitat model utilized should be included in this section.

Enclosure 2

Information for All-Bird Conservation Planning:

Bird Conservation Initiative Web Sites:

The North American Waterfowl Management Plan is now undergoing revision. The 2003 Update to the Plan will combine the core elements of the original 1986 Plan and the 1994 and 1998 updates with guidance addressing the issues and conditions of the 21st century.

It is available in draft form at <http://northamerican.fws.gov/NAWMP/2003nawmpdraft.htm>. See especially the continental population objectives and geographical and population priorities in Section IV and Appendix B. The related links on the NA WMP home page provide additional regional perspectives.

Partners in Flight, the landbird conservation initiative, maintains an information-rich website at <http://www.partnersinflight.org/>. It includes links to many bird resources, notably downloadable PDF versions of some 50 PIF Physiographic Area Plans, the Species Assessment Database, a Research & Monitoring Needs Database, and an extensive species by species conservation information table (<http://www.partnersinflight.org/birdac.htm>). The forthcoming Continental Plan will include population estimates and regional conservation targets for all North American landbirds.

The U.S. Shorebird Conservation Plan is available for download at <http://shorebirdplan.fws.gov/>. The site also provides access to regional shorebird planning documents and technical reports, including the Upper Mississippi Valley / Great Lakes Regional Shorebird Conservation Plan.

Version 1 of the North American Waterbird Conservation Plan emphasizes colonial-nesting waterbirds and seabirds. Information on how to request copies is available through the publications link at <http://www.waterbirdconservation.org/>. A plan for the Upper Mississippi Valley / Great Lakes region is currently being reviewed and will be available in 2005.

Additonal Regional Planning and Management Resources:

U.S. North American Bird Conservation Initiative (NABCI): <http://www.nabci-us.org/>

Breeding Bird Survey (BBS): <http://www.mp2-pwrc.usgs.gov/bbs/index.html>

Important Bird Areas (IBAs): <http://www.audubon.org/bird/iba/>

Species of concern in USFWS Region 3: <http://midwest.fws.gov/Endangered/>



United States Department of the Interior

FISH AND WILDLIFE SERVICE
Marion Illinois Suboffice (ES)
8588 Route 148
Marion, IL 62959
(618) 997-3344

Received
8/22/05
[Signature]

August 17, 2005

Mr. Hurston A. Nicholas
Forest Supervisor
Shawnee National Forest
50 Highway 145 South
Harrisburg, Illinois 62946

Dear Mr. Nicholas:

This letter acknowledges the U.S. Fish and Wildlife Service's (Service) July 21, 2005 receipt of your July 19, 2005 letter requesting formal section 7 consultation under the Endangered Species Act. The request for consultation concerns the possible effects of your proposed revision of the Shawnee National Forest Land and Resource Management Plan (Proposed Plan) on the endangered Indiana bat (*Myotis sodalis*). We concur with the Biological Assessment that implementation of the Proposed Plan is likely to adversely affect the Indiana bat.

While we request some additional information and coordination with your staff as indicated below, we will begin the consultation clock as of our receipt of your request letter. We have assigned log number 2005-R3-MISO-1 to this consultation. Please refer to that number in future correspondence on this consultation.

Section 7 allows the Service up to 90 calendar days to conclude formal consultation with your agency and an additional 45 days to prepare our biological opinion (unless we mutually agree to an extension). Therefore, we expect to provide you with our biological opinion no later than December 3, 2005. We anticipate providing a draft biological opinion no later than November 3, 2005.

After reviewing the Biological Assessment for the threatened Mead's milkweed (*Asclepias meadii*), we find that the adverse effects associated with implementation of the Proposed Plan are not entirely insignificant or discountable, and therefore, are likely to adversely affect the species. This is based on the following:

- a. During many years in southern Illinois the growing season begins prior to the end of March. Therefore, prescribed burns conducted during this time, although beneficial over the long-term, may result in some adverse impacts (e.g., loss of some individual plants).

Mr. Hurston A. Nicholas

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- b. The standards and guidelines state that “Prescribed burns **should** take place between the end of October and the end of March to stimulate flowering.” The term “should” is not an imperative term indicating that something will occur. While this does provide some flexibility, it also would seemingly allow prescribed burning to occur during the summer (as referenced in Appendix E of the Draft Revised Plan) which could result in loss of plants.
- c. As described in the Biological Assessment, some Dispersed Recreational Use will continue to have some adverse effects on Mead’s milkweed. While this adverse effect is relatively minor, it is likely to increase in the future as the population of Mead’s milkweed increases in size and distribution.

Therefore, we recommend formal consultation for Mead’s milkweed to be completed as well. The Biological Opinion for Mead’s milkweed can be completed during the same time frame established for Indiana bat.

As part of the consultation process, in the next few weeks we will continue sorting through the information provided to ensure that we have a complete understanding of all aspects of the proposed plan and activities that may result in adverse effects to Indiana bats and Mead’s milkweed. We will require continued exchange of information with your staff as we complete this exercise.

At this time, we are requesting additional information and references to further assist in evaluating the impacts of the Proposed Plan and the Standards and Guidelines. This additional information request includes the following:

1. For Indiana bat hibernacula occurring on or near the Forest – Request information regarding the total number of forested acres occurring within a 5-mile (8 km) radius of the hibernacula and a breakdown of ownership (e.g., how much occurs on the Forest and how much is in private/other ownership). In addition, identify which proposed management actions/activities are proposed within the 5-mile radius.
2. For Indiana bat maternity colonies occurring on or near the Forest – Request information regarding the total number of forested acres occurring within an 5-mile (8 km) radius distance of the center of the maternity colony and a breakdown of ownership (e.g., how much forest occurs on the Forest and how much is in private/other ownership). In addition, identify which proposed management actions/activities are proposed within the 5-mile radius of the colony. Also provide information from studies (reports, literature, etc.) conducted on these colonies that identify the range of foraging activity to provide an understanding of habitat use by the colony.

Mr. Hurston A. Nicholas

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3. Literature/references requested

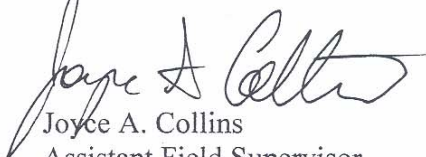
- a. Appendix E – Hoosier-Shawnee Ecological Assessment
- b. Feldhamer and Carter 2005 (referenced on page 48 of the BA)
- c. Kath 2005 (referenced on page 52 of the BA)
- d. Jackson 2005 and Carter 2005 (referenced on page 65 of the BA)
- e. Davis 1970, Lyon et al. 2000b and 2000c (referenced on page 66 of the BA)
- f. Wade et al. 2000 (referenced on page 69 of the BA)

4. The contents of a biological assessment are discretionary, but generally include information on direct and indirect effects and discussion of cumulative effects. Cumulative effects, per Section 7 of the Endangered Species Act, are those effects of future State or private activities, not involving Federal activities that are reasonably certain to occur within the action area of the Federal action subject to consultation. The Biological Assessment provided is generally lacking in discussion of cumulative effects. To assist in preparation of our Biological Opinion we request further development of information on cumulative effects as they pertain to the Indiana bat.

As a reminder, the Endangered Species Act requires that after initiation of formal consultation, the Federal action agency may not make any irreversible or irretrievable commitment of resources that limits future options. This practice insures agency actions do not preclude the formulation or implementation of reasonable and prudent alternatives that avoid jeopardizing the continued existence of endangered or threatened species or destroying or modifying their critical habitats.

If you have any questions or concerns about this consultation or the consultation process in general, please feel free to contact me at 618/997-3344, ext. 340.

Sincerely,



Joyce A. Collins
Assistant Field Supervisor

cc: IDNR (Kath, Shimp)



IN REPLY REFER
TO:
FWS/RIFO

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Rock Island Field Office
4469 48th Avenue Court
Rock Island, Illinois 61201
Phone: (309) 793-5800 Fax: (309) 793-5804



October 31, 2005

Mr. Hurston A. Nicholas
Forest Supervisor
Shawnee National Forest
50 Highway 145 South
Harrisburg, Illinois 62946

Dear Mr. Nicholas:

On July 21, 2005, the U.S. Fish and Wildlife Service entered into formal Section 7 consultation on the effects of your proposed revision of the Shawnee National Forest Land and Resource Management Plan. The 90-day consultation period expired on October 19, 2005. The additional information we requested on August 17, 2005, was provided via an email on August 18, 2005, a mail package received on August 22, 2005, and a mail package received on September 14, 2005. The package received on September 14, 2005, contained a revised Biological Assessment with additional information on cumulative effects.

On October 18, 2005, we met with representatives of your staff to discuss the proposed standards and guidelines developed for the endangered Indiana bat (*Myotis sodalis*) and to discuss the anticipated effects of the proposed management actions. The meeting was productive and resulted in revision of the proposed standards and guidelines which were provided to the Service via email on October 25, 2005. We were also provided a list of changes in scheduled management practices.

We are in the process of preparing our Biological Opinion and significant progress has been made. However, due to overwhelming workload and activities associated with completing end of year reporting requirements and new fiscal year work planning, we will be unable to meet our anticipated deadline of providing the draft Biological Opinion by November 3, 2005. Instead, we now anticipate providing the draft Biological Opinion no later than November 17, 2005.

Mr. Hurston A. Nicholas, Forest Supervisor

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If you have any questions or concerns about this consultation or the consultation process in general, please feel free to contact me at 309/793-5800, ext. 201, or Ms. Joyce Collins, Assistant Field Supervisor, Marion, Illinois Sub-Office at 618/997-3344, ext. 340.

Sincerely,

A handwritten signature in black ink, appearing to read "Richard C. Nelson". The signature is written in a cursive style with a large initial "R".

Richard C. Nelson
Field Supervisor



United States Department of the Interior

FISH AND WILDLIFE SERVICE
Marion Illinois Suboffice (ES)
8588 Route 148
Marion, IL 62959
(618) 997-3344

December 3, 2005

Mr. Hurston A. Nicholas
Forest Supervisor
Shawnee National Forest
50 Highway 145 South
Harrisburg, Illinois 62946

Dear Mr. Nicholas:

This letter transmits the Fish and Wildlife Service's (Service) Programmatic Biological Opinion for the proposed 2006 Forest Plan for the Shawnee National Forest (SNF), Illinois. This programmatic opinion addresses the effects of the proposed action (Revised Forest Plan) on the threatened Mead's milkweed (*Asclepias meadii*) and the endangered Indiana bat (*Myotis sodalis*) in accordance with section 7 of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 et. seq.). Your July 19, 2005, request for formal consultation was received on July 21, 2005.

The SNF provided the Service with a Programmatic Biological Assessment dated July 2005 and, subsequently revised September 2005, that assessed the effects of the Revised Forest Plan on both the Indiana bat and Mead's milkweed as well as the following listed species: gray bat (*Myotis grisescens*), bald eagle (*Haliaeetus leucocephalus*), least tern (*Sterna antillarum*), pallid sturgeon (*Scaphirhynchus albus*), fanshell mussel (*Cyprogenia stegaria*), fat pocketbook pearly mussel (*Potamilus capax*), pink mucket pearly mussel (*Lampsilis abrupta*) and orange-footed pearly mussel (*Plethobasus cooperianus*). We concur with your assessment that the proposed Revised Forest Plan is not likely to adversely affect the gray bat, bald eagle, least tern, pallid sturgeon, fanshell mussel, fat pocketbook pearly mussel, pink mucket pearly mussel, or orange-footed pearly mussel. Therefore, these species will not be discussed further.

This Programmatic Biological Opinion is based on information provided in the July/September 2005 Programmatic Biological Assessment, the January 2005 Proposed Land and Resource Management Plan, the January 2005 Draft Environmental Impact Statement for the Proposed Land and Resource Management Plan, conversations with your staff, electronic mail exchanges of information, your November 29, 2005, comments on the Draft Programmatic Biological Opinion, and other sources of information. A

Mr. Hurston A. Nicholas

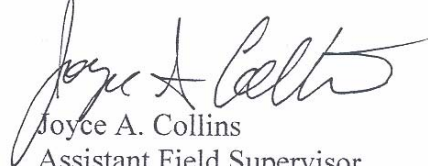
2.

complete administrative record of this consultation is on file at the Service's Marion, Illinois Ecological Services Field Office.

I want to thank you and your staff for the exceptional cooperation during the development of this biological opinion. Furthermore, I appreciate your commitment to the recovery of federally listed species on the SNF. I believe the 2006 Forest Plan will benefit the conservation status of all federally listed species on the SNF as well as other declining species.

If you have any questions or concerns about this consultation or the consultation process in general, please feel free to contact me or Mike Thomas of this office at 618/997-3344.

Sincerely,



Joyce A. Collins
Assistant Field Supervisor

cc: IDNR (Kruse, Kath, Shimp)
USFS (Randy Moore – Regional Office)
USFWS (Nelson, Pruitt, Szymanski)



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

JUN 20 2005

REPLY TO THE ATTENTION OF:

B-19J

Hurston A. Nicholas
Forest Supervisor
USDA – Forest Service
50 Highway 145 South
Harrisburg, Illinois 62946
Attn: Plan Revision Comments

RE: Draft Environmental Impact Statement for the Proposed Land and Resource Management Plan for the Shawnee National Forest, Alexander, Gallatin, Hardin, Jackson, Johnson, Massac, Pope, Union and Williamson Counties, Illinois, EIS No. 20050107

Dear Mr. Nicholas:

In accordance with Section 309 of the Clean Air Act and the National Environmental Policy Act (NEPA), the U.S. Environmental Protection Agency (U.S. EPA) has reviewed the Draft Environmental Impact Statement (DEIS) for the Proposed Land and Resource Management Plan for the Shawnee National Forest in Illinois. The Shawnee National Forest, established in 1939, is located at the southern tip of Illinois and is bordered on the east and south by the Ohio River and on the west by the Mississippi River. For over 70 years the Forest has been managed under the multiple-use concept, which ensures the conservation and wise use of its resources.

Through implementation of Forest Plans, the Forest Service intends to provide the public a variety of resource uses, recreational experiences and services while protecting physical and biological resources. The Shawnee National Forest contains some of the largest and most diverse blocks of mature hardwood forest, forest-interior habitat, bottomland forest and openland habitats in Illinois. At the same time, the Shawnee National Forest is appreciated for its recreational opportunities. The challenges the Forest Service is confronting while managing the Forest under the multiple-use concept are well documented in Shawnee's Proposed Land and Resource Management Plan, the associated DEIS, and the Need for Change Document. The seven areas identified as focus areas in this plan revision are: (1) Watershed Resources, (2) Biological Diversity and Wildlife and Aquatic Habitat, (3) Recreation Management, (4) Forest Ecosystem Health, (5) Mineral Resources, (6) Wilderness, Roadless Areas, and Wild and Scenic Rivers, and (7) Land Ownership.

The U.S. Forest Service evaluated four alternatives in the DEIS for revising the 1992 Plan. Alternative 1 is the No Action alternative, which represents continuing management as stipulated under the 1992 Plan. Alternative 2, the Preferred Alternative, emphasizes forest ecosystem health; Alternative 3 emphasizes preservation of old-growth forest and non-motorized recreation. Alternative 4 emphasizes recreational activities but is otherwise similar to Alternative 2. We believe that this range of alternatives is responsive to comments received from the public during the scoping phase.

Regarding watershed resources, EPA supports the protection of watersheds that provide drinking water to local communities, the restoration and management of bottomland hardwood forests, and the use of filter strips in sensitive riparian areas. EPA also supports the need to maintain oak-hickory forest-type within its natural range of variability, along with other diverse habitats on the Forest in order to promote recovery or sustain populations of threatened and endangered species, Regional-Forester designated sensitive species, and species of viability concern. We also support adaptive management and restrictive use approaches for managing natural resources that are adversely impacted by recreational activities. Because Alternative 2 emphasizes these principles, EPA concurs with the selection of Alternative 2 as the Preferred Alternative.

EPA has no objections to the Proposed Land and Resource Management Plan. We have rated the DEIS an “LO” – Lack of Objections. We have enclosed an explanation of our rating. To further substantiate plans for the Shawnee National Forest, the Forest Service should consider providing the following information in the Final Environmental Impact Statement:

- Additional information regarding how management area prescriptions align geographically with pre-settlement, present, and projected forest communities.
- Coordination letters from resource agencies especially U.S. Fish & Wildlife Service, Illinois Department of Natural Resources, and the Illinois Historic Preservation Agency. This information would provide an interested reader with a sense of whether there were areas of debate between agencies or whether federal and state agencies concurred with the Forest Service’s direction.

Thank you for the opportunity to review the Land and Resource Management Plan and DEIS. If you have any questions, please contact Sherry Kamke of my staff at (312) 353-5794.

Sincerely,



Kenneth A. Westlake, Chief
NEPA Implementation Section
Office of Science, Ecosystems, and Communities

cc: Randy Moore, Regional Forester

SUMMARY OF RATING DEFINITIONS AND FOLLOW UP ACTION*

Environmental Impact of the Action

LO-Lack of Objections

The EPA review has not identified any potential environmental impacts requiring substantive changes to the proposal. The review may have disclosed opportunities for application of mitigation measures that could be accomplished with no more than minor changes to the proposal.

EC-Environmental Concerns

The EPA review has identified environmental impacts that should be avoided in order to fully protect the environment. Corrective measures may require changes to the preferred alternative or application of mitigation measures that can reduce the environmental impacts. EPA would like to work with the lead agency to reduce these impacts.

EO-Environmental Objections

The EPA review has identified significant environmental impacts that must be avoided in order to provide adequate protection for the environment. Corrective measures may require substantial changes to the preferred alternative or consideration of some other project alternative (including the no action alternative or a new alternative). EPA intends to work with the lead agency to reduce these impacts.

EU-Environmentally Unsatisfactory

The EPA review has identified adverse environmental impacts that are of sufficient magnitude that they are unsatisfactory from the standpoint of public health or welfare or environmental quality. EPA intends to work with the lead agency to reduce these impacts. If the potential unsatisfactory impacts are not corrected at the final EIS date, this proposal will be recommended for referral to the CEQ.

Adequacy of the Impact Statement

Category 1-Adequate

The EPA believes the draft EIS adequately sets forth the environmental impact(s) of the preferred alternative and those of the alternatives reasonably available to the project or action. No further analysis or data collecting is necessary, but the reviewer may suggest the addition of clarifying language or information.

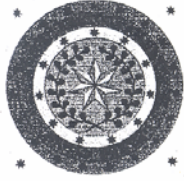
Category 2-Insufficient Information

The draft EIS does not contain sufficient information for the EPA to fully assess the environmental impacts that should be avoided in order to fully protect the environment, or the EPA reviewer has identified new reasonably available alternatives that are within the spectrum of alternatives analyzed in the draft EIS, which could reduce the environmental impacts of the action. The identified additional information, data, analyses, or discussion should be included in the final EIS.

Category 3-Inadequate

EPA does not believe that the draft EIS adequately assesses potentially significant environmental impacts of the action, or the EPA reviewer has identified new, reasonably available alternatives that are outside of the spectrum of alternatives analyzed in the draft EIS, which should be analyzed in order to reduce the potentially significant environmental impacts. EPA believes that the identified additional information, data analyses, or discussions are of such a magnitude that they should have full public review at a draft stage. EPA does not believe that the draft EIS is adequate for the purposes of the NEPA and/or Section 309 review, and thus should be formally revised and made available for public comment in a supplemental or revised draft EIS. On the basis of the potential significant impacts involved, this proposal could be a candidate for referral to the CEQ.

*From EPA Manual 1640 Policy and Procedures for the Review of the Federal Actions Impacting the Environment



United Keetoowah Band of Cherokee Indians in Oklahoma
P.O. Box 189 • Park Hill, OK 74451
2450 South Muskogee Ave • Tahlequah, OK 74464
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Saline District

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Sequoyah District

Albert Shade
Tahlequah District

JUN 02 2005

Shawnee
Nat'l Forest

The United Keetoowah Band of Cherokee Indians in Oklahoma has received your letter concerning the following project:

Forest Plan Revision

The Chief has referred your letter to me as I am the tribal Point of Contact for the Native American Graves Protection and Repatriation and Section 106 consultation.

The United Keetoowah Band has specific interest in the following states; Alabama, West Virginia, Georgia, North Carolina, South Carolina, Virginia, Kentucky, Texas, Arkansas, Tennessee, and Oklahoma, with other points of interest, as well.

Concerning the aforementioned site, the Band is currently unaware of any documentation directly linking Indian religious sites to the proposed construction. The United Keetoowah Band has no objection to the proposed construction. However, if any human skeletal remains and/or any objects falling under NAGPRA are uncovered during construction, the construction should stop immediately and the appropriate persons, including state and tribal NAGPRA representatives contacted.

Wado,

A handwritten signature in black ink, appearing to read "Lisa Stopp".

Lisa Stopp
GSPB 10001
Historic Preservation

Illinois Nature Preserves Commission
One Natural Resources Way
Springfield, IL 62702-1271

June 17, 2005

Hurston A. Nicholas
Shawnee National Forest
Forest Plan Revision Comments
50 Hwy 145 South
Harrisburg, IL 62946

Dear Supervisor Nicholas:

The Illinois Nature Preserves Commission has carefully reviewed the Proposed Land and Resource Management Plan and Appendices, along with the Draft Environmental Impact Statement for the Plan Revision for the Shawnee National Forest. We are cognizant of the enormously complex task the Shawnee has just completed. We appreciate the large number of issues, and opinions about those issues the Shawnee staff were required to digest and scrutinize. We observed that the Plan utilized current scientific knowledge in making the decisions proposed in this Plan. We applaud the completion of this task and commend your work.

The Commission looks forward to working with the Shawnee as partners over the duration of this Plan, as we have in the past. The Shawnee is the largest owner of Inventory Natural Areas in the state, other than the Department of Natural Resources. These natural areas are an important part of our state's high quality natural resources and we will strive to work with you in protecting the natural areas in your ownership.

The Illinois Nature Preserves Commission supports Alternative 2 as the preferred alternative. This alternative combines science-based guidelines for improving and maintaining forest ecosystem health and wildlife diversity. Alternative 2 is favored also because of its strong protection of special features, including natural areas and endangered and threatened species. Alternative 2 supports exotic species control and an expanded prescribed burning program, as well as better management of forest-interior habitat. Alternative 2 provides more control of recreational pursuits that have historically damaged the forest and especially natural areas, such as equestrian overuse and ATV use. We will address each of our preferences and concerns in the body of our comments.

NATURAL AREA MANAGEMENT

The Commission is very pleased with the treatment of natural areas in the Plan. We are pleased that the INAI natural areas will continue to be protected on the forest and that the forest will include areas that the State of Illinois determines to qualify for the INAI. Natural Area Management prescriptions (Appendix E) are thorough and accurate. We are pleased that the closure orders are in effect which prohibit fires, repelling, rock-climbing, ATV use, off-highway vehicle use, camping, and equestrian-use in natural areas.

The Commission has always supported the policy of no equestrian-use in natural areas and this is our policy in state natural areas also. We continue to strongly support this policy. Because the previous Plan allowed an equestrian trail in several natural areas, we supported the Plan, while voicing our opposition to equestrian-use in any natural area. Now that we are entering a new planning period, and the growing equestrian-use of the last decade has shown serious damage to natural areas from equestrian-use, we urge the forest to continue the science-based guidelines followed in the rest of the Plan, and NOT allow equestrian-use in any natural area on the forest.

We are also pleased that the Forest Plan supports active management of the 80 natural areas, on the Shawnee through application of prescriptions contained in Appendix E. The prescriptions allow for restoration, maintenance and enhancement of the natural communities through prescribed burning, shrub removal, use of herbicide for exotic species control, and other management practices. We request that the active management be undertaken in a timely manner. Most of the INAI natural areas that contain communities where prescribed fire is an important management tool, are long overdue for this action. We urge the Shawnee to not only allow this in the Plan, but to engage in the management as an ongoing program, before areas are lost due to neglect.

Monitoring of the natural areas, and the recreational use in natural areas that has caused damage in the past, has been an issue the Commission has addressed repeatedly. We are pleased that monitoring is addressed in this Plan. However, in the Standards and Guidelines for Natural Areas, page V-51, section NAI9.1(G) Monitoring, the Plan states "monitor each site **periodically** to identify disturbances". On page VI -15 on the Monitoring Matrix, the Purpose is identified as "determine if recreational practices...are causing degradation to rare ecosystems...". If this refers to Natural Areas, the Standards and Guidelines should state "monitor annually, not periodically". We recommend that page V-51, section NA19.1 (G) Monitoring should be changed to read "monitor each site **annually** to identify disturbances."

The Commission would like to see this section expanded to include a proposed action if disturbance is found. Over the past decade INPC/IDNR has repeatedly monitored natural areas and reported damage to the Forest Service. In many of these instances, the forest never took action to stop the activity causing the damage. We wish to see this section strengthened, so that the next fifteen years provide a clear path to solving this perennial problem.

RECREATION

The Commission enthusiastically supports the new mandate that equestrians be restricted to a designated trail system. This will eliminate cross country and user-created trails that the forest is unable to monitor and maintain. We also encourage the forest to designate this trail system in a timely manner, which will allow equestrians to comply with the new mandate. We recommend that the trail be no longer than that which the forest is capable of signing, maintaining, and enforcing with its current workforce. We support the restoration and closure of former user created trails to allow the forest to heal and to avoid confusion for the equestrian users.

The Commission supports the ban on ATVs, OHVs and any unlicensed off highway vehicles throughout the forest.

The Commission urges the Forest Service to adopt in Alternative 2, two items of concern that are more favorable in Alternative 3. The Commission supports from Alternative 3, "the seasonal .closure of a maximum of 400 miles of non-motorized trails (DEIS III-279)". This recommendation would prevent the most severe damage to the non-hardened trails and save thousands of dollars a year in trail maintenance. The Commission also supports and urges the Forest Service to adopt from Alternative 3 (DEIS III-279), "existing system trails in natural areas would be closed to equestrian use, but left open to hiking."

The Commission also notes that in the Monitoring Matrix (Response to Revision Topic 3, page VI -16 in the Plan) the forest plans to monitor the system trails annually to determine if the trails are marked, maintained, designed and mapped to meet the needs of the users. This includes the equestrian restriction to the trail system. We are pleased to see this level of monitoring included in the Plan. Again, we request that the follow-up action to noting the problems on the trail become a part of the Plan also.

WILDERNESS

The Commission has concerns with some of the language in Appendix E, page V65- V70 in the Standards and Guidelines for Wilderness. The Commission directs the Forest Service to review the House Reports: No. 101-784, Pt. 1 (Committee on Interior and Insular Affairs) that accompanied the Illinois Wilderness Act of 1990, Public Law 101-633, Nov. 28, 1990. In the Committee Reports, additional direction is given to the Forest Service in several areas of management, including the use of prescribed fire, control of non-native species, and Illinois Natural Area Inventory Sites. We believe this language is not adequately reflected in the Forest Plan.

There are a number of INAI natural areas within wilderness areas. The language in the Committee Report was included to assure that in the future, special concern would be afforded in the management of these natural areas within wilderness to give them the management and protection necessary for their long-term viability. In part the Committee report stated:

The Committee recognizes the evolutionary role of fire in the natural development of certain types of native plant communities and urges the Forest Service to effect the judicious use of prescribed fire within the wilderness areas designated by this Act where necessary to approximate natural conditions. The Committee notes that such a program is consistent with the Wilderness Act and Forest Service wilderness fire policy and urges the Forest Service to use prescribed fires to maintain the fire-dependent plant communities within these areas.

The Committee urges the Forest Service to detect, monitor, and evaluate the presence of non-native species occurring within the wilderness areas designated by this Act and, guided by the minimum tool principle, to take such measures as may be necessary to control non-native speciesThe Committee notes that the only effective control may be the application of glyphosphate. The Committee recommends that the Forest Service use glyphosphate to eradicate Japanese honeysuckle...

The Committee acknowledges that some of the wilderness areas designated by this Act contain sites which

have been identified by the Illinois Natural Areas Inventory and which are officially recognized by the State of Illinois as "natural areas". The Committee urges the Forest Service, in consultation with the State of Illinois, to ensure that these "natural areas" are managed to preserve their ecological integrity. The Committee also recognizes the potential for damage to these "natural areas" from equestrian use in the form of soil compaction and erosion, trampling of vegetation, and introduction of non-native plants. The Forest Service, therefore is urged to ensure that equestrian use is controlled to prevent damage to the significant ecological features of these sites.

Appendix E, page V-65 to V- 70 speak to these issues, but the language is unclear and inconsistent. For example, the Standard and Guideline (SG) states that "Management activities that may be seen include fire suppression; prescribed burning; eradication of non-native exotic plants and control of non-native invasive species ". However, in SG WD19.2 (G) Vegetation Management, the Plan states, "Non-native invasive species should be controlled if threatening **adjacent lands and** resources." This does not state that the non-native species will be controlled if threatening the wilderness area lands or the natural area within the wilderness area. This is not consistent with the language of the Committee Report. On page V -66, WD21, Environmental Management, the SG in the Plan states, "Pesticides should be used in wilderness only when necessary to prevent loss of the wilderness resource, or to prevent significant losses to resources values on private or public lands bordering the wilderness." Again, this language is not consistent with the language of the Committee Report which states, "take such measures as may be necessary to control non-native plants."

In Appendix E, page V-67, WD23, Recreation Management, no mention is made of the need to "ensure that these 'natural areas' (within wilderness) are managed to preserve their ecological integrity" and that "the Forest Service is therefore urged to take reasonable precautions to ensure that equestrian use is controlled to prevent damage to the significant ecological features of these sites" as the Committee Report states.

It is also not clearly stated that administrative access can be used for management purposes to

access the natural areas within wilderness that are in State of Illinois ownership and this is important to make clear. The State of Illinois must have access to the State owned natural areas and nature preserves for management and monitoring purposes.

In order to clear these inconsistencies, the Commission recommends that the Forest Service include an additional section in the Standard and Guideline on Wilderness, such as WDxx , Natural Areas within Wilderness. These special issues addressed by the Committee Report should be clarified in this section.

FOREST ECOSYSTEM HEALTH AND SUSTAINABILITY

The Commission supports the forest's goal of maintenance of the oak-hickory ecosystem. The Commission is aware of the shift occurring on the forest to maples and other shade tolerant species. We agree that this is not enhancing healthy forests and wildlife diversity. The Commission encourages the forest to use prescribed burning extensively to accomplish the goal of oak-hickory regeneration. The Commission also supports the restoration of non-native pine plantations to native hardwoods.

The Commission supports expanded efforts to promote the recovery and viability of federally listed threatened and endangered species, Regional Forester sensitive species and species of viability concern. We encourage active management where needed to promote these species.

The Commission is pleased to see that more emphasis is placed on the control of non-native invasive species and the return to the use of pesticides to control these species. This is a serious issue that the forest must aggressively confront in the next decade.

The Commission appreciates the ability to comment on the revised Forest Plan and looks forward to future conversations about the Plan and forest management.

Sincerely,



Don McFall, Acting Director
Illinois Nature Preserves Commission

DM:jfd



ILLINOIS ENVIRONMENTAL PROTECTION AGENCY

1021 NORTH GRAND AVENUE EAST, P.O. BOX 19276, SPRINGFIELD, ILLINOIS 62794-9276, 217-782-3397
JAMES R. THOMPSON CENTER, 100 WEST RANDOLPH, SUITE 11-300, CHICAGO, IL 60601, 312-814-6026

ROD R. BLAGOJEVICH, GOVERNOR RENEE CIPRIANO, DIRECTOR

217/782-7326

June 14, 2005

Hurston A. Nicholas
Shawnee National Forest
Forest Plan Revision Comments
50 Hwy. 145 South
Harrisburg, IL 62946

Subject: Comments on the Shawnee National Forest Proposed Land and Resource
Management Plan and Draft Environmental Impact Statement

Dear Mr. Nicholas,

We appreciate the opportunity to comment on the proposed Land and Resource Management Plan for the Shawnee National Forest and the Draft Environmental Impact Statement (DEIS) for the proposed Plan. After careful review, we are submitting the following comments for your consideration.

Page III-46, paragraph 2 of the draft environmental impact statement, contains a discussion regarding air quality and smoke management guidelines developed by the Forest Service to reduce the atmospheric impacts of prescribed fires (USDA 1976). Protection of public health is of paramount concern and improvement of visibility is also important to the citizens of Illinois. We, therefore, request that the guidelines consider expected air quality conditions before a prescribed burn is implemented. The United States Environmental Protection Agency (USEPA) maintains a website (<http://www.airnow.gov>) that provides forecasts of expected air quality nationally using a standardized method of reporting air pollution values called the Air Quality Index (AQI). The AQI converts the measured pollutant concentration in a community's air to a number on a scale of 0 to 500, with a value of 100 (color coded as orange) corresponding to air quality levels considered unhealthy for sensitive individuals. The Illinois EPA, therefore, requests that the plan be revised to prohibit prescribed burns on days when forecasted air pollution levels are unhealthy (orange), or worse in the vicinity of the Shawnee National Forest, including the St. Louis metropolitan area. This will help to ensure that both human health and visibility are protected.

Some of the information found on page III-44 that addresses air quality within the Shawnee National Forest is incorrect. The third paragraph on that page contains a sentence, which reads as follows: "Air within the Forest exceeds the established ambient standards." Based on monitoring data collected in Jackson and Hamilton Counties, there

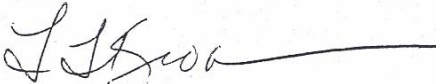
ROCKFORD – 4302 North Main Street, Rockford, IL 61103 – (815) 987-7760 • DES PLAINES – 9511 W. Harrison St., Des Plaines, IL 60016 – (847) 294-4000
ELGIN – 595 South State, Elgin, IL 60123 – (847) 608-3131 • PEORIA – 5415 N. University St., Peoria, IL 61614 – (309) 693-5463
BUREAU OF LAND – PEORIA – 7620 N. University St., Peoria, IL 61614 – (309) 693-5462 • CHAMPAIGN – 2125 South First Street, Champaign, IL 61820 – (217) 278-581
SPRINGFIELD – 4500 S. Sixth Street Rd., Springfield, IL 62706 – (217) 786-6892 • COLLINSVILLE – 2009 Mall Street, Collinsville, IL 62234 – (618) 346-5120
MARION – 2309 W. Main St., Suite 116, Marion, IL 62959 – (618) 993-7200

PRINTED ON RECYCLED PAPER

have been no violations of the National Ambient Air Quality Standards for any pollutants in the vicinity of the Shawnee Forest. Therefore, this statement should read, “Air within the Forest **meets** the established ambient standards.” In addition, the statement regarding the pending designation of nonattainment areas for PM2.5 should be updated. USEPA finalized the PM2.5 designations on April 15, 2005. Please refer to the website at www.epa.gov/pmdesignations for current information. In southern Illinois, only the counties of Madison, Monroe, and St. Clair, and one township in Randolph County (Baldwin Township) are designated as nonattainment.

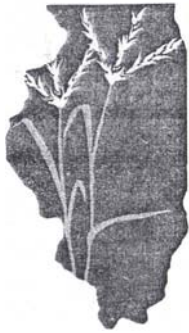
It is our hope that these comments will be helpful to you as you finalize your plans for the Shawnee National Forest. Thank you for providing Illinois EPA the opportunity to review and comment on your proposed plan. If you require any assistance or clarification of our comments, please contact Rob Kaleel of my staff at 217-524-4343.

Sincerely,



Laurel L. Kroack, Chief
Bureau of Air

cc: Rob Kaleel
Pamela Brooks
Richard Blume-Weaver
Steve Hupe



Illinois Department of Natural Resources

One Natural Resources Way Springfield, Illinois 62702-1271
Rod R. Blagojevich, Governor
217.785.0075 . <http://dnr.state.il.us>
Joel Brunsvold, Director

June 10, 2005

Mr. Hurston Nicholas
Forest Supervisor
Shawnee National Forest
Highway 145 South
Harrisburg, IL 62946

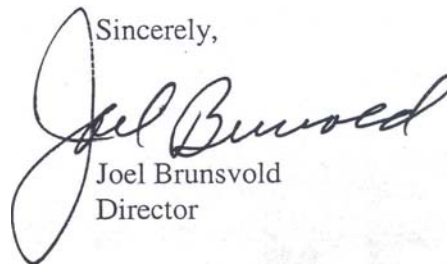
Dear Mr. Nicholas:

We in the Illinois Department of Natural Resources appreciate the opportunity to review the current Proposed Forest Plan for the Shawnee National Forest. The Shawnee is of great importance to the people of the State of Illinois and we remain vitally interested in its present and future management. The process of planning for the future of the Shawnee, as we know from past experience, can be a complex and contentious undertaking. Let me congratulate you and your staff for using the best available science while trying to balance the needs and demands of a broad range of interested publics.

I wish to express our support for the preferred Alternative 2. Among the alternatives presented, it provides the best guidance to assure forest ecosystem health and wildlife diversity. Moreover, it most closely coincides with the and complements our own State of Illinois - Comprehensive Wildlife Conservation Plan & Strategy, a document that forms the basis for many of our comments that follow:

While we are firm in our support for Alternative 2, we also believe there is opportunity for improvement within this alternative. To that end, the attached comments provide an explanation and analysis of each of our concerns followed by the specific recommendation we are making. It is my hope these requests will be given serious consideration. To the extent it would be useful, I am willing to commit appropriate persons of my staff to work cooperatively in helping to resolve any of these matters. I think this would be an excellent time and opportunity to take our longstanding cooperative relationship to a new level of mutual support.

Sincerely,

A handwritten signature in black ink that reads "Joel Brunsvold". The signature is written in a cursive style with a large, looping initial "J".

Joel Brunsvold
Director

Shawnee National Forest
Proposed Land and Resource Management Plan
IDNR Comments

June 2005

The Illinois Department of Natural Resources (IDNR) supports Alternative 2, the preferred alternative of the Shawnee National Forest Proposed Land and Resource Management Plan (Proposed Forest Plan). Alternative 2 provides the best guidance for natural resource management activities on the Shawnee National Forest (SNF) to assure wildlife diversity and maintain forest ecosystem health. **It is important to note that Alternative 2 provides land and resource management direction that is clearly complementary to the State of Illinois Comprehensive Wildlife Conservation Plan & Strategy (State Plan).** As IDNR and the SNF begin implementation of the State Plan and Proposed Forest Plan, respectively, a renewed level of partnership and mutual support between the two agencies will be important in meeting the ambitious goals outlined in each of these plans.

While IDNR supports the vast majority of the plan's content, we have identified a number of subject areas that we wish to be noted and considered in the final Forest Plan. These are listed below along with a brief discussion and specific recommendation for each topic.

WILDLIFE MANAGEMENT

White-tailed Deer. An IDNR objective is a net reduction statewide in the white-tailed deer herd, emphasizing increased harvest opportunity. Deer are undoubtedly an important ecological and recreational resource on the SNF, and the Proposed Forest Plan includes prescriptions designed to improve the quality and quantity of deer. This is not necessarily a conflicting objective with the State Plan, so long as local and landscape white-tailed deer herds do not exceed the human-tolerated carrying capacity and are not excessively browsing vegetation, particularly within high quality natural communities. Eliminating ATV/OHV use on SNF may achieve a number of ecological, aesthetic and recreational objectives shared by IDNR, but we believe that a limited, temporary allowance of ATVs during the firearm deer season could be a management tool to increase harvest opportunities. This broad access of the SNF by hunters is important to assure that deer populations are maintained at levels that prevent over-browsing of high quality forests, limit crop damage on neighboring landowners, and possibly help reduce deer/vehicle collisions on roads dissecting the SNF. The Proposed Forest Plan prohibits the use of ATVs except for administrative purposes. IDNR believes that allowing limited, responsible ATV use to facilitate hunter access during the Illinois Firearm Deer seasons on the SNF and recognizes that it is not the same as ATV sport riding and should be regarded as a mechanism to facilitate Illinois deer management.

IDNR Recommendation- ATV Use During Deer Hunting Season: Special provisions should be made to allow for ATV access of the SNF during the traditional 7 -day Illinois Firearms Deer season for the sole purpose of assisting in the removal of deer legally harvested with firearms.

Large Openlands. The old fields and grassland habitats that comprise the SNF's large openlands are characterized by low species diversity, presence of exotic plants and accelerating natural succession. The management prescription for large openlands described in the Proposed Forest Plan are largely justified to improve and maintain these areas and to complement habitats available in the surrounding private, agricultural landscape. However, the management prescription includes rows of native shrubs within old fields. Rows of shrubs and woody vegetation should not be established and ought to be eliminated within large openlands. Rows of woody vegetation will have the effect of fragmenting the openlands, thus reducing the open areas required by some species on the SNF, most notably Henslow's sparrow (see Herkert et al. 1993, Sample and Mossman 1997). Further, evidence indicates that wildlife in linear features experience higher mortality and nest predation than in discrete habitat patches (Pasitschniak-Arts and Messier 1996, Major et al. 1999), thus shrub patches should be the management objective rather than rows. Lastly, patches of shrubs, rather than rows, will lend a natural aesthetic appeal to large openlands on SNF.

IDNR Recommendation - Management of shrubs in openlands: Rows of shrubs and other woody vegetation should not be established and existing linear plantings ought to be eliminated within large openlands. Establishment of shrub patches should be encouraged when appropriate.

Forest-edge Management. The State Plan indicates that forest habitat should transition gradually into open woodland and successional habitat on all uplands. At a number of places within the Proposed Forest Plan, SNF acknowledges that much adjacent private land is open pasture and cropland. Forest edges can be managed specifically to grade from grassland, to shrubland, open woodland and forest to provide broad transitional areas (50-100 m) for a diverse suite of wildlife, and possibly to ameliorate negative effects (e.g., high rates of mortality, nest predation, and brood parasitism) associated with abrupt ecotones. SNF may be able to achieve greater abundance of management indicator species including yellow-breasted chat and northern bobwhite, and recreation ally-important species including wild turkeys, while sacrificing little interior area for mature forest management indicator species including scarlet tanager and worm-eating warbler. .

IDNR Recommendation-Forest-edge Management: Develop a transitional management prescription where SNF meets private open lands.

Exotic and invasive animals. Invasive plant species are mentioned in the plan, but no discussion or management strategy addressed invasive animals such as feral hogs. Such animals can have significant impacts on forest health, natural areas, and sensitive wildlife species and need to be address in the Proposed Forest Plan. .

IDNR Recommendation- Invasive animals: Monitoring for invasive animals should be included in the Proposed Plans Monitoring Matrix and provide guidance to the SNF to work with the State of Illinois to develop control strategies.

FOREST MANAGEMENT

The State Plan identifies exotic species, increases in mesophytic tree species, and fragmentation by exurban development as major challenges to forest, open woodland and barrens habitat in the Shawnee Hills. Alternative 2 of the Proposed Forest Plan has provisions for addressing exotic species and includes management prescriptions for prescribed fire and timber harvest that will encourage oak maintenance and regeneration. SNF is to be commended for establishing these ambitious objectives and ecologically-justified management prescriptions.

Large Forest Blocks. The SNF, as the largest public land holding in Illinois, has significance in helping to achieve statewide objectives identified in the State Plan for Illinois wildlife and habitat. In particular, very large forest tracts (tens of thousands of acres), and the high-level forest interior conditions within them (e.g., net recruitment of forest-interior neotropical migratory birds), are most realistically achievable within the Shawnee Hills natural division, where the vast majority of the SNF occurs. Alternative 2 indicates that about 125,000 acres would be managed in 'interior forest' conditions (> 1 mile radius), but whether or not much larger forest interior conditions might be achieved is not discussed. The Proposed Forest Plan does indicate "...however, populations of most interior species may not improve substantially in the planning area due to the fragmentation of land-uses and farming and grazing management on adjacent privately owned lands..." (at Exec. Summ. pg. 26). IDNR will support the SNF in striving to achieve much larger contiguous forests blocks to provide habitat for area sensitive species within Illinois. .

Exurban development is not necessarily occurring on national forest lands, but the national forest may be able to mitigate, in part, the negative effects of exurban development by consolidating land holdings into larger contiguous parcels. The importance of the SNF as an unfragmented forest landscape will increase as exurban development continues. Exurban development also changes the context of all types of management on the SNF as adjacent landowners become involved at property interfaces. This can interfere with everything from prescribed burning to hunting as issues of smoke pollution and legal shooting distances to residences are raised.

IDNR Recommendation - Large Forest Blocks: Proposed Forest Plan should direct land acquisition to consolidate land holdings into larger contiguous parcels.

Oak Hickory Maintenance. Maintaining the oak-hickory forest as the predominant forest type in the region is crucial to achieving the goal of a healthy, sustainable forest ecosystem. Oaks are keystone species which are critically important for sustaining the entire ecosystem including many wildlife species. Management activities, such as timber harvesting, prescribed burning and other silvicultural treatments are important in maintaining the oak-hickory component of the forest, and for creating early successional habitats that are critical to many native wildlife species.

On the Kaskaskia Experimental Forest, records clearly demonstrate what happens when the forest is allowed to develop for over sixty years with no active management. Sugar maple trees and other shade tolerant species are dramatically increasing in numbers and oak and hickory trees

are steadily decreasing. This pattern is occurring across much of the SNF.

There are several places on the SNF that give evidence of successful, aggressive forest management. One of these areas is Caney Ridge, where the results of a thirty year old silvicultural clear cut are evident. Today, there is a vigorous young oak-hickory forest developing. Professional forest managers know that an oak-hickory forest cannot be sustained and regenerated without vegetative disturbance.

The DEIS (p. III-49), indicates that, in 1962, the maple-beech component of the SNF was just 2 percent; in 1985, it had increased to 26 percent. The phenomenon of oak species being replaced by maple is further demonstrated by the forest survey results showing change between 1985 and 1998 (p. III-63, Draft DEIS).

The shelterwood harvest system under even-aged management is a desirable silvicultural method for maintaining the oak-hickory forest type. Ecological restoration of non-native pine stands to native hardwoods should be prioritized on historical oak hickory sites. There is a definite need for prescribed fire and herbicides in the interest of improving oak-hickory regeneration and for controlling invasive species. This alternative provides land managers with the greatest array of management tools needed to create and maintain the diverse vegetative conditions required to meet the plan's goals.

Even though Alternative 2 is the best of the four options presented, only 4.7 MMBF of timber is proposed to be harvested annually under this alternative. This amounts to only 16% of the net annual growth of 29 MMBF (International rule) on lands suitable for timber production based on the latest Forest Inventory and Analysis statistics. This level of harvest is far below annual mortality, insufficient to maintain and improve forest health and sustainability, does not adequately address oak regeneration issues and provides minimal economic and community benefits

Recommendation - Silvicultural Agenda for Oak Maintenance: Reevaluate proposed harvest and modify to accommodate oak regeneration restoration goals.

FISHERIES MANAGEMENT

No Concerns. The Proposed Forest Plan adequately addresses aquatic resources and fisheries management

WILDERNESS MANAGEMENT

Pesticide Use - Although technically provided for in the proposed alternative, pesticides appear to be a very limited option for invasive species control in areas on the SNF officially designated as Wilderness. The proposed alternative limits its use to "only when necessary to prevent loss of the wilderness resource, or to prevent significant losses to resource values on private lands or public lands bordering the wilderness." (p. V-63, Proposed Plan). It's unclear as to how this may be interpreted, i.e, definition of "wilderness resource" or "significant loss".

Whether this is to be interpreted as meaning that pesticides must always be the measure of last resort is unclear, but, if that is the case, then we believe this is too stringent a standard to be applied even in Wilderness Areas. A decision on whether or not to use pesticides, when such use is indicated in natural resource management programs, ought to be based on an evaluation of their safety, efficacy, and legality as well as their feasibility when compared to other alternatives.

IDNR supports the safe and judicious use of pesticides on public lands for a variety of natural resource and outdoor recreation management purposes. Chemicals can be an important part of integrated pest management programs designed to control certain invasive plant species that are prone to invade and persist in native plant communities. We are concerned that the proposed alternative may limit the best available technologies for managing invasive species for the next fifteen years. If this is the case, then Wilderness Areas could serve as reservoirs for invasive and exotic pest plant species.

IDNR Recommendation - Pesticides in Wilderness: Clarify the status of pesticide use in wilderness. Standards and guidelines for pesticide use should be clear and based on an evaluation of their safety, efficacy, and legality as well as their feasibility when compared to other alternatives.

Prescribed fire: The role of fire in maintaining and restoring the tallgrass prairies of the Midwest is well researched; the parallel and analogous role of fire in savanna and oak dominated forest and woodland communities is also well documented. Over the last 50 years scientists and land managers have been re-introducing fire into these ecosystems by using prescribed burning. Today prescribed burning is widely used by land managers, foresters, wildlife managers, conservation biologists and restoration ecologists to accomplish a wide variety of ecological and management goals and objectives. IDNR recognizes that prescribed fire is one of the most important management tools available for upland community maintenance and restoration.

Prescribed Fire - The Proposed Forest Plan should be clear that natural areas management and prescribed fire management in designated Wilderness Areas should not be limited due to imposed Wilderness Area limitations and that fire as a management tool should be available and be utilized to the greatest extent to manage natural communities.

Access to Inholdings - The proposed alternative essentially restricts motorized access into Wilderness but is unclear how to gain access to non-federal inholdings that are not cemeteries. The Proposed Forest Plan must allow continued access to State properties for management and recreational opportunities, i.e., in the case of Lusk Creek Wilderness area which contains Lusk Creek Nature Preserve.

IDNR Recommendation- Access to inholdings: Proposed Forest Plan should allow for a procedure for IDNR to be permitted motorized access to State land to maintain recreational trails and for ecosystem management

NATURAL AREAS MANAGEMENT

Natural area protection. IDNR agrees that areas recognized by the Illinois Natural Areas Inventory (IN AI) will receive protection in Alternative 2 by way of the Natural Areas Management Prescription. It should be noted that the Forest Service-designated natural areas are also recognized by the INAI. The INAI is a comprehensive and ongoing effort to find, evaluate, describe, and classify the best examples of Illinois' natural heritage, including high quality natural communities and endangered species habitats. These INAI sites comprise but a diminutive proportion of the total land and water area of the state. INAI sites are environmentally sensitive resources that are considered to be irreplaceable assets by the State. Providing protection and maintaining the high ecological value of the INAI sites is also an objective of the State Plan and is vitally important to the conservation of rare species in Illinois.

Historically, IDNR has refrained from designating equestrian trails within INAI natural areas on IDNR properties, recognizing that equestrian use holds the potential for threatening the natural integrity of these sites. Therefore, it is IDNR's policy, and it is IDNR's expressed intent, to avoid wherever possible proposing or permitting any equestrian use within its agency owned/managed INAI natural areas.

IDNR Recommendations - Equestrian Trails in Natural Areas - We recommend that the Proposed Forest Plan prohibit equestrian trail development in INIA sites on the SNF. Monitoring of any approved equestrian use in these most ecologically sensitive areas of the SNF is absolutely essential and should have a specific monitoring guideline.

RECREATION MANAGEMENT

Designated trails system for equestrians. Alternative 2 addresses the equestrian trails issue by providing the SNF with much greater control of equestrian use while setting forth a well-planned and well-maintained recreational trails system. Alternative 2 better serves the users while seeking to protect natural resources. IDNR, along with a broad range of constituency groups places the development of a good designated recreational trails system high on their list of priority needs for the SNF. The practice of allowing equestrian use to occur off of designated travelways may have worked well decades ago, but with well-documented increases in equestrian use and proliferation of equestrian campgrounds, it has resulted in an alarming increase of usercreated trails which are often redundant, poorly sited and abandoned after major damage to the resource has been done. The impacts of these trails are well-documented and often include rare plant communities and threatened and endangered species. In addition, the current situation on the forest is problematic in terms of trail maintenance and has proven to be a source of concern and confusion for equestrian users as well. The proposed Forest Plan should give clear guidance for monitoring and responding to impacts from equestrian use.

IDNR Recommendation -Monitoring recreational use - The Monitoring Matrix in the Proposed Forest Plan gives guidance for annual monitoring to assess if any recreational practices are causing impacts to any rare ecosystems or communities. We recommend that this guideline should be

broadened to include all natural communities and resources, not just those that are rare.

CONSERVATION OPPORTUNITY AREAS

The State Plan defines conservation opportunity areas (COAs) as places with special significance in conserving Illinois' species in greatest need of conservation. In most cases, important wildlife and habitat resources occur within a proposed COA, whereas restoration is critical within others. In all, conservationists have indicated a strong willingness to initiate or continue conservation actions. It is worth noting that two proposed COAs occur partially or entirely within the proclamation boundary of the SNF.

LaRue-Pine Hills-Western Shawnee-Trail of Tears. This area of tremendous biological diversity includes portions of the Lower Mississippi Bottomlands, Ozark and Shawnee Hills natural divisions. Much of the Mississippi Bluffs district of SNF could be considered within this COA. These areas are identified in the State Plan as important habitat for forest and forested wetland species in greatest need of conservation, respectively. IDNR objectives for the area include maintaining ecological connectivity across this transition area, restoring and maintaining high-quality natural communities, and contributing to a large forested landscape which appear to be consistent with the proposed plan. It is important to note that the Proposed Forest Plan is consistent with these desired conditions, and expansion of the forest boundary into the Mississippi River and Ohio River floodplains which will help achieve broader forest and wetland habitat objectives in the Lower Mississippi Bottomlands and Alluvial Plain natural divisions..

Recommendation - Forest Boundary Expansion: To give high priority to land acquisitions in the Mississippi River and Ohio River floodplains which will help achieve broader forest and wetland habitat objectives in the Lower Mississippi Bottomlands and Alluvial Plain natural divisions.

Eastern Shawnee. This COA is based on the Hidden Springs district, or eastern portion of SNF. The State Plan clearly demonstrates this area is the most critical forested landscape for species in greatest need of conservation in Illinois. The objectives within this COA is to manage a very large forest landscape (>50,000 acres), improve and/or maintain oak-hickory forest conditions, and protect and restore natural communities. The Proposed Forest Plan is instrumental in meeting the desired conditions within this COA. However, high-level forest interior conditions likely cannot be met within existing SNF lands given adjacent land uses, without conservation of private forests and/or readjustment of the forest boundary (see statewide forest objectives above).

Recommendation - Forest Boundary Expansion: Recognize that the eastern portion of SNF has been identified in the State Plan as the most critical forested landscape for species in greatest need of conservation in Illinois.

References

Herkert, J.R., R.E. Szafoni, V.M. Kleen, and J.E. Schwegman. 1993. Habitat establishment, enhancement, and management for forest and grassland birds in Illinois. Illinois Dept. of Coriserv. Natural Heritage Technical Publication 1. .. .

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Date: April 21, 2005

Subject: Draft for Proposed Land Resource Management Plan

The following are some of the aspects to the proposed plan that could be detrimental to the economy and well-being to the citizens of Pope County, Illinois.

1. Erosion of the tax base. Until Congress appropriates how much or even if they appropriate funds, the County is unsure of what to budget. If property was under private ownership, the tax base would undoubtedly be higher. The Forest Service appropriates approximately \$1.25 per acre.
2. No industry within the confines of Forest Service land. No timbering is currently being harvested. This money was used to support our schools.
3. There are a limited number of jobs available. The recreation with the horse camps and hunting do not generate a large number of jobs. Under the new plan these would be curtailed even further and in some plans nonexistent.
4. The forest is a great place to grow marijuana and do other illegal activities. The County does not have the financial resources to patrol these areas. .
5. It is a drain on the County resources to do search and rescue. Sheriff Office, ESDA, and fire department are generally involved along with volunteers.
6. Pope County has the most forest service land and we have no ranger station.
7. Deer population is at an all time high. This has had impact on auto insurance. Comprehensive insurance is higher in this area because of the deer. There have been several fatalities because of the deer.
8. Some farmers have quit planting crops because the deer population. A herd of 50 or more deer can clean-up a soybean field very quickly and it is not economically feasible to plant. The deer are a menace and a hazard and if the hunters can't access the forest service many new problems arise.
9. There are many small cemeteries scattered throughout the forest service. The only way to access some of these is by 4-wheeler.

Connie S. Gibbs, Pope County Clerk
P.O. Box 216
Golconda, IL 62938

III. COMMENTS AND RESPONSES RELATED TO PLAN REVISION OR THE DEIS

We have sorted the comments according to subject-matter areas within each of the resource areas analyzed in the FEIS and present them here with our responses. The comments related to land-ownership adjustment, as well as process, are presented following the resource-area discussions. Comments outside the scope of the Plan revision or EIS are addressed in Section III. The order of resource/subject areas is:

Table H-3. Response to comments—order of resource/subject areas.

A. Soil and Water	
Soil Resources	Water Resources
B. Air	
C. Forest Ecosystem Health and Sustainability	
Below-Cost Timber Sales	Pesticide Use
Fire Use and Suppression	Restoration of Non-native Pine Plantations
Insects and Pathogens	Silvicultural Systems
Non-native Invasive Species	Timber Harvest
Oak-Hickory Forest	Timber Products
Old-Growth Forest	Wildlife Openings and Large Openings
D. Biodiversity	
Animal Protection Laws	Natural Communities
Birds	Non-native Invasive Species
Cave Valley	Oak-Hickory Forest
Cougar	Oakwood Bottoms-Greentree Reservoir
Early-Successional Habitat	Old-Growth Forest
Fire	Restoration of Non-native Pine Plantations
Forest Composition	Species Viability Evaluation
Management Indicator Species	Timber Harvest
Migratory Bird Treaty Act	Wildlife
Modeling	Wildlife Openings and Large Openlands
Monitoring	
E. Forest-Interior Habitat	
Fragmentation	Interior-Habitat Management
F. Natural Areas	
G. Candidate Wild and Scenic Rivers	
H. Wilderness	
Roadless Inventory	Wilderness Management
I. Recreation	
ATV Use	General Recreational Use
Cave Management	
J. Heritage Resources	
K. Visual Quality	
L. Mineral Resources	
M. Socioeconomics	
N. Land-Ownership Adjustment	
O. Process	
Analysis	Modeling
Biological Assessment and Biological Opinion	National Forest Management Act
Data Quality	Range of Alternatives
Editorial	Relative-Value Analysis
Hoosier-Shawnee Ecological Assessment	Standards Vs. Guidelines

A. SOIL AND WATER

SOIL RESOURCES

1. The discussion of the effects of ATV use in the DEIS is inadequate and should consider submitted studies and reports. The EIS should explore mitigation measures such as additional law enforcement as it pertains to unauthorized ATV use and equestrians who do not follow the rules. Because of the highly erodible soils on the Forest, no ATV use should be allowed.

RESPONSE:

Soil compaction, erosion, rutting and sedimentation are some of the direct and indirect effects of ATV/OHM use addressed on FEIS pages 66-67.

We anticipate that it is possible to mitigate these adverse effects on soil and water resources through the proper location of travelways on the landscape, surface-hardening with gravel and the installation of drainage structures to divert water runoff. These and other appropriate mitigation measures would be considered at the site-specific level of analysis should a proposal to authorize ATV/OHM use be contemplated. The revised programmatic Plan does not authorize, fund, or implement any decision to construct or maintain ATV/OHM trails. Under the 1995 court order, there has been no legal ATV/OHM use of the Forest for the past decade. After listening to the public and taking a hard look at the potential environmental consequences (at the programmatic level) of allowing future ATV/OHM use, it was decided to codify and continue that status quo in the revised plan. We appreciate the concerns expressed regarding the potential, adverse effects on soils and will take this into account should a future proposal to allow ATV/OHM use be considered somewhere on the Forest.

Law enforcement personnel are not managed at the Forest level, but the Forest Supervisor can focus their activities. It would not be appropriate to include in the EIS discussion of law enforcement as a mitigation measure since the decision-maker does not control the allocation of personnel. Law enforcement is an administrative procedure that follows existing statutes, regulations and Forest Service policy (FSM 5302, 5309.11, and others).

2. The DEIS fails to properly address the adverse effects that timber harvest can have on soil productivity, even with mitigation measures. Timber harvest removes trees, vegetation and biomass that rebuild the soils. It also affects microorganisms, and causes soil compaction and erosion.

RESPONSE:

The analysis addresses at a programmatic level the effects of timber removal on soils and hydrology. The general effects of timber management are discussed on FEIS pages 69-73. In general, timber management practices have the potential to increase erosion and compaction. Standards and guidelines, however, have been developed to prevent and/or minimize adverse effects on soil and water resources, and to protect site productivity on the Forest, while providing opportunities to enhance and restore ecosystems. Site-specific responses will vary based on the types of harvest methods employed, as well as the actual site conditions, and these aspects would be addressed and evaluated during project-level analyses.

The revised Plan does not state when, where, or how timber might at some future time be harvested, nor does the Plan dictate the use of any particular timber-harvest method. The Plan simply sets forth the “proportion of probable methods of harvest,” as required by NFMA Section 6(f)(2); it does not mandate how, when, or where harvest might occur over the next 10 to 15 years. Notwithstanding what was allowed under the 1992 Plan, there has been little to no timber harvest over the past ten years.

3. The DEIS fails to discuss how much soil would be lost to erosion and sedimentation in streams under the various alternatives. The document asserts there will be no difference among the alternatives, even though there should be fewer adverse effects from Alternative 3 since it does not remove any trees.

RESPONSE:

The EIS contains analysis of a planning document that authorizes no site-specific projects. Additional, site-specific analysis will be performed of any projects proposed to implement the Forest Plan, addressing any potential effects on soil resources. For this reason, it is appropriate to compare planning alternatives in the EIS in a more general way because there are no on-the-ground specifics. A comparison of the effects of planned timber harvest is available on FEIS page 29. There we agree that Alternative 3 would result in the least-adverse direct and indirect effects on soil and water resources of the alternatives.

4. The DEIS should consider the loss of organic matter and soil nutrients, including phosphorus, potassium, magnesium, nitrogen and mercury, due to prescribed fire, as well as the issue of soil-heating that can affect soil biota and physics. The effects of an out-of-control prescribed fire on soil productivity and erosion also should be considered.

RESPONSE:

The DEIS addressed the effects of fire on organic matter and soil nutrients on pages III-31 through III-33. This discussion is presented on FEIS pages 74-77. Mercury is not addressed because information is limited about the fate of heavy metals after a prescribed fire. The NRCS currently is conducting a local study of heavy-metal distribution in southern Illinois, and we will review any new information as it becomes available.

Soil heating has not been a problem in previous prescribed fires, and we do not expect it to be one in the future. Soil temperatures measured within one minute of the flame passing the soil during prescribed fires on the Forest indicated that the soil temperature had risen slightly, but not enough to affect soil biota or soil physics (USDA Forest Service, 1997).

Prescribed fires are implemented within parameters designed to limit the intensity of the fire. Prescribed fires that get out of control are rare; in fact, we have no record of any prescribed burn escaping control on the Forest. Regardless, each prescribed burn is accompanied by a site-specific plan of action that addresses what would be done to suppress wildfire at that particular site.

5. Protection of the soil from erosion seems to be one of the most important issues on the Forest. The Plan should direct the use of only native species (in Table 2, Appendix G) for seeding mixtures.

RESPONSE:

We agree that protection of our soil resources is very important.

While the use of only native species is a desirable goal, local sources of native genetics are hard to find in southern Illinois and, when available, can be very expensive. Native seed produced outside of southern Illinois may not thrive under our conditions and so would be less likely to achieve restoration objectives. While the use of native species is preferable, the establishment of vegetation to stabilize disturbed soil is so important that we do not want it to be dependent upon potentially cost-prohibitive or non-existent sources. Under any reseeding conditions, we may use a non-native, non-persistent, weed-free nurse crop to provide temporary cover to halt erosion until native species can be established.

WATER RESOURCES

6. Since one of the main reasons for the establishment of national forests was to help keep our water supplies clean, the Plan should not allow vegetation disturbance, including commercial timber sales, in the water-supply watershed management areas.

RESPONSE:

The Plan allows vegetation management activities, including timber removal for wildlife or ecological purposes, in public water-supply watersheds. The effects of vegetation management are discussed beginning on FEIS page 90. Upon review of the analysis, we continue to conclude that vegetation management and maintaining the goals of the water-supply watershed management prescription are not mutually exclusive. Additionally, although the Plan identifies vegetation management as an acceptable activity, it does not authorize specific projects. Site-specific analysis would disclose any effects on watershed resources and provide mitigation measures to avoid site-specific adverse effects.

7. The EIS should address the effects of permitted ATV and horse use on streams and soils. There should be mitigation measures and a comparison of the alternatives. The FEIS should indicate the number of miles of stream that would be affected by permitted ATVs under each alternative.

RESPONSE:

The FEIS addresses the effects of recreational activities such as horseback riding and permitted ATV use on soil and water resources and also compares the alternatives on pages 33-46. Plan Forest-wide recreation standards and guidelines provide direction for the development of site-specific mitigation measures specific to the conditions of individual projects.

The ATV accessibility permit program is not part of the planning process and, so, no resource indicators, such as miles of stream affected, are presented. Although permitted ATV use is not specifically analyzed in the Plan, it is included in the cumulative effects analysis.

8. The Plan's revised riparian-area protections appear to be inadequate, allowing activities to contribute excessive erosion and siltation in floodplains. Horse trails and confinement areas should not be allowed in the filter-strips or floodplains.

RESPONSE:

The riparian filter-strip width was determined using current science and is consistent with IDNR best management practices. The effects of applying the filter-strip standards are summarized on FEIS pages 57-59.

The Forest Plan allows some flexibility in riparian filter strips. For example, under the bare-soil exposure limit guideline, a trail may be placed to cross a creek. Locating trails or stock-confinement areas in the riparian filter strip would require a site-specific analysis of the effects; but, in general, the guidelines are designed to maintain soil cover on at least 90 percent of the riparian filter strip, allowing these critical areas to function effectively as a filter.

9. The Forest should include in the Plan a management prescription for riparian areas and/or filter-strips and explain why the restriction zones on ground-disturbing activities for intermittent and ephemeral streams are so reduced, as compared to perennial streams. The Forest should consider the adverse effects of timber removal outside the riparian zones, especially near ephemeral and intermittent streams where the riparian buffer zone is narrower. The filter-strip guidelines should apply in the Mississippi and Ohio Rivers floodplains.

RESPONSE:

The Plan's protections for riparian filter strips are located in the Forest-wide standards and guidelines. We think this is appropriate because the Forest-wide standards and guidelines apply across all management areas on the Forest and take precedence over less-restrictive management prescriptions.

We think the filter-strip guidelines for ephemeral and intermittent streams are appropriate because these streams are typically narrower than perennial streams and flow only in response to heavy rainfall or snowmelt. FEIS pages 59 and 60 highlight studies demonstrating that filter strips of similar dimensions were successful in protecting water quality.

The major goals of the Mississippi and Ohio Rivers Floodplains management prescription include the restoration of wetland hydrology and management of wetland and floodplain habitat. Since floodplain and wetland restoration, function and management are already the primary emphases in these areas, we concluded that additional direction to manage these areas was unnecessary.

10. The DEIS cites several filter-strip studies to demonstrate their effectiveness, but it is unclear how the details of the studies compare to what is required by Plan standards and guidelines. It is also unclear if they comply with USDA information quality guidelines.

RESPONSE:

The riparian filter-strip dimensions in the studies cited are comparable, even less restrictive, than those in the Plan. As peer-reviewed studies published in scientific journals,

they comply with the information quality guidelines. We have received no scientific evidence, either from the comment or the public, that would contradict the scientific evidence we examined and presented in the EIS regarding the efficacy of the riparian filter strips.

11. In the discussion of roads and trails management and minerals management, the DEIS failed to compare the effects of the alternatives. Alternative 3 would have fewer effects than the other alternatives because it does not harvest trees and would not require as many roads.

RESPONSE:

The comparison of alternatives begins on FEIS page 23. The FEIS also includes a comparison of alternatives for minerals management on page 31.

12. The EIS should address the effects of horse manure on water quality.

RESPONSE:

The EIS addresses the effects of horse manure on water quality in a programmatic manner (FEIS page 21), stating “...manure that is washed into streams... enriches them with nutrients.” We would conduct on-site analysis of the effects of manure on water quality for project-specific environmental considerations.

We have, in fact, taken a hard look at this issue during the analysis of four watersheds for the first phase of the trails-designation project (see *FEIS for the Trails Designation Project—Phase 1, 2006*). The analysis indicates that the effects of horse manure on water quality are minor. This is confirmed by water-quality testing at the site-specific level, e.g., in the Lusk Creek watershed, where horses are often present but water quality is among the best in the state.

13. The Plan should have standards to protect watersheds from the effects of timber removal, include a management prescription for perennial streams and provide guidance for Forest-wide stream management and protection in Appendix E.

RESPONSE:

The Plan contains Forest-wide standards and guidelines applicable to many types of projects, including timber removal (pages 42-43). The riparian corridor filter-strip standards and guidelines at FW25.2 apply to riparian areas across the Forest. Implementation of these standards and guidelines during projects would help avoid or minimize adverse effects on watershed resources.

Habitat management guidelines in Plan Appendix H direct managers to “improve or maintain the abundance and diversity of stream habitats” (page 199). The Plan includes new management direction for water-supply watersheds and the Mississippi and Ohio Rivers floodplains. The Plan’s standards, guidelines and management prescriptions are appropriate as presented and will provide the guidance needed to achieve the objective of maintained or improved stream quality.

14. The DEIS presents a weak rationale for the claim that the management of wildlife openings and large openlands would result in no adverse direct or indirect effects on soil and water resources. The effects of herbicides, bulldozers and row crops used in wildlife openings and large openlands were not addressed, nor were the effects of management on soil, or water storage and runoff.

RESPONSE:

The discussion of openings and openlands management adequately describes the expected effects. This discussion, on FEIS pages 77 and 78, includes a general overview of the anticipated actions in these areas. As site-specific projects are proposed, more-detailed analyses would be prepared.

The allowable management activities under Alternatives 1, 2 and 4 would establish and maintain vegetative cover. Water-storage capacity in the soil is mainly controlled by the texture, amount of organic matter and bulk density of the soil profile (USDA NRCS, 2003). Soil textural properties would not be altered, organic matter would not be adversely affected, and compaction would be minimized by following Plan guidelines FW25.5 and FW25.6. These guidelines limit equipment and disturbance of the inherent capability of the soils based on site-specific analysis. Since vegetation will be maintained and compaction will be minimized, water storage would not be adversely affected by management.

As stated in the DEIS, the openings are surrounded by forested, vegetated land that would act as a buffer to catch any eroded soil particles before they could enter a stream. Standards and guidelines regarding riparian buffers would supersede management prescriptions for both wildlife openings and large openlands and would protect streams.

15. The DEIS states, “Fertilizers and lime could be applied at recommended rates for maintaining vegetation. These amendments would be incorporated into the soil to ensure that they remain on the site...” and, “The loss of fertilizers from the sites would be minimal because only small amounts of fertilizers would be used...erosion and compaction are not likely because most openings are located on nearly level to gently-sloping (not steep) ridge-top sites and any management would be done while soils are not wet.” There is no management standard to require this, and it is unclear whether there is any scientific basis or monitoring data to support the statements. The Plan contains no specific management standards to ensure that tilling, mowing and other management activities would be restricted in extent in the large openlands and wildlife openings. It is possible that fertilizer would not be trapped if a bulldozer is used next to a stream and the area is then fertilized.

RESPONSE:

Local monitoring data is lacking regarding fertilizer movement in openlands and wildlife openings. Studies have shown, however, that reduced rates of application and incorporation of phosphorus fertilizer increase the chances that the nutrients will remain on-site (Djodic *et al.*, 2002). The recommendations in the Plan are intended to correct levels of soil nutrients without exceeding plant needs. Our goal is not to achieve maximum growth or yield, but simply to establish a healthy stand of grasses, legumes or food crops where they have been found desirable through site-specific analysis.

The Plan does not identify standards or guidelines specifically addressing the incorporation of fertilizers, or tilling or mowing. These management actions are addressed, however, in a more general way in Plan standards FW25.5 and FW25.6, which limit equipment and disturbance to the inherent capability of the soils, based on site-specific analysis. We anticipate minimal effects from openland management activities because of the limited frequency and extent of the treatments. Additional site-specific analyses would be completed for any projects proposing these, or similar, treatments. Additionally, the incorporation of fertilizers is addressed in Plan Appendix F, which outlines recommended fertilizer rates and application methods. This is adequate programmatic direction for this issue.

Plan standard FW25.2 defines riparian filter strips and Plan guideline FW25.2.2 specifies allowable bare-soil exposure within the filter strips. These standards and guidelines preclude us from exposing large areas of bare soil along streams. Should a situation arise where bare soil in the riparian filter strips is identified as a resource concern, regardless of the cause, the effects of restoration activities, including the use of fertilizer, would be addressed in site-specific analysis.

16. The Plan should ensure that management of floodplains would sustain maximum biodiversity from a riverine-floodplain perspective and a variety of habitats, including ephemeral wetlands.

RESPONSE:

The recent expansion of the Forest purchase-area boundary provides us with new opportunities for acquiring, restoring and managing lands in the Mississippi River floodplain. As described on Plan page 75, the Mississippi and Ohio Rivers Floodplains management prescription would focus on wetland habitat and hydrologic restoration. Hydrologic restoration would be accomplished where possible to simulate natural wetland functions. Some areas would provide permanent-water conditions comparable to historic swamps and oxbows. Overall, the floodplains would be a landscape of bottomland hardwoods with interspersed woody and herbaceous wetlands, some of which would be managed to promote annual-wetland habitat and vegetation.

In areas that hold water and are wet for long periods, cypress may be selected for reforestation and management. There is currently some diversity of age-classes as a result of natural succession. Some areas, however, including those with existing easements, may be managed as openlands to support wildlife species and add diversity. Forest habitat would be managed to consist generally of shade-intolerant tree species and bottomland hardwoods, including pin oak, swamp white oak, green ash, overcup oak, cherrybark oak, pecan and hickory. Openland habitats would be managed for native grasses and forbs.

17. The Plan should include management policy for large, woody debris, including leaving the debris in streams to create habitat for invertebrates and fish. The Plan should ensure protection of the water quality of Bluff Springs by maintaining appropriate amounts of vegetation near the springhead and within the recharge area and ensuring that septic systems do not contaminate the springs.

RESPONSE:

The Plan does not specifically address the management of large, woody debris in streams, but references management practices defined by the IDNR Division of Forest Resources

(FW25.1) for guidance. We realize the importance of woody debris in streams and monitor the relative abundance of woody debris through annual stream surveys. We do not remove woody debris from streams, except when it threatens structures (e.g., spillways, bridges and culverts) that, if affected, could cause substantial erosion and affect stream habitat.

Maintaining appropriate filter strips on perennial and intermittent streams will ensure recruitment and continued abundance of woody debris in streams. The Forest will protect seeps and springs as stated on page 25 of the Plan. The Forest has no control over activities on private land, although these actions would be considered in site-specific environmental analyses before a decision would be made to implement a project potentially affecting a seep or spring.

18. The EIS should address the effects of activities that threaten water quality due to soil erosion, mass wasting, sedimentation, nutrient removal, increased water temperatures, changes in water supply and storm flows, channel erosion, increased nitrates and mercury contamination. Additional factors that should be considered in the analysis of cumulative effects include: 1) coarse-particulate organic matter, 2) fine-particulate matter, 3) algal abundance, 4) temperature extremes, 5) turbidity, 6) diurnal cycle of dissolved oxygen, 7) nutrient input into the stream, 8) amount of suspended solids, 9) stability of substrate and banks, 10) uniformity of water depth, 11) habitat heterogeneity, 12) flow extremes, 13) diversity of microhabitat velocities, 14) primary and secondary predation, 15) abundance of shredders versus scrapers and 16) abundance of omnivores versus piscivores.

RESPONSE:

The DEIS addressed the effects on water resources from various activities on both public and private lands (these can be found on pages III-3 and III-4). Soil erosion, sedimentation and nutrients are analyzed primarily; however, the effects of different management actions on overall water quality are also discussed. Several of the 16 “additional factors” listed in the comment, including water temperature, water supply and storm flows, channel stability, levels of trace elements, streambank stability and aquatic plant and macroinvertebrate communities must be in good condition for overall water quality to be good. However, most of the items listed are complex components of water quality and would be analyzed at the project level if identified as an issue.

19. The EIS should disclose the effects of not following the state best management practices because they are not standards in the Plan. The document should identify all site-specific best management practices for controlling non-point-source pollution and the water-quality monitoring required to demonstrate the adequacy of the practices.

RESPONSE:

Plan guideline FW25.1 states, “(Forest management) activities... will be guided by the best management practices defined by the Illinois Department of Natural Resources...” (See Response 291 regarding compliance with standards and guidelines.) The IDNR best management practices focus on common-sense methods of preventing/ minimizing erosion and sedimentation, including installing drainage on roads and trails, stabilizing and establishing vegetative cover on bare soil, and minimizing disturbance to stream channels and riparian areas. Compliance with Plan standards and guidelines will protect and, in many instances, improve water quality.

Monitoring to ensure that soil and water resources are protected is listed as a requirement in Plan Table 6-2, page 102. If necessary, more-specific monitoring requirements could be developed following site-specific analyses of proposed projects.

20. The Forest Service should restore lakes to a healthy condition by releasing grass carp or using chemicals to get rid of weeds and moss, thus bringing them to a desirable condition.

RESPONSE:

Plan guideline FW26.8.1 states, “Excessive vegetation in lakes and ponds should be controlled when it impedes the use-objective for the water body. Control may be mechanical, biological or chemical, and management practices such as aquatic weed control, use of selective pesticides and annual drawdown are allowed.” Although not specifically mentioned, the use of grass carp would be considered a biological control. Grass carp have been utilized in the past in pond management and, where appropriate, could be used again. Any stocking of fish would be coordinated with the IDNR, the agency that manages fisheries on the Forest. Note, however, that the programmatic revised Plan directs no related action and makes no proposal of any related action. Any control practices would require project-related, site-specific analysis under NEPA.

21. The EIS should go into much more detail regarding the use of aquatic pesticides, specifically: What about effects on non-target receptors? What effects would there be on public health? What if a kid swims in the water after it is treated?

RESPONSE:

As stated in Plan guideline FW21.1, “The use of pesticides and biological treatments is allowed following appropriate environmental consideration that indicates use will meet management objectives.” The use of rotenone or any other pesticide would occur only after site-specific analysis and disclosure of effects. A site-specific environmental analysis would include the detail requested by this comment. Non-target impacts to other flora, fauna and humans would be assessed. Application of pesticides would follow EPA guidelines.

22. The EIS should be more forthcoming in comparing the effects of the alternatives.

RESPONSE:

The DEIS addresses potential effects at a programmatic level and in sufficient detail to enable the deciding official to choose among the alternatives. Comparisons of alternatives are found throughout Chapter 3 of the DEIS and FEIS and are summarized on FEIS pages 23 through 32.

23. Watersheds seem to be areas that are too large to be addressed by only one management prescription. Areas nearest streams should be managed differently from areas further away.

RESPONSE:

We agree that uniform management prescriptions cannot always address adequately the variable resource concerns in a watershed. For this reason, we included in the Plan Forest-wide riparian corridor (filter-strip) and riparian-area standards and guidelines (Plan page 42). These standards and guidelines supersede less-restrictive management prescriptions.

Additionally, analysis of individual projects typically includes site-specific effects on riparian areas.

B. AIR

24. The IEPA suggests that Plan guidelines consider expected air-quality conditions before a prescribed burn is implemented, and that the Plan be revised to prohibit prescribed burns on days when forecasted air-pollution levels are unhealthy in the vicinity of the Forest, including the St. Louis metropolitan area.

RESPONSE:

We are concerned, like the IEPA, with the potential effects prescribed burning could have on the air quality of areas such as the St. Louis metropolitan area, Evansville, Indiana, local communities and other sensitive locations. We realize that the future of ecosystem and fuels management depends on how well we identify and protect both local and regional sensitive receptors. Because of this concern, the following measures would be followed to mitigate potential adverse effects:

- Smoke management and mitigation would be included in all prescribed burning plans (Plan standards FW51.1.2.1 and FW51.1.2.2). The Forest Service would minimize the effects of smoke from any prescribed fire by identifying and avoiding smoke-sensitive areas and following state standards.
- The best available smoke-management practices and control measures would be used to ensure that prescribed fires do not adversely affect public health, safety, or visibility.
- We are also concerned about the potentially adverse effects of smoke on non-attainment areas and possible effects on air quality would be analyzed at the project level.

25. The EIS should consider the effects on air quality from the emissions of prescribed burning, ATVs, leaf blowers and lawn mowers.

RESPONSE:

Emissions from prescribed burning are addressed on FEIS pages 88-89. The Forest addressed the effects on air quality of different actions based on the degree of anticipated effect. The anticipated adverse effect on air quality from the use of leaf blowers and lawn mowers is expected to be negligible.

The EPA has identified emissions from ATVs, OHMs and other recreational engines as contributing to ozone pollution and emitting carbon monoxide and particulate matter. The EPA estimates that large, industrial, spark-ignition engines, recreational vehicles and diesel marine engines collectively account for about nine percent of hydrocarbon emissions, four percent of carbon monoxide emissions, nine percent of nitrous oxide emissions and five percent of particulate matter emissions. The EPA has taken steps to regulate the emissions from these types of engines, including ATVs and OHMs. New machines will be required to meet stricter emission standards beginning in 2006-2007. Old machines will not be required to meet the new standards, but as years pass the older machines will be replaced.

The EPA anticipates a 60-80 percent reduction in the major pollutants emitted by these engines (EPA, 2002).

The Plan prohibits ATV/OHM use except for administrative and permitted use. On the Forest, about 1,500 people are authorized currently to use an ATV because of disability. The ATV accessibility permit program is an administrative action not part of the planning process; however, the Forest is reviewing it and requirements that are more stringent are anticipated. As part of the proposed changes, we expect the number of permitted riders to stabilize at substantially less than the current number.

An unknown amount of unauthorized ATV use occurs scattered across the Forest. Since there are no designated areas in which to concentrate large numbers of these machines for extended periods, the potential for adverse effects on air quality are remote. Although the use is producing small amounts of pollutants, these emissions are separated spatially and temporally and are estimated to have a negligible effect on air quality. This effect will become more negligible as these machines become cleaner in the coming years.

26. The EIS should consider the effects of management and use activities on global climate change and hydrologic and carbon cycles.

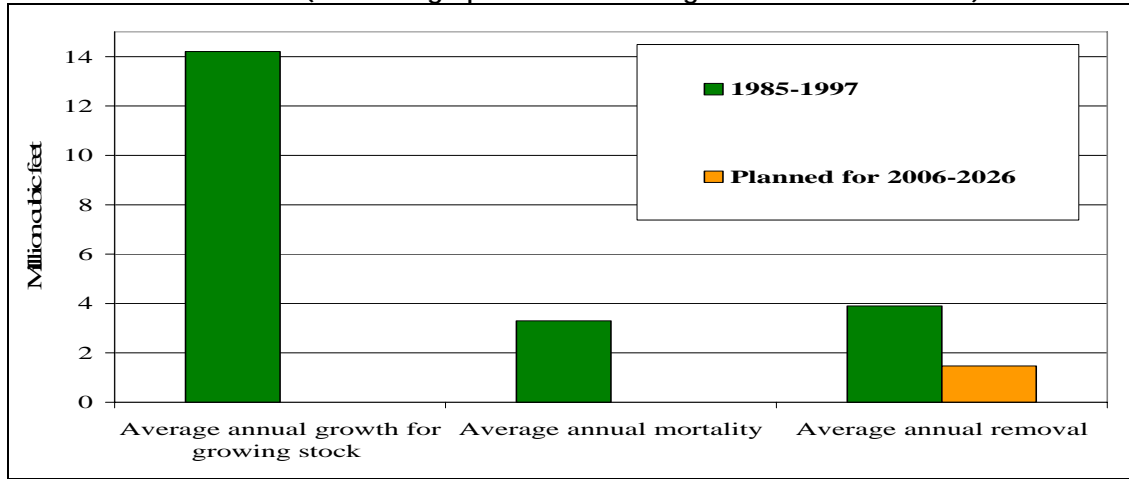
RESPONSE:

Although it is beyond the scope of the EIS, we will discuss briefly the relationship of Forest activities to global climate change and hydrologic and carbon cycles. Carbon is removed from the atmosphere and stored in plant and animal biomass. Tree branches, leaves, roots and stems contain carbon, including both new tissues and organic material in the soil. Combustion, respiration and decay release the stored carbon back to the atmosphere.

Although prescribed burning releases CO₂, the vegetative growth following the fires should compensate for the temporary loss. Additionally, most of the organic matter in the soils in the project area is in the upper soil horizons. Steps taken to prevent soil erosion will also protect the soil organic matter.

Proposed and probable management activities would remove some stored carbon from the Forest. The Plan allows removal of up to about 1.47 million cubic feet of timber annually over the next two decades. Figure I-1, adapted from Haugen (2003), illustrates the annual growth, mortality, and removal of trees on the Forest from 1985-1997 and scheduled removal for the next two decades. The proposed harvest volume is very conservative in comparison to the volume of biomass added, on average, to the Forest each year. It is anticipated that the Forest Plan will be effective in providing for the restoration and management of healthy natural communities over the planning period, while maintaining the Forest as an effective carbon sink.

Figure I-1. Growth, mortality, and removal of trees on the Forest from 1985-1997 and planned removal for the next two decades (data and graph taken from Haugen 2003 and Forest Plan).



Global climate change is a developing issue of concern that could have an effect on future Forest conditions. However, current modeling tools have a high level of uncertainty, especially in relatively short planning timeframes such as the Forest Plan (15 years) (Changnon *et al.*, 2004). Until better predictive-modeling technologies are available, the restoration and management of high-quality natural resources and maintenance of biological diversity will best prepare these resources for the potential effects of global climate change.

Forest activities, as planned, are not capable individually or cumulatively of affecting the hydrologic cycle.

C. FOREST ECOSYSTEM HEALTH AND SUSTAINABILITY

BELOW-COST TIMBER SALES

27. The Forest should address the issue of below-cost timber sales. If timber removal must be done commercially, the government should not be subsidizing the timber companies through below-cost sales. If possible, the sales should be profitable to the government.

RESPONSE:

The DEIS addresses the issue of below-cost timber sales in Alternative 3, which allows no commercial timber harvesting as part of the vegetation management activities. The DEIS then compares the effects of Alternative 3 with the other alternatives in terms of the costs of its implementation and its effectiveness in achieving desired future conditions on the Forest. We have had no commercial timber sales on the Forest for over ten years; therefore, we are not certain of the demand for and value of the types of timber that could be available for sale as part of vegetation management activities. Our estimates were based on the value of timber sold from private lands in the state. We hope to make a profit on the timber that is sold from national forest lands; however, we emphasize that the objective of any timber removal on the Forest is not the production of timber products, but the creation of

vegetative conditions that enhance wildlife habitat and maintain a healthy forest ecosystem. Timber sales are a vegetation management tool to help achieve these objectives.

The Forest Service addressed concerns regarding below-cost sales and subsidies for timber companies in a November 6, 2000 letter from Ann M. Bartuska, Director, Forest and Rangeland Staff, subject: Forest Service Comments on the Report Entitled, “The Economic Case Against National Forest Logging” (www.ifia.com/Special_Reports/Talberth_Letter.pdf). Excerpts follow:

When a sale is offered, it is offered competitively—and the contract is normally awarded to the firm offering the highest bid. These requirements have been imposed to help insure that the government is justly compensated for any timber it sells. Arguments of a subsidy arise from the fact that the price the government charges for timber is not always sufficient to cover its full costs of sale preparation and administration...the Forest Service cannot always price its timber high enough to cover its full costs of production, because if it did so—in some instances it would only succeed in driving itself out of the market—which would compromise its ability to use timber sales as a management tool...

28. The DEIS should disclose the amount of money that will be returned to the US Treasury and how much will be diverted for other uses (e.g., KV fund). It should compare the amounts of money lost from various kinds of logging. It should address the effects on local landowners having to compete with below-cost government timber and the indirect effect of poor private forest management. It should address the findings of the 1995 GAO/RCED 95-237FS report and all the points of Forest Service publication PNW-GTR-403. It should compare the economic values of standing forest for carbon storage, flood prevention, watershed protection, tourism, recreation, mushroom gathering, etc. to the economic values of a “stumpland.” The Forest Service needs to address the methodology used to address below-cost sales.

RESPONSE:

We conducted two economic analyses as part of the forest planning process: An economic impacts analysis using the IMPLAN model and a comparison of the present net value (PNV) among the alternatives. The IMPLAN model looks at the effects of the alternatives on the local economy. The PNV calculations compare the costs and revenues of forest management, including silvicultural exam, road costs, sale preparation and administration, reforestation, timber-stand improvement and prescribed burning. Overhead costs and law enforcement are not included in the analysis for PNV; however, budget expenditures are included in the IMPLAN model. Several types of timber harvesting and associated costs are analyzed in the alternatives, including group-selection harvesting, shelterwood and shelterwood with reserves, and then compared to Alternative 3, which allows no timber removal.

Regarding effects on private landowners, the Bartuska letter referenced in the previous response states, “Given that the US is a net importer of wood products, the argument that national forest timber sales adversely affect private forest owners is difficult to accept. The domestic market is large enough to accommodate all interested domestic producers.”

A General Accounting Office (GAO) report for the Forest Service, GAO/RCED 95-237FS (1995), identified the National Forest Fund (NFF), which includes payments to states and the roads and trails fund, Knutson-Vandenberg (KV) fund, salvage sale fund (SSF), brush disposal fund (BD) and purchaser road credits, to apply timber sales receipts within timber sale areas and on national forest lands. These funds are available for county schools and roads through the NFF; for reforestation, timber-stand improvement, prescribed burning and wildlife habitat improvement through the KV fund; for reduction of hazardous fuels through the BD fund; for salvage of timber damaged by fire, insects or disease through the salvage sale fund; and for constructing permanent forest system roads. Although amounts vary by timber sale, the GAO report shows that contributions to these funds reduce the amount of money transferred to the federal treasury by about ninety percent.

As suggested in the Forest Service publication PNW-GTR-403 (Niemi and Whitelaw, 1999), the EIS for the Forest Plan does provide a description of the geographic and economic settings, analysis of economic values and impacts and a summary of the potential economic consequences of alternative approaches to forest management. Although their publication focuses on economic tradeoffs, Niemi and Whitelaw also realize it is possible for forest management decisions to increase multiple outputs at once. Values generated by recreation and tourism on the Forest are included in the economic analysis using the IMPLAN model. Dollar values are not generally established for carbon storage and watershed management in Plan-level economic analyses. The methodology of the economic analyses performed during the Forest planning process is addressed in Appendix B of the EIS.

FIRE USE AND SUPPRESSION

29. The Plan should require surveys before and after prescribed burns and that the areas to be burned should be posted so that no one will venture into the area by mistake.

RESPONSE:

The site-specific environmental analysis for each prescribed burning proposal will determine the amount of survey, data collection and analysis that is necessary. This includes the monitoring required for planning and conducting prescribed burning, as has occurred for completed prescribed fires. Prescribed burning also requires the preparation and implementation of a prescribed fire plan for each project (Plan standard FW51.1.2.1) that includes notification of the public, forest visitors and nearby residents of planned and operational prescribed fire activities.

30. The DEIS asserts that fire is a natural component of the ecosystem of southern Illinois. If so, why are there so few natural fires? Why is no pre-settlement data available for southern Illinois as there is for southern Indiana? The DEIS states that large fires similar to those in Western forests could occur on the SNF. What proof is there that this is possible? The DEIS fails to disclose the effects on maple of past burning. The information provided seems to demonstrate the need for an alternative that proposes burning to address the understory without timber sales. An alternative should also be developed that would require smaller burns and monitoring. The Plan should contain clearer guidance as to how natural and human-caused fires should be addressed.

RESPONSE:

FEIS Table 3-8 presents ten-year average data for wildland fires on the Forest. This table reflects only the fires known to have occurred in this timeframe. While the majority of fires on the Forest are small, we have experienced four large fires in the past ten years that burned between 100 and 300 acres each. Fire modeling has shown that, given the proper combinations of weather and fuels conditions, larger fires are possible in our area.

There are, of course, many more fires in the vicinity of the Forest that are suppressed by one of the many local fire departments and which are not recorded in this table. The highly intermixed ownership pattern on the Forest complicates the fire-suppression response, with a host of local fire departments, IDNR and other federal agencies all responding to fires within their areas of jurisdiction. Although the data reflect only the fire-suppression responses of Forest resources, there are indeed many more fires each year in our local area. As stated in several citations, the decrease in the number of fires corresponds well to the establishment of fire ordinances. The effectiveness of the fire-suppression programs of all the local agencies has had an effect on the number of fires as well.

Several researchers cited in the FEIS (pages 92-93) mention the role of historic, human-caused burning and its effect on forest structure and composition in the area. Recent fire data on the Forest (FEIS page 94) indicates that about one percent of the fires are from natural ignitions. This correlates well with some of the historical information (Ruffner personal communication, 2005).

On page III-50 of the DEIS, we stated that pre-settlement fire-history data are unavailable for southern Illinois. It is more accurate to say that pre-settlement fire-history data for southern Illinois are *limited*. In our region, one of the primary reasons for this situation is the widespread logging of the primary forests and the deterioration of cut stumps (Ruffner and Groninger, 2004). The amount of data available for this purpose varies by geographic region. Robertson and Heikens (1994) attempted to conduct pre-settlement studies in our area, but had problems finding a sufficient number of trees that dated to pre-settlement times. This study also found that many of the older trees had deteriorated heartwood. Fralish *et al.* (2002) present a thorough analysis of pre-settlement data for our region, in accordance with methods generally accepted in the scientific community. The *Hoosier–Shawnee Ecological Assessment* (GTR NC-244) and other publications also discuss pre-settlement conditions.

Our use of the existing information is in compliance with CEQ regulations, since it is sufficient to provide the basis for a reasoned choice among the alternatives and is not expected to contribute to reasonably foreseeable significant adverse effects on the human environment.

Prescribed fire and its effects on maple regeneration have been well documented in Ruffner and Groninger (2004), Ruffner (2001), Ruffner and Davis (2002), Parker and Ruffner (2004), Thompson (2004), and others. Some of these studies were within the proclamation boundary of the Forest. In general, fire kills smaller diameter, less-than-two-inch, maples (Ruffner and Groninger, 2004); however, the effect of prescribed fire on maple mortality is dependent upon many variables. Generally, the smaller the diameter of the trees and the hotter the intensity of the fire, the higher the percentage of maples removed through the application of prescribed fire. These findings are supported by observations of

Forest personnel of the local effects of fire on maple mortality (E. Shimp, S. Widowski, R. Smith, personal communication, 2005). Ruffer and Groninger (2004) concluded that removal of these trees by cutting should be considered. Removal of trees by cutting is discussed in Plan Appendix C, under the heading “Intermediate Treatments.”

Plan standards and guidelines for fire management (FW51, and following) provide sufficient direction for wildland-fire suppression response, whether natural or human-caused, in accordance with established guidelines and policies that provide more specific direction.

31. With regard to fire, McClain and Elzinga (1994) suggest there were no reported wildfires in early-settlement Illinois south of Gallatin County. They question whether Native Americans had the tools to do widespread burning and state that there is little evidence that there was widespread burning in our forests. Other research shows that fire does not necessarily result in increased oak regeneration and has other effects, such as drying out the soil, removing the duff layer, injuring trees and opening the land to exotics, causing unnatural resprouting of woody vegetation, increasing soil erosion and killing insects and other non-target organisms, including snails and turtles.

A study (provided) indicates that fire management to control maples resulted in increased garlic mustard invasion, a growing problem on the Forest. The Forest should treat large-scale burns as experimental and become part of the scientific process, with thorough documentation of conditions on the ground prior to the fires and frequent follow-up analyses at each site. While historical documents and science show that maple is best controlled or eliminated by prescribed fire, we have gone so many years without fire that no one really knows for sure what the results are going to be on the Forest. Some prescribed burns in the Cap Sauers Holding nature preserve in Cook County have resulted in areas of dead oak trees and a decrease in the abundance of oaks.

RESPONSE:

The reference to McClain and Elzinga (1994), “The Occurrence of Prairie and Forest Fires in Illinois and Other Midwestern States, 1679-1854,” is a discussion of the use of “ring fires” by Native Americans to assist in hunting buffalo on the prairies of Illinois, almost without exception in the fall. The citation notes the historical documentation of two fires in Gallatin County, one in 1819 and another in 1822. The article is a thorough discussion of the ability of Native Americans to utilize fire for this purpose. Williams (2001) cites over 300 studies documenting the Native Americans’ use of fire, as do numerous other authors.

A reference was made to research indicating that prescribed fire does not necessarily result in increased oak regeneration and results in adverse effects. The Forest Plan cites numerous studies related to oak regeneration and the effects of fire. The literature is replete with research on this topic. Two of the submitted articles, “The Role of Fire in Oak Regeneration” (Van Lear and Watt, 1993) and “Prehistoric Human Use of Fire, the Eastern Agricultural Complex, and Appalachian Oak-Chestnut Forests: Paleoecology of Cliff Palace Pond, Kentucky” (Delcourt *et al.*, 1998), cite the crucial role of fire in oak forests from a current and historical perspective. While prescribed fire has some effects that may be deemed adverse, these tend to be short-term and on a small scale, considering the scope and intensity of prescribed fire on a landscape scale.

The article cited regarding garlic mustard invasion after a prescribed fire to control maples, “Structural Composition and Species Richness Indices for Upland Forest of the Chicago Region” (Bowles *et al.*, 2000), includes the following statement concerning fire management and garlic mustard: “The results of these tests must be interpreted with caution, as specific information is not always available on the nature, timing, or exact location of these burns, nor on the condition of stands prior to burns.” We confirmed this by telephone with the principal author of this study.

We also received a study, “Response of Garlic Mustard, ‘*Alliaria petiolata*,’ and Forest Understory to Herbicide and Prescribed Burning” (Martin and Parker, 2004), that stated, “Methods to eradicate garlic mustard have produced varied results, with herbicide and prescribed burning the most effective.” Additional documentation of the effectiveness of prescribed fire as a control method for garlic mustard can be found in several documents, including “Vegetation Management Guideline, Garlic Mustard” (Illinois Nature Preserves Commission, 1990), which states, “Fall or early spring burning is an effective control in oak woodlands. Repeated burns over several years may be necessary to achieve adequate control and to eliminate plants produced from the seed bank.” Another article, by Chen, published in the Illinois Natural History Survey Reports in November/December 1998, makes similar recommendations, as does the USDA Forest Service publication, “Nonnative Invasive Plants of Southern Forests—A Field Guide for Identification and Control” (Miller, 2003). These publications, as well as others, provide adequate rationale and documentation of the effectiveness of prescribed fire as a garlic mustard control-tool.

We note the reference to prescribed burning in a nature preserve in Cook County that resulted in areas of dead oak trees not apparent for a few years. It was suggested that this could lead to a decrease in the abundance of oaks. While this outcome is certainly possible in the short term, the longer-term effects of prescribed fire, as documented in the literature, contribute to continued oak dominance in oak-hickory systems.

32. The Nature Conservancy supports the proposed landscape-level burning as similar to its approach to conserve at the landscape scale. However, the Plan should address the complexity of the management effort and provide guidance in the form of standards and guidelines for prescribed fire in terms of which areas to target for landscape-scale burns, fire-return intervals and/or ecological land-type-specific goals, similar to the detail specific to natural areas in Plan Appendix D. The Plan does not specify a normal operating season for prescribed burning in the standards and guidelines, and Appendix D indicates an “open-ended” burning season for natural areas. With regard to the fire-return intervals in Appendix D, the interval of five to eight years for maintenance of the upland-forest community-types should be 10 to 20 years, and the 1-2-year interval for maintenance of a dry woodland seems too frequent.

RESPONSE:

The landscape-level burning of the Plan is a process that will incorporate multiple activities, many of which will be dependent upon monitoring to gauge the success of each project. In the initial entries, it is likely that more than one prescribed-fire treatment could be necessary to meet management objectives. In addition, other cultural treatments may be needed, based upon the site-specific conditions encountered. Possibly additional control practices for invasive species may be necessary if fire alone is not adequate to meet the non-native invasive species objectives. We think that an adaptive management approach,

including close monitoring and follow-up treatments, is a sound method to implement this strategy. Through monitoring on a site-specific basis we will be able to develop specific strategies to use as a guide for treatments, keyed to ecological land-types. We are currently preparing an update to refine the Forest ecological land-types, and the implementation practices will form an important set of guidelines for site-specific implementation practices and schedules.

Plan Appendix D indicates an open-ended burning season for many of the communities listed. Additional guidance in these descriptions adds, “Generally fire will be prescribed for autumn or spring; however, during the height of a drought cycle, prescribed fire applied in late summer would be optimal in simulating pre-settlement occurrences.” The intent behind these guidelines is to provide the agency with the ability to capitalize on preferred burning conditions that may be present within the calendar year. These, however, need to be coordinated with other Forest Plan standards, such as those that limit burning to certain timeframes. These would include standards that limit burning opportunities in order to mitigate effects on the Indiana bat, or to enhance restoration of Mead’s milkweed. While some guidelines may appear to be of short-duration intervals, such as those listed for dry woodlands, the intent is to allow us to implement practices that will not be artificially constrained. If we were limited by prescribing a fire-return interval that was too long, we could lose the opportunity to apply repeated prescribed fire when needed to meet management objectives. The application of prescribed fire on a shorter-return basis may be beneficial, or in some cases essential, to control re-sprouting or for other community restoration or maintenance needs.

All of the community descriptions related to fire-return intervals address the fact that the time period prescribed will be monitored, and adjusted, based upon site-specific evaluations. They are intended as guidelines to be validated and adjusted as needed, through monitoring, while at the same time not be unreasonably restrictive in meeting community restoration and maintenance needs.

33. The DEIS should disclose how timber sales increase fire danger and how far a fire could spot, as well as address the danger to nearby structures. The data presented on page III-52 should distinguish between natural and human-caused fires. The Plan (page IV-7) should indicate that the main way to protect structures from forest fires is to manage the area around the structures, and should provide for public education on how to protect structures from fires.

RESPONSE:

Timber sale contracts include provisions for the prevention and suppression of wildland fires. These provisions include modifications in operating schedules to include seasonal and daily restrictions, as well as provisions requiring that fire-suppression equipment be on-site if operations occur in fire season and conditions warrant. As stated on Plan page 50, all contracts for work should contain clauses or direction that provide for adequate fire protection on or near the work site. There is no record of timber sale-related fires on this Forest and, in checking with personnel on the Hoosier National Forest, we learned there is no record of timber sale-related fires there. The analysis adequately addresses this concern.

FEIS page 94 states that over 99 percent of fires on the Forest are human-caused. We have clarified the data presented in FEIS Table 3-8. With regard to structure protection, we have been working with local volunteer fire departments to assist in delivering the structure-protection message to the public. There is an abundance of information on this topic, much of which is available on the “Firewise” website. This information provides specifics on providing proper clearances and fuel storage, as well as other information related to having a fire-safe structure in a wildland setting. We address the wildland-urban interface in FW51.3.

INSECTS AND PATHOGENS

34. The DEIS states that the implementation of Alternative 1, 2 or 4 would promote a more vigorous forest that should be more resistant to insects and pathogens (pages III-78 and III-84). Since insects and pathogens are part of a healthy, functioning forest, the EIS should address this effect on forest health. The DEIS also states that Alternative 3 would promote old-growth forest in which tree vigor would be less due to the natural weakening of older trees. To assert that an old-growth forest is unhealthy seems baseless, as this is a natural condition that evolution has created. The EIS should present studies and data on the effects of insects and pathogens on old-growth forests versus cut-over lands. The DEIS states (page III-57) that conditions conducive to destructive outbreaks of insects and pathogens include extensive areas of older, mature trees. If this is true, how does the Forest Service explain pre-settlement forests? It would seem that an even-aged stand is much more susceptible to outbreaks than an old-growth forest.

RESPONSE:

There has been increasing recognition that *native* insects and pathogens are integral parts of functioning forest ecosystems (US Forest Service, 1988). The discussion in the EIS is attempting to explain that, as a forest ages and the trees reach physiological maturity, growth is not as vigorous and the trees become more susceptible to insects and pathogens, many of which are *non-native* and extremely destructive. In many instances, as overstory oaks and hickories die in aging stands, they are likely to be replaced by maple and beech trees from the understory. The resulting maple-beech forest-type would not provide for the sustainability of the oak-hickory forest ecosystem. Since the maple-beech type could not offer the biodiversity and wildlife benefits of an oak-hickory forest, it would not be considered as healthy. (See biodiversity section in FEIS.) Pre-settlement forests on upland sites in southern Illinois were predominantly oak-hickory (Fralish *et al.*, 2002), established and maintained by disturbance conditions, such as fire, that controlled the succession to maple-beech. Native insects and diseases undoubtedly played a role in that forest ecosystem.

35. The DEIS refers to the pathogenic oak decline on the Mark Twain National Forest although the forests on the Mark Twain are nothing like on the SNF: The soils are much poorer and the trees much smaller. The Forest Service should discuss the impacts to the Mark Twain.

RESPONSE:

We agree that the soils in the Missouri Ozarks of the Mark Twain National Forest are rockier, drier and generally less productive than many of the soils here; and this can result in trees that may not grow as tall, on average, as those found on the Forest. However, much

of the forest on the Mark Twain and throughout the Missouri Ozarks is oak-hickory, similar to the forest-type here. The forests on the Mark Twain and Shawnee National Forests are also of similar age because both areas were extensively logged in the late 1800's and early 1900's. Since oak decline can be brought on by the physiological maturity of the oak trees and environmental factors, such as drought, it is possible that oak decline could affect the oak trees on the Forest.

36. The DEIS discusses the southern pine beetle as a “pest” (page III-58), although it seems it should not be considered a problem. Since the Forest Service plans to remove the pine, allowing the beetles to kill them would save tax dollars, rebuild the soil and speed up the process of converting the pine plantations to native forests. The forest tent caterpillar problem in Oakwood Bottoms, also discussed in the DEIS, would seem to be due to the fact that the area is basically an even-aged monoculture. The EIS should examine ways to deal with it by eliminating the even-aged monoculture.

RESPONSE:

The DEIS states that the southern pine beetle is the most destructive bark beetle in the southern United States. It makes no statements as to whether the Forest Service would take steps to control an outbreak of the beetle. It is unlikely that control measures other than salvage operations would be undertaken unless required to reduce the fire hazards of heavy fuel situations.

Oakwood Bottoms is dominated by a fairly even-aged, overmature pin oak forest that was established through natural regeneration after the area was farmed in the 1920's. This has led to conditions that make the area susceptible to outbreaks of the forest tent caterpillar. Many of the pin oaks are dying either from physiological maturity, from the stress of repeated defoliation by tent caterpillar infestations, or from past flooding. Observations of the forest at Oakwood Bottoms reveal that the pin-oak overstory is being replaced by elm, ash and soft maple, none of which is nearly as beneficial to migrating waterfowl as the pin oak and the acorns they provide. Timber-stand improvement and understory plantings with a variety of bottomland oak species are needed to help regenerate the pin oak overstory to a more diverse forest that is more resistant to attacks by the forest tent caterpillar, as well as an important habitat for migrating waterfowl.

Management actions such as these will be needed to enhance the tree-species diversity in Oakwood Bottoms, which will benefit waterfowl populations that depend on the area. If nothing is done, this area will naturally succeed to tree species that do not produce the same type and quality of waterfowl forage, and a valuable refuge for migrating waterfowl will be lost. The programmatic framework of the Plan does not authorize site-specific action in Oakwood Bottoms, but allows for such action to occur if deemed appropriate following site-specific environmental analysis.

37. The DEIS states, “The susceptibility of trees to damage or mortality from insects or disease is related to stand and site conditions and forests that are overmature are particularly vulnerable” (Loftus and Fitzgerald, 1989). If this is true, how do old-growth forests come into being? The Forest Service should indicate any overmature forest on the SNF displaying the mortality of the even-aged stands. With this in mind, it is unclear how the Forest Service justifies the creation of even-aged stands.

RESPONSE:

Old-growth forests develop over time when individual, long-lived species avoid mortality from physical or biological factors, including insects and pathogens. As indicated by Forest Service Inventory and Analysis plot data, red and black oaks have a higher mortality rate at their present age of about 100 years, as compared to the longer-lived white oaks. This appears to support the findings of Fralish *et al.* (2002) that show the white oak was dominant on many upland sites in the pre-settlement old-growth forests in southern Illinois. The Plan identifies shelterwood as a probable method of timber harvest that could achieve the objectives of the management prescriptions. The Plan does not authorize any timber harvest, or determine when, where, or how timber harvest will proceed, if at all. These factors are determined only after site-specific analysis.

NON-NATIVE INVASIVE SPECIES

38. The DEIS states, “Under all alternatives, existing roads could provide opportunities for the dissemination of non-native invasive species and the displacement of native species. This adverse, indirect effect can be mitigated as described above in the discussion on non-native invasive species.” The EIS should address the key findings of a report by the NRDC (1999) regarding the role of roads in spreading invasive species and should discuss and quantify the effects of the ATV/OHM prohibition on preventing the spread of invasive species.

RESPONSE:

The role of roads in spreading invasive species is addressed on FEIS page 102 and mitigation measures are discussed on pages 102-103. We agree that ATV/OHMs, as well as hikers and equestrians, can contribute to the spread of non-native invasive species. Since Alternatives 1 and 4 allow for ATV/OHM trails and Alternative 4 allows for use on some level 1 and 2 roads, the opportunity for the spread of invasive species could be higher under these alternatives than with the base level of unauthorized use that is likely to occur under any of the alternatives. Since it is not possible to quantify how system trails would change the amount of unauthorized use, we cannot quantify the effects the ATV/OHM prohibition would have on preventing the spread of invasive species.

39. Plan direction (FW34.2.2 and NA19.2) should be expanded to include control of native invasive species, because native species can also be detrimental to a natural ecosystem and cause a loss of biodiversity. Examples include the removal of maple and beech to restore oak-hickory forests and the treatment of woody, invasive species to restore hill prairies and barrens. The IDNR and the Illinois Nature Preserves Commission recommend that invasive species should also be controlled in wilderness areas. The direction in the Plan (WD19.2) is unclear as to whether this would be allowed, and should be clarified.

RESPONSE:

Although non-native invasive species are identified as the cause of adverse effects on native ecosystems, we agree that native species can be considered invasive in certain situations. However, the problem with native invasive species is an issue related to natural succession and is best addressed through the goals and objectives of the Forest Plan and through achieving the desired future conditions for the various management areas on the Forest. The language of Plan guideline WD19.2 has been clarified. Higher-level approval is required for control of non-native invasive species in wilderness.

40. The Plan should include an early-detection process and an official response procedure for new occurrences/populations of invasive species and, if not, the Forest should consider developing and implementing a plan for prevention, early detection and rapid response because these steps are the most economical and effective ways of managing invasive species and their adverse effects on ecosystems. The Plan should provide for the monitoring of invasive species to determine the activities that promote their introduction and spread. The Forest Service should prioritize and secure funding for invasive plant species research on the SNF.

RESPONSE:

Plan Chapter VI, "Implementation, Monitoring and Evaluation," requires annual monitoring of invasive species. Some preliminary inventories of non-native invasive species have been initiated in cooperation with Southern Illinois University. Additional refined monitoring and detection procedures, along with response measures, will be developed during Plan implementation. A conceptual design for a national early-detection and rapid-response system for invasive plants has been proposed (USDA-USDI, 2003). It identifies goals, objectives and action items that could be adapted to the Forest. Funding priorities for research on the Forest regarding invasive plant species would be dependent upon the availability of funds in the research branch of the Forest Service or in the annual budget for the Forest.

41. The Plan addresses invasive plant species, but there is no discussion of invasive animals, such as feral hogs. The Plan should include the monitoring of invasive animals, as well as guidance regarding a control strategy. Plan guideline FW34.2.2 states that invasion-prevention measures should be implemented to maintain native ecosystems. The Plan should detail those measures.

RESPONSE:

The direction in Plan standards and guidelines FW34.2 and FW34.2.1 is applicable to non-native invasive animals as well as plants, and the monitoring direction found on Plan page 104 would also apply to invasive animals. Control measures for invasive plants and animals could vary widely, depending on the species and site-specific situations in which they are found. The determination of appropriate prevention and/or control measures is best made during project-level environmental analyses and not at the programmatic level of the EIS.

42. The discussion in the DEIS of non-native invasive species should identify the subject species. The Plan should define what is meant by "invasive species" and list them. If additional species are found that meet the Plan's definition, they should be added to the list. The list should be reviewed annually. The Plan also should require that all project-level environmental analyses address any effects a proposed project would have on the introduction of invasive species.

RESPONSE:

The term "non-native invasive species" is defined in the Plan glossary (Appendix A). For management purposes, maintaining a current list of non-native invasive species, based on ongoing monitoring and evaluation, is more useful than naming species in the Plan. Plan Chapter VI requires annual monitoring of invasive species. We have initiated inventories of non-native invasive species in cooperation with Southern Illinois University. Additional, refined monitoring and detection procedures, along with response measures will be

developed during Plan implementation. If invasive species are an issue in a project area, they will be addressed in the site-specific environmental analysis for that project.

OAK-HICKORY FOREST

43. The IDNR states that, although Alternative 2 is the best of the four alternatives presented, only 4.7 MMBF of timber would be harvested annually. This amounts to only about 16 percent of the net annual growth of 29 MMBF on national forest lands suitable for timber production, based on the latest Forest Inventory and Analysis statistics. This level of harvest is far below the annual mortality, is insufficient to maintain and improve forest health and sustainability, does not adequately address the oak regeneration issues and provides minimal economic and community benefits.

RESPONSE:

We realize that the proposed allowable sale quantity derived from the Spectrum timber harvest scheduling model is considerably less than the net annual growth that is estimated by the Forest Inventory and Analysis plots for the Forest. The Spectrum model is a linear program that includes a number of constraints on timber harvest entries and a goal to try to optimize present net value. These constraints, in conjunction with the management prescriptions, forecast a limited amount of volume available for harvest during this planning period. The programmatic framework set forth in the Plan is designed to allow for oak regeneration and protect the oak-hickory forest-type. Future project decisions will be developed with public participation to work to achieve the goals and objectives of the Plan.

44. The Forest Service makes a good case for the importance of fire in maintaining oak-hickory forest. However, there appears to be a lack of references to literature documenting the successful use of fire to regenerate oak-hickory. The Forest Service should provide examples of success. It is unclear as to why the Plan vision indicates that the amount of oak-hickory forest will continue to decline even after Plan implementation.

RESPONSE:

We have provided additional references in the FEIS pertaining to the success of prescribed burning in conjunction with other vegetation management activities. The Plan vision for the future condition of the Forest anticipates that, overall, the amount of oak-hickory forest will continue to decline because, as much as we work to maintain oak-hickory on all areas where it presently exists, it will not be possible for us to affect all the acres requiring silvicultural treatments, especially with the limitations on management in some areas.

45. The DEIS contends that extensive efforts will be needed to maintain the oak-hickory forest. What is the scientific basis for this contention? The Forest should provide monitoring data that indicate the proposed methods would work 100 percent of the time.

RESPONSE:

Field observations indicate that oak regeneration is often lacking and maple trees are already growing under the oak-hickory overstory in many places on the Forest, so it appears to us that extensive efforts are likely to be needed to maintain the oak-hickory forest type. This is documented by data from the Forest Inventory and Analysis plots located on the Forest, as described by Haugen (2003). Although we do not have monitoring data that demonstrate the proposed methods will work 100 percent of the time, we plan to implement

silvicultural activities that have been shown to help regenerate oaks (Van Lear and Brose, 2002; Johnson *et al.*, 1989; Loftis, 1990; Brose and Van Lear, 1998a and 1998b; Brose *et al.*, 1999). Adaptive management will be required during implementation of the Plan. We plan to utilize the shelterwood harvest method in conjunction with prescribed burning to establish natural oak regeneration. If this is not 100 percent effective, underplanting with oak and hickory seedlings could be needed. Timber-stand improvement could be required to release the oak-hickory regeneration from competing vegetation not controlled by prescribed burning.

46. The Plan would remove 80-150-year-old oaks and hickories in order to re-establish young oaks and hickories. Since oaks can live for hundreds of years, the Plan will actually reduce the amount of oak-hickory forest by removing the oaks currently here. There is conflicting research regarding the need for timber removal to regenerate oaks and hickories. In fact, a literature review funded by the Forest Service concluded that, “Any harvesting on the forest will tend to reduce the oak component of the future stands.” In light of this, it is unclear how the Forest Service is able to claim that thousands of acres of even-aged logging will result in oak-hickory stands. The EIS should discuss the irretrievable and irreversible nature of removing the big oak trees to save the oaks. The Plan should allow the use of prescribed fire only to control maple and beech in the understory.

RESPONSE:

The EIS analysis of Alternative 3 describes the effects of not cutting any of the oak and hickory trees. It is true that some oaks can live for hundreds of years. However, some oaks, particularly the red and black, have considerable mortality at their present age of about 100 years. The comment implies that the Plan authorizes the removal, or harvest, of oaks and hickory trees, which it does not do. The Plan acknowledges that mortality is occurring in mature stands and sets forth a programmatic framework to allow the Forest to respond to the on-the-ground situation. The Plan identifies shelterwood as a probable harvest method (16 U.S.C. 1604[f][2]).

The advantage of the shelterwood harvest method is that the overstory oaks and hickories can be retained indefinitely to achieve adequate advance regeneration of oaks and hickories in the understory to reforest the stand. As discussed by Van Lear and Brose (2002), shelterwood harvesting, and shelterwood with reserves, in conjunction with other silvicultural treatments, including prescribed burning, planting and timber-stand improvement, can be successful in the maintenance of the oak-hickory forest type.

As discussed by Dey (2002), fire has played an important role in the history of oak-forest ecosystems. Prescribed fire is also important in oak management, as discussed by Van Lear and Brose (2002). However, since fire has been limited by forest-fire control measures for much of the last 70-75 years, shade-tolerant species such as maple and beech have been allowed to become established and grow up in the understory of the oak-hickory stands. Much of this shade-tolerant understory competition has grown to a size that cannot be controlled by prescribed fire alone. Because of this situation with the understory competition, and because inadequate light often limits oak regeneration and recruitment into the overstory (Lorimer, 1993), an alternative incorporating only prescribed fire has not been analyzed in detail in the EIS. The planting of oak-hickory seedlings in pine stands and in wildlife openings is contemplated or allowed under the Plan in an attempt to maintain this critical forest-type.

47. The Plan should allow the advance of natural succession on the Forest and protect the oaks currently there. The DEIS assumes that a beech-maple forest is undesirable, but fails to support this assumption (III-64) or describe what the conditions would be in an old-growth beech-maple forest. It is unclear that a conversion from oak-hickory to maple-beech is occurring. The assumption that so many trees will die appears baseless. It would seem that the existence of pre-settlement, old-growth forests would not have been possible if a large percentage of oaks are dying.

RESPONSE:

The analysis of Alternative 3 describes the effects of allowing the advance of natural succession on the Forest. The discussions regarding the relative value of a maple-beech forest as compared to that of an oak-hickory forest are related not only to the wildlife-food value of the hard mast—acorns and hickory nuts—but also, and primarily, to the biological diversity associated with the two forest-types. Fralish (2004) compared the diversity of the understory vegetation in an oak-hickory stand with a maple-beech understory and found a 90-percent drop in species richness and cover.

The natural succession of the oak-hickory forest-type to maple-beech across much of the central and eastern United States is discussed by a number of forest scientists/ecologists (Johnson *et al.*, 2002; Abrams, 1992; Abrams and Nowacki, 1992; Fralish, 1997; Jokela and Sawtelle, 1985; Nowacki *et al.*, 1990; Lorimer, 1985 and 1989; Schlesinger, 1989), but the specific situation on the Forest is well explained by Fralish *et al.* (2002). The comment seems to take issue with the overwhelming scientific evidence and on-the-ground observation that natural succession is replacing oak-hickory with beech-maple in the central hardwoods region, including the Forest. However, no evidence to the contrary is offered to support this view. Present mortality in oaks and hickories—and anticipated future mortality—and the transition to maple-beech is well documented.

Information from the continuous Forest Inventory and Analysis plots, presented by Haugen (2003), shows large increases in the numbers of maple and beech trees in the understories and mid-stories of the existing oak-hickory forest. These are the trees that will replace the overstory oaks and hickories as they die. Information presented by Fralish *et al.* (2002) demonstrates that the presettlement old-growth forests in southern Illinois contained a large percentage of white oaks, which are longer-lived than red and black oaks. Thus, we are likely seeing a similar situation today, as the red and black oaks gradually drop out of the overstory and the white oaks continue to live on for a longer time.

This higher mortality rate of red and black oaks is documented by Schlesinger (1989) using permanent plots at Kaskaskia Experimental Forest. Fralish (1997) discusses the community succession in the central hardwood forest and projects that the basal area of mesophytes in a southern Illinois forest stand will exceed that of oak and hickory by 2054. Shotola *et al.* (1991) discuss the presettlement, present and future composition changes regarding sugar maple invasion of an old-growth oak-hickory forest in southwestern Illinois, and predict that if current trends continue, the area will be dominated by sugar maple.

48. The DEIS asserts that the main reason maples are overtaking the understories is the lack of fire (DEIS III-55). The EIS should consider other explanations for the increase in maple, including deer eating the oak seedlings and increased maple-seed production by mature sugar maples at old homesites. The EIS also should address the effects timber removal could have, e.g., contributing to an increase in the deer population that, in turn, could affect oak regeneration.

RESPONSE:

As described on FEIS pages 94-96, the lack of fire is a contributing factor to the increase of maple in the understories of existing oak-hickory forests. Sugar maples at old homesites could be influencing maple regeneration as sources of maple seed. Maples were also found naturally scattered across the presettlement landscape in southern Illinois, primarily on the more mesic sites. The source of the seed is not part of the present problem. The maple is already established in the understories and mid-stories of the oak-hickory forest. The issue now is to preserve the diversity of forest-types by maintaining the oak-hickory forest-type. The Plan allows us to evaluate and apply, as appropriate, the most effective management tools to regenerate existing oak-hickory overstories. The FEIS also discloses the potential environmental effects that may result from taking no action to protect the oak-hickory forest type: loss of diversity and adverse effects on MIS and other at-risk species. (See FEIS Chapter 3 Biodiversity section, pages 126-228.)

As discussed by Feldhammer (2002) and Haas and Heske (2005), deer could certainly be influencing the amount of oak regeneration that becomes established on the forest floor. Acorns are a favorite food for deer, turkey, squirrels, mice and many other species of wildlife that inhabit the oak-hickory forest. The small amount of early-successional habitat that might be produced annually through shelterwood harvesting on the Forest is not likely to affect the deer population in southern Illinois. The amount of private agricultural land interspersed with national forest ownership provides more than adequate habitat to maintain deer populations at a high level. One objective of the “Illinois Comprehensive Wildlife Conservation Plan and Strategy” (2005) is to reduce the deer herd in the state through increased deer harvest. We will monitor the effectiveness of the Plan’s silvicultural treatments to determine whether sufficient oak advance regeneration is established, or if other treatments are needed to accomplish successful regeneration of the oak-hickory forest.

49. The DEIS asserts the need for and effectiveness of timber harvesting in maintaining the oak-hickory forest type (III-84). The EIS should disclose the success/failure of oak regeneration on sites that have been harvested in the past and whether the harvests have converted oak-hickory forest to other species. In regard to uneven-aged management and group selection, research indicates that natural gaps in forests are very small, tenths of an acre, and that creating such gaps does not help in oak reproduction. Large, group-selection openings are not natural, and will not aid in oak regeneration.

RESPONSE:

Similar to the results reported by Fischer (1987) for clearcuts on the Hoosier National Forest, past hardwood clearcuts on the SNF have often resulted in an increase in other hardwood species and declines in the percentage of oaks in the regenerated stands, especially on the more productive sites. This is the reason the Plan uses the best available scientific information to protect the oak-hickory forest-type across the Forest. The Plan

identifies shelterwood and shelterwood with reserves as the probable methods of harvest, in conjunction with prescribed burning. The Plan contemplates or allows management that ensures advance oak regeneration before the final overstory of oak and hickory trees is removed. Regarding the size of openings in natural gaps or in group-selection harvesting, for any openings in the forest canopy to be regenerated to oaks, adequate advance oak regeneration must be established before the opening is created. The EIS discusses the probable consequences of another decade of no timber harvesting: loss of diversity and adverse effects on MIS and other at-risk species.

50. The DEIS should point out that the forest will not convert from oak-hickory to maple-beech unless the Forest Service removes the mast-producing oaks, or if there is mortality.

RESPONSE:

We disagree that the forest is not currently converting from oak-hickory to maple-beech in many places. Monitoring data and field-verification indicate that, indeed, oak-hickory mortality and natural succession (loss of the oak-hickory component) is occurring. The comment offers no evidence to the contrary. The issue is oak-hickory *regeneration*; data and field-observation confirm that in many areas the mature oaks and hickory trees are not reproducing, due largely to the lack of disturbance, shading and competition by maple and beech. As oaks and hickories die, they are replaced by the existing maples growing in the understories and mid-stories of the forest. Removing the oak-hickory overstory without first establishing adequate oak advance reproduction and controlling the existing shade-tolerant species in the understory would accelerate the conversion to the maple-beech type. This is the reason the Plan allows the shelterwood harvest method, in conjunction with prescribed burning, timber-stand improvement and tree planting, to deal with the oak-regeneration problem and the conversion to a maple-beech forest.

51. It is unclear in the DEIS whether the documented decrease in oak-hickory and increase in maple-beech is due to timber removal or natural conversion of the forest.

RESPONSE:

Both of these situations have occurred, or are occurring, on the Forest. Much of the Forest is converting naturally, with a lack of oak regeneration and the gradual encroachment of maples into the understory of the oak-hickory forest. Many areas that were clearcut in the past without adequate advance oak regeneration, especially the more productive sites, have become dominated by species other than oaks and hickories. Oak-hickory mortality and succession to the maple-beech forest-type has continued over the past decade when no timber harvest has occurred. This is the reason it is critical to establish advance oak regeneration and control the maple understory if much of the oak-hickory forest-type is to be maintained.

52. The DEIS states, “The perpetuation of oak-dominated forest ecosystems was and is dependent upon the presence of adequate advanced oak regeneration when tree-fall gaps occur (Sander, 1972).” In light of this, it is unclear why the Forest Service asserts the need to harvest the forest with even-aged management in order to maintain oak-hickory?

RESPONSE:

The key phrase in the cited sentence is, “...the presence of adequate advanced oak regeneration....” If adequate advanced oak regeneration is not present in natural tree-fall

gaps, in small group-cuts under the group-selection harvest method, or in clearcuts, all will lead to the regeneration of those openings with the species or seed present in the understory. The shelterwood harvest method (an even-aged management technique), in conjunction with prescribed burning and other silvicultural activities, appears to offer the best opportunity for creating the conditions needed for establishing and promoting the growth of oak-hickory regeneration.

53. It is unclear whether or not the models used for growth projections assume that the areas from which timber is removed stay in oak and what the percentage is if they do not. The DEIS fails to disclose the methodology or the assumptions, as required by NEPA. The EIS also should disclose if these models comply with the USDA information quality guidelines.

RESPONSE:

The modeling of the harvest activities assumes that the proposed silvicultural practices will maintain the oak-hickory forest-type. The methodology and assumptions used in the Forest Vegetation Simulator model and the Spectrum model are disclosed in DEIS Appendix B (now FEIS Appendix B) and are available in the planning record. These models are established and maintained by the Forest Service for forest planning and other modeling efforts within the agency and for the use of other organizations. They comply with the information quality guidelines.

54. The DEIS assertion that an increase in sunlight resulting from a shelterwood-with-reserves harvest of pine would trigger a growth response from the understory seems without scientific basis. It is unclear what the composition of the understory would be. The EIS should present monitoring data on the species composition of pine stands that have been harvested so far on the Forest, and the status of pine regeneration in stands that have not been harvested.

RESPONSE:

The statement that an increase in sunlight would trigger a growth response from the understory is based on basic forestry principles regarding increased growth with increased sunlight, and supported by basic forestry textbooks (Smith *et al.*, 1997 and Spurr and Barnes, 1980). The statement regarding species composition is supported by stocking-survey information from pine stands that have been harvested using shelterwood with reserves (survey forms are in the planning record).

Stocking surveys from past pine harvests using shelterwood with reserves have shown that the understory composition would be well-stocked with native hardwoods and contain a good percentage of oaks and hickories, averaging 66-percent stocking with oaks and hickories. Only 12 percent of the plots were stocked with pine. (This could indicate a need for timber-stand improvement to remove the pine regeneration.)

55. In the DEIS it is unclear what the scientific basis is for the stated direct and indirect effects of Alternative 2.

RESPONSE:

Much of the discussion regarding the direct and indirect effects of all of the alternatives is based on basic silvical and ecological principles of oak silviculture presented in Johnson *et al.* (2002), McShea and Healy (2002), Spetich (2004) and others.

56. The DEIS discusses the effect of the shelterwood harvest method in the long term, but does not consider the short term. Removing the mature oak and hickory cannot be undone. If the Forest Service spends the next ten years addressing the understory, all the oaks that are creating the seeds could be removed in the following ten years.

RESPONSE:

The effects in the short term on the overstory and the regeneration of moderately shade-tolerant or shade-intolerant species are discussed in the EIS. With the shelterwood harvest method, the overstory oaks that are producing the seed for natural regeneration of the stand will be retained until adequate oak advance regeneration is established. Shelterwood is identified as a probable harvest method, though site-specific analysis could determine that another method of harvest, or none at all, is preferable to meet the goals and objectives of the Plan. Site-specific conditions must be taken into consideration before a harvest method is selected and a decision made to authorize timber harvest on a particular site.

57. The DEIS discusses the difficulty of obtaining and accumulating oak regeneration on good sites (III-73) using clearcutting, but does not indicate how the Forest Service will respond to this situation with two-step clearcuts.

RESPONSE:

The advantage of the shelterwood harvest method over the clearcut method is that the overstory can be retained until adequate oak advance regeneration is established through cultural treatments. Shelterwood with reserves leaves healthy, mature, mast-producing trees well distributed across the affected area; it is not fairly characterized as a “two-step clearcut.” To the contrary, a shelterwood harvest recognizes that natural regeneration methods of shade-intolerant species often are successful in regenerating oaks and hickories, where clearcutting alone may not. We emphasize that the Plan simply identifies shelterwood as a probable harvest method that could be chosen at some future time. The actual choice of harvest method for any particular site has not been analyzed or determined at this stage of decision-making.

58. The DEIS discussion of the lack of disturbance under Alternative 3 should consider natural disturbances, such as storms, fire, etc.

RESPONSE:

As supported by Franklin *et al.* (2003), low-severity fires that are typical on the Forest do not usually cause mortality to large hardwood trees in the overstory. The natural disturbance of windstorms is incorporated into the Spectrum model for all alternatives. Rebertus and Meier (2001) present information regarding blow-down dynamics in oak-hickory forests of the Missouri Ozarks. Based on this information, we estimate that approximately one percent of the Forest area will be affected per decade under all alternatives in the Spectrum analysis. However, unless oak advance regeneration is present in the understory, these natural disturbances will also lead to more maple-beech growing into the overstory and replacing the oak-hickory.

59. The DEIS assertion that Alternative 3 would not maintain forest growth vigorous enough to prevent insect and pathogen problems (III-73) seems to be without scientific basis. How does the Forest Service explain places like Beall Woods and how we get old growth?

RESPONSE:

The discussion in the EIS is attempting to demonstrate that, as a forest ages and trees reach physiological maturity, tree growth is not as vigorous and the trees become more susceptible to insects and pathogens. As the overstory oaks and hickories die in an old-growth situation, they will likely be replaced by maple and beech trees in the understory. The resulting maple-beech forest-type would not provide for the sustainability of the oak-hickory forest ecosystem. Since the maple-beech type would not have the biodiversity and wildlife benefits of an oak-hickory forest, it therefore would not be considered to be as healthy a forest. (See FEIS Chapter 3 Biodiversity section, pages 126-228.)

At the old-growth Beall Woods Nature Preserve in Wabash County in southeastern Illinois, a study by McClain *et al.* (2001) shows that sugar maple has replaced oak as first in importance over the last thirty years, whereas a 1962 study reported white oak to be the leading dominant in the upland forest. Sugar maple, a shade-tolerant, fire-sensitive species, has been increasing in importance since European settlement due to the human-imposed reduction of fire frequency and the corresponding increase in canopy cover (McClain *et al.*, 2001). This is consistent with observations and monitoring of forest-types on the Forest.

Thus, the condition of Beall Woods is not a steady state, but has changed considerably over the past 30 years. Like many places on the Forest, Beall Woods is losing the dominance of its oak-hickory component as a result of the difficulty of natural regeneration. It is good evidence of the oak-hickory regeneration issue we are trying to address through the development of the Plan's programmatic framework: lack of management action will allow the maple-beech forest-type to succeed oak-hickory, due to mortality in the latter and lack of regeneration. A similar situation is documented by Shotola *et al.* (1991) at the old-growth Weaver's Woods in southwestern Illinois. This succession to maple-beech has wildlife effects similar to those described in FEIS Chapter 3.

60. The EIS should address the effects—adverse and favorable—of a maple-beech forest.

RESPONSE:

The effects of a maple-beech forest on biological diversity are discussed in the biodiversity section of the FEIS and in Response 81. The favorable effects on the aesthetics of the Forest are discussed in the FEIS visual quality section. We provide here a summary of the noteworthy consequences of allowing succession to the maple-beech forest-type in historically oak-hickory forests.

Oak-hickory forests were the dominant, presettlement forests on ridge-tops and south- and west-facing slope ecological land-types on the Forest (Fralish *et al.*, 1991; Fralish *et al.*, 2002). Their loss on historical sites would be accompanied by the decline of the native flora and fauna that evolved with these native communities. The overall biodiversity of the Forest similarly would decline as a result, with the loss of species and species abundance and distribution.

Herbaceous understory plants, including many native wildflowers, will greatly decline, with a corresponding effect on overall biodiversity (Fralish, 1977), not to mention the beauty of the Forest. Loss of herbaceous understories in historical oak forests would also adversely affect the food and cover they provide native wildlife, such as the wild turkey, worm-eating warbler and American woodcock, all ground-nesting and -foraging species in oak-hickory communities. Additionally, soil-surface erosion would increase as a result of the loss of understory plants (Fralish, 1997).

Native, forest-insect populations would decline for at least 50-100 years (Fralish, 1997). This could indirectly and adversely affect foods for native wildlife and the pollination of some native forest plants. With the loss of oak-hickory forests on ridge-tops and the loss of oak species on the productive north slopes of the Forest would come the loss of the most productive oak-hickory forest-sites and communities. Tall and large-diameter oaks and hickories would be lost from the Forest of the future. With the loss of oak-hickory forests would come the loss of diversity and abundance of hard mast, an important food-source for many native animals (squirrels, chipmunks, mice, wild turkeys, blue jays, redheaded woodpeckers, wood ducks, and others) during the winter, when food is scarce and the nutritional quality of alternate foods is low (Healy, 2002).

Recent studies have found that avian diversity measured as total abundance and species richness is 50-200 percent greater in oak-dominated hardwood forests than in those dominated by maple (Rodenwald and Abrams, 2002). Based on this study, we could expect the loss of oak-dominated forests to result in a decline in the diversity of bird species on the Forest.

61. The DEIS asserts that Alternatives 1, 2 and 4 will maintain oaks. This assertion seems to be without scientific basis.

RESPONSE:

The reason we are predicting that Alternatives 1, 2 and 4 will maintain oaks on certain parts of the Forest is that we plan to implement silvicultural activities that have been shown to help establish oak regeneration. Alternative 3 does not include any of these actions and, therefore, is not expected to maintain as much of the oak-hickory forest-type as Alternatives 1, 2 and 4. Johnson *et al.* (2002), McShea and Healy (2002), Spetich (2004) and Loftis and McGee (1993) provide a wealth of information on the scientific basis of the silvicultural activities we plan. The Plan provides a programmatic framework for future decisions. Site-specific analysis will test various management alternatives to determine the best course of action to protect the diversity of the forest, including oak and hickory trees.

62. The DEIS states that Alternatives 2 and 4 would result in greater beneficial, direct and indirect effects related to sustaining forest ecosystem health and maintaining more of the oak-hickory forest-type than would Alternatives 1 and 3; however, it seems that removing the oaks would not maintain them.

RESPONSE:

Management, maintenance and restoration of ecosystems is part of the ecosystem management goal, and a healthy and sustainable forest ecosystem is essential for maintaining biological diversity. The IDNR and The Nature Conservancy support management activities that help maintain the oak-hickory forest where it has historically

been the dominant forest-type. The benefits to wildlife and biological diversity are discussed in the effects on biodiversity in the FEIS. Silvicultural treatments that create the conditions necessary to establish and promote the growth of oak-hickory seedlings and saplings, even if they do involve the harvesting of some of the existing overstory oak trees, will help to maintain the oak-hickory forest type over the long term.

Recent publications (Keyser *et al.*, 1996; Brose and Van Lear, 1998a and 1998b; Brose *et al.*, 1999) have shown promise for the use of the shelterwood harvest method in conjunction with prescribed burning. At Land between the Lakes, located in Kentucky southeast of the Forest, Schmeckpepper *et al.* (1988) found that the shelterwood harvest method resulted in 70-percent stocking of large oak-hickory regeneration, and 100-percent smaller oak-hickory regeneration. Doing nothing will not maintain the oak-hickory type on many sites across the Forest and would allow the succession to a shade-tolerant forest-type to progress.

63. The DEIS states that the oak-hickory forest is dominant today in most of the same places where it was dominant in pre-settlement times. However, the Forest Service contends that oak cannot survive without the Forest Service removing the oaks. If that is true, please explain what the DEIS means.

RESPONSE:

Wildfires and fires ignited by Native Americans, together with seasonal tornadic windstorms, helped maintain the predominantly oak-hickory forest that was present prior to European settlement. Fires helped create the conditions favorable for oak regeneration, and controlled the establishment and growth of shade-tolerant, fire-intolerant maple and beech. Damage from windstorms provided sufficient sunlight to release the oak and hickory regeneration in the understory.

Most of the pre-settlement oak-hickory forest was cut, burned and grazed in the 1800's and early 1900's. This created the disturbance and light-conditions favorable to the regeneration, maintenance and growth of a young oak-hickory forest, which has grown into the present oak-hickory forest we have today. This forest cannot be perpetuated without disturbance and light-conditions favorable to oak-hickory regeneration and growth. During the last 70 years, fires have been controlled, allowing the establishment and growth of shade-tolerant, fire-intolerant maple and beech in the understory and mid-story of the oak forests. This has resulted in conditions not present in pre-settlement times.

While it is true that oak presently dominates many of the sites across the Forest, it is clear from observation of old-growth forests like Beall Woods and Weaver's Woods in southern Illinois, Dysart Woods in southeastern Ohio (McCarthy and Keiffer, 2004), Davis-Purdue Natural Forest in Indiana (Parker and Eichenberger, 1978), Radrick Forest in southern Michigan (Hammit and Barnes, 1989), Dick Cove Natural Area in Tennessee (McGee, 1986) and Chicago's upland old-growth forests (Bowles *et al.*, 2005), that mature oak forests, without management to enhance and facilitate regeneration, will be lost to the maple-beech forest-type (with the attendant adverse wildlife and biological diversity consequences). We are beginning to see this occur on the Forest; many areas are presently transitioning from oak to maple.

Based upon the best scientific information available, and with public involvement, we have collaboratively developed a programmatic framework that will allow us to examine future site-specific actions to address the issue. The consequences of no action are set forth in the programmatic EIS, as well as in the examples noted above. The Plan does not authorize timber harvest; it provides a framework for future decisions.

64. In discussing Alternatives 1 and 2, the DEIS appears to assert that the maples are killing off the oaks. The only way the conversion from oak-hickory to maple-beech can occur is if the Forest Service removes the forest or the trees die.

RESPONSE:

We disagree. The EIS does not assert that ‘maples are killing off the oaks’; but rather, that the shade-intolerant oak seedlings cannot compete with the shade-tolerant maples without fire or other action. Maples simply out-compete or suppress the oak seedlings and, over time, come to dominate forest stands. The oak-hickory component is gradually lost to the maples and beech. This is clearly documented in scientific literature as well as field-observations across southern Illinois.

Many areas on the forest are presently in transition from an oak-hickory forest-type to a maple-beech type, because maples are growing in the shade of the overstory oaks and hickories. This conversion is taking place whether harvesting takes place or not. Harvesting of the oak-hickory overstory without adequate advance oak regeneration can speed the transition to maple-beech or other hardwoods.

65. In the DEIS discussion of the effects of Alternative 2, it is unclear whether implementation of prescribed burning, shelterwood harvesting, tree planting and timber-stand improvement would support a greater percentage of oak-hickory forest-type than would occur if no actions were taken. The EIS should provide evidence that proves the effectiveness of Alternative 2, because it seems that removing oaks would decrease the oaks.

RESPONSE:

Shelterwood harvesting has not been used in oak-hickory stands on the Forest in the past, although shelterwood with reserves has been used in pine stands to advance the conversion of non-native pine plantations to native hardwoods. Several studies (Johnson *et al.*, 1989; Loftis, 1990; Brose *et al.*, 1999) from different areas within the oak-hickory range indicate positive results using the shelterwood method. These experts and others have established scientific support for our analysis. Monitoring of site-specific actions will confirm the success of various management activities in producing oak-hickory regeneration. The Plan is a dynamic document that allows for adaptation in response to new information and monitoring data.

66. The DEIS describes generally restrictive management under Alternative 3, but it is unclear how the alternative could limit disturbances. Tornadoes and similar disturbances happen regardless of what plans say. The EIS fails to address other possible explanations for the conversion from oak-hickory to maple-beech.

RESPONSE:

Wind is the most prevalent natural disturbance likely to affect the Forest. Rebertus and Meier (2001) presented information regarding blowdown dynamics in oak-hickory forests

of the Missouri Ozarks. Based on this information, the Spectrum analysis estimates that about one percent of the Forest will be affected in each decade under all alternatives. This is the only disturbance analyzed under Alternative 3, except for prescribed burning in barrens areas. Unless oak advance regeneration is present in the understory, these natural disturbances will also lead to more maple-beech growing into the overstory.

Limited fire over the last 70-75 years has led to the establishment of shade-tolerant species in the understory of the oak-hickory forest. This lack of fire-disturbance will continue under Alternative 3 and lead to additional conversion from oak-hickory to maple-beech. As indicated above, natural disturbances were taken into account in the modeling of the consequences of various alternatives. Thus, the probable effects of natural disturbances, such as tornadoes, were part of the modeling of environmental effects.

67. The DEIS discussion of the cumulative effects of the generally restrictive management under Alternative 3 asserts that timber harvesting is necessary for oak-hickory regeneration and growth. If this is the case, how have the species survived and not gone extinct before harvest? How does the Forest Service explain the condition of Beall Woods?

RESPONSE:

Fralish *et al.* (2002) show that white oak, a fairly long-lived and fire-resistant species, was one of the most prevalent species on a variety of sites in the pre-settlement forests of southern Illinois. The pre-settlement oak-hickory forest was most likely maintained by periodic fires—human-ignited as well as wildfire—that prevented the establishment and growth of the more shade-tolerant and fire-sensitive maples. Regarding the old-growth Beall Woods in Wabash County, southeastern Illinois, a study by McClain *et al.* (2001) shows that sugar maple has replaced oak as the first in importance over the last thirty years; whereas, a 1962 study reported white oak to be the leading dominant in the upland forest. This increase in sugar maple at Beall Woods is to be expected, as it has increased notably in most Illinois forests during the past 30 years (Ebinger, 1986). Shotola *et al.* (1991) have documented a similar maple conversion at the old-growth Weaver Wood's in southwestern Illinois. Sugar maple is a shade-tolerant, fire-sensitive species that has been increasing in importance since European settlement due to human-imposed reduction of fire frequency and a corresponding increase in canopy cover (McClain *et al.*, 2001).

Thus, Beall Woods is an illustration of the issue we are trying to address in the development of this programmatic Plan. The conversion of Beall Woods has had wildlife-related, aesthetic, and diversity consequences. Simply put, Beall Woods is analogous to the condition of the Forest over time under Alternative 3. There are some site-specific differences, but the overall change and ongoing processes at work in the “old growth” at Beall Woods is an illustration of what is likely to occur here. Forests, Beall Woods, Weaver Woods, as well as the SNF, change over time whether they are managed or not.

68. Plan guideline MM19 calls for maintenance of oak-hickory in the areas under minimum management. It is unclear why the Forest Service would include this direction when some of the areas are openland and not naturally oak-hickory?

RESPONSE:

Some management could be undertaken to protect the oak component on these sites, as determined through site-specific analysis.

OLD-GROWTH FOREST

69. The DEIS discussion of the effects of Alternative 3 asserts that old growth is an unhealthy condition, but provides no scientific data or studies to support the assertion. The Forest Service should provide this data, as well as explain what is undesirable about an old-growth beech-maple forest. It seems that timber removal would result in there never again being more than a few hundred acres of old growth in the state.

RESPONSE:

Alternative 3 was developed to address the issue of managing the Forest for old-growth ecosystems. In the analysis of effects on forest ecosystem health and sustainability, the discussion focuses on the relative abilities of the alternatives to sustain the oak-hickory forest-type and on the vigor of the trees in a forest with varying age-classes compared to the vigor of older trees. Nowhere is the statement made that old growth is an unhealthy condition. One of the main advantages of an oak-hickory forest over a maple-beech forest is related to the greater biological diversity associated with the oak-hickory forest ecosystem. This is discussed in the FEIS Chapter 3 Biodiversity section. Although it is projected that Alternative 3 will provide over 215,000 acres of predominantly maple-beech, old-growth forest in the long term (150 years), Alternatives 1, 2 and 4 are each projected to provide over 100,000 acres of old-growth forest.

PESTICIDE USE

70. The EIS should disclose the effects of pesticide use, including the effects of herbicides on neighboring property and on native vegetation. If herbicides could be used in burned areas to control non-native invasive species, that should be addressed. The analysis should specify the pesticides that would be used, the effects of their inert ingredients, and possible effects on non-target species. Also, it is unclear why herbicides would be used for timber-stand improvement when lack of fire has been stated to be the problem. The EIS should discuss the programmatic effects of pesticide use since incorporation by reference of the Southern Region's vegetation management EISs is insufficient in disclosing the effects of the different alternatives and how they compare. The Forest should prepare a sub-regional EIS on pesticide use, as stipulated in the 1988 settlement agreement of the appeals of the 1986 Forest Plan.

RESPONSE:

No decision to use pesticides is being made in the programmatic decision for the Forest Plan. The Plan addresses the use of pesticides on the Forest only. It is not possible to analyze in the EIS the effects of herbicides on neighboring property since we do not know where or when an herbicide might be used. The FEIS discloses the effects of integrated pest management—which can include pesticide use—on threatened, endangered and sensitive

plant species (pages 189-190, 204-213). Site-specific effects of pesticide use would be considered in project-level environmental analyses associated with specific proposals.

The lack of fire is a contributing problem in the succession of oak-hickory to the maple-beech forest-type. However, fire has been restricted for so long that the shade-tolerant maples have been able to grow to a size at which they are not likely to be controlled by prescribed burning alone. Trees over 1½ inches in diameter have been shown not to be top-killed by prescribed burning (Franklin *et al.*, 2003). Therefore, herbicides could be useful in controlling shade-tolerant species where they dominate the understory of the oak-hickory forest. General effects of herbicide use in conjunction with prescribed burning are discussed in the FEIS section on forest ecosystem health and sustainability (page 114).

The programmatic vegetation-management EISs prepared by the Southern Region of the Forest Service disclose the environmental effects of common herbicides used in forest management. Information from these EISs is incorporated by reference because it contains a wealth of information on the most common herbicides used in vegetation-management in adjacent states. This includes analysis of risks to public health and non-target organisms. The information from these documents could be utilized to support site-specific analyses of the proposed use of herbicides on the Forest.

Sub-regional EISs on pesticide use could be helpful in the Eastern Region for gathering information at the programmatic level, just as the sub-regional EISs in the Southern Region provide pertinent information. However, a sub-regional EIS for pesticide use is not required by law or regulation, or as a result of the 1988 settlement agreement on the appeals of the Forest Plan. The settlement agreement section XVIII-A-7 states, "...this Agreement shall terminate upon revision of the Shawnee National Forest Plan pursuant to 36 CFR 219.10 (g) (1982) or succeeding regulations." The completion of the 1992 significant amendment of the Forest Plan terminated the settlement agreement.

71. The EIS and/or Plan should provide more detail regarding pesticide use. The DEIS provides no evidence that pesticide use is required and appears to have no basis for concluding that integrated pest management would have no effects under any alternative.

RESPONSE:

The programmatic analysis in the EIS sets forth and evaluates a broad-scale management framework that includes possible future pesticide use. As this analysis and decision does not authorize or fund the use of any pesticides, it has no direct or indirect environmental effects. As directed in Plan guideline FW21.1, future decisions regarding pesticide use will be based on site-specific environmental analyses of proposed use. The use of pesticides will be carefully controlled and monitored on the Forest. Only US Environmental Protection Agency registered and approved pesticides would be used. Forest Service Manual and Handbook direction would guide the safe and effective use of pesticides on the Forest.

RESTORATION OF NON-NATIVE PINE PLANTATIONS

72. Although under the Plan the Forest would remove non-native pine to restore the plantations to hardwoods, the Forest Service should consider managing the pine as a valuable renewable resource, especially since the pine plantations are monuments to the dedicated work of the Civilian Conservation Corps.

RESPONSE:

The Civilian Conservation Corps completed many outstanding projects on the Forest, including the reforestation of many old farm-fields with pine trees to help control soil erosion and provide renewable wood products. The pine have done an excellent job in controlling erosion and restoring the soils. However, the biological diversity of the Forest can be improved by converting these non-native pine plantations back to native hardwoods. Timber harvesting proposed under Alternatives 1, 2 and 4 can utilize some of this renewable resource and also help speed the conversion process to native hardwoods.

73. The DEIS asserts that the conversion of non-native pine stands would be delayed under Alternative 3 (page III-84), although they appear to be converting on their own. Research shows that harvesting in pine stands slows down the conversion process. The DEIS statement (page III-82), "Pine shelterwood and thinnings on the Forest have aided the establishment of native hardwoods in the understories of some of the non-native pine plantations" is questionable. Since visual evidence indicates otherwise, the Forest should provide monitoring data supporting this assertion. Also, it seems that the pines left from a shelterwood harvest would live as long as the pine in stands that are not harvested. Since the pine trees should live as long under Alternative 2 as Alternative 3, the difference between the alternatives appears to be that Alternative 2 would result in much more pine regeneration than Alternative 3.

RESPONSE:

The increased sunlight caused by the reduction in overstory pine through harvest under Alternatives 1, 2 and 4 will create more favorable growing conditions for young oaks and hickories in the understories of the pine plantations. This will allow these hardwoods to grow to a larger size more quickly. We have found no research that contradicts the effectiveness of this process, nor have we been offered such evidence, by the commentator or otherwise. Monitoring data indicate that shelterwood harvests on the Forest have aided in the establishment of native oak-hickory in the pine plantations. Pine trees remaining in the overstory could indeed live as long under Alternative 1, 2 or 4 as they would under Alternative 3. The difference between the harvested and non-harvested areas is that the oak and hickory in the harvested areas will have better growing conditions over a longer period than under Alternative 3. Pines that become established under the pine shelterwood can be removed with timber-stand improvement activities, or through prescribed burning.

74. Although pines originally were planted to control soil erosion, the Forest Service converted many native hardwood forests to pine in an attempt to establish a pine industry in southern Illinois, and the Forest Supervisor received an award for this effort. The 1986 Forest Plan called for converting hardwood stands to pine plantations. The Forest Service should disclose this history because it bears on the credibility of the agency's expressed desire to restore non-native pine plantations to hardwoods.

RESPONSE:

The 1986 Forest Plan envisioned active management of the pine-timber resource. The Forest Supervisor at the time was attempting to contribute to the economy in southern Illinois by working with local sawmills to establish a reliable pine-timber supply for their operations. However, this management objective was changed as a result of the negotiations and settlement agreement related to appeals of the 1986 Plan. The 1992 Forest Plan called for the ecological restoration of non-native pine plantations—most of which

were established in the 1930's, '40's and '50's—to native hardwood ecosystems. The 1992 decision focused on improving biological diversity by harvesting non-native pine trees. Now, nearly 14 years later, the Forest Service is concerned about the lack of regeneration of oak and hickory trees and the implications this has for wildlife, tree-species diversity, aesthetics and other forest resources. The best available scientific information indicates that active management will be necessary to arrest this loss of diversity.

The 1986 decision was based upon the scientific and economic information and social values of that time. Much of this information has changed or been refined since that decision was made. Clearly, society's interests and views regarding national forests have changed. While the 1986 decision may be of historical interest, it has no bearing on the credibility or legal sufficiency of the revised Plan. The revised Plan was developed in an open and collaborative fashion, with input from many people with diverse views. One goal shared by almost everyone is the desire for a healthy, biologically diverse forest. We listened, and developed a Plan that will protect resources and provide goods and services for the public.

75. The DEIS states that the pine overstory would likely persist for several more decades, although they appear to be dying rapidly. The EIS should disclose the current age of the pines and their expected life-span, as well as explain the presence of native hardwoods in the understory. While 20 years ago these were almost pure stands of pine, the Forest Service should acknowledge that this is simply not true today.

RESPONSE:

Although hardwoods are growing in the understory of many of the plantations, the overstories remain relatively pure stands of pine. This is evidenced by the most recent (2003) aerial photographs of the Forest, which reveal few hardwoods in the overstories. We do not know with surety how long the pine trees—predominantly shortleaf and loblolly—will live in these plantations because they are outside their natural ranges. These species can live 200 to 300 years in their native ranges. We were being conservative in estimating that the pines, now primarily 50 to 70 years old, would likely persist for several more decades.

76. In the Even-Aged Hardwood Forest management prescription, the Plan states, “Overall, the even-aged hardwood forest is a natural-appearing landscape with stands of hardwood trees in various age- and size-classes, interspersed with both permanent and temporary openings. Hardwood trees dominate, but there are minor amounts of softwoods intermixed, and associated understories.” Even-aged harvest destroys forests and does not result in a “natural-appearing” landscape. Also, it is unclear why the Forest Service proposes to include pine—“softwoods”—in the desired future condition under this management prescription.

RESPONSE:

We disagree that the forest is destroyed with even-aged harvest methods. The Plan allows the use of shelterwood and shelterwood-with-reserves harvest methods, in conjunction with prescribed burning and other silvicultural treatments, to help maintain the oak-hickory forest-type. These activities will help maintain the health of the forest, not destroy it. Pine is not part of the desired future condition under the Even-Aged Hardwood Forest management prescription. Although some native softwoods, such as the eastern redcedar,

will be present and desirable for the future condition of even-aged hardwood forest management areas, the desired future condition as expressed for this management prescription has been edited to focus on stands of hardwood trees.

SILVICULTURAL SYSTEMS

77. The Plan would employ the shelterwood and shelterwood-with-reserves harvest methods to maintain the oak-hickory forest-type, although it makes no sense to cut down the oaks and hickories if you are trying to maintain them. It is unclear which natural forces that once affected the canopy that produced the oak-hickory forest are no longer operating.

RESPONSE:

Fralish *et al.* (2002) show that white oak, a fairly long-lived and fire-resistant species, was one of the most prevalent species on a variety of sites in the pre-settlement forests of southern Illinois. The pre-settlement oak-hickory forest was most likely maintained by periodic fires—human-ignited as well as wildfire—that prevented the establishment and growth of the more shade-tolerant and fire-sensitive maples. Other disturbance factors, such as wind, snow and ice, drought, floods and insects and pathogens are discussed by Parker and Ruffner (2004). Most of the pre-settlement oak-hickory forest was cut, burned and grazed in the 1800's and early 1900's. This created the disturbance and light conditions favorable to the regeneration and growth of the oak-hickory forest that has matured into the oak-hickory forest of today.

Windstorms still occur across the landscape, but data presented by Rebertus and Meier (2001) show that only about one percent of the Forest landscape is likely to be affected in each decade. Since the cutting, burning and grazing that helped establish the present oak-hickory forest have been fairly limited over the last 70 to 75 years, shade-tolerant species such as maple and beech have become established in the understories and mid-stories of the forest. If we are to maintain the oak-hickory forest-type, environmental conditions that are favorable to the regeneration and growth of young oaks and hickories must be established. Control of competing vegetation is necessary to allow the young oaks and hickories to grow. The Plan allows the shelterwood and shelterwood-with-reserves harvest methods, in conjunction with prescribed burning and timber-stand improvement, to help create the environmental conditions needed for the establishment and growth of oak-hickory regeneration.

78. In discussing the direct and indirect effects of even-aged management and shelterwood harvesting, the EIS should disclose the full extent of success and failure of past attempts to achieve oak regeneration through timber removal, and should address the study, “The Regeneration Response to Clearcutting on the Hoosier National Forest,” which found that only 4 of 74 clearcuts were regenerating to oak-hickory. There seems to be no scientific basis for the claimed advantage of the shelterwood harvest method in establishing adequate advance regeneration. According to *Upland Hardwood Silviculture, a Review of the Literature* (Mills *et al.*, 1987), regardless of the silvicultural system, harvesting seems to reduce the component of oak in the next stand, and even-aged silviculture, as compared to uneven-aged, generally shows a faster decline in oak stocking, since all existing stems, including the oaks, are harvested and oak regeneration is generally poor.

RESPONSE:

Similar to the results reported by Fischer (1987) for clearcuts on the Hoosier National Forest, past hardwood clearcuts on the SNF have often resulted in an increase in other hardwood species and declines in the percentage of oaks in the regenerated stands, especially on the more productive sites. We acknowledge the results of Fischer's research some 20 years ago, as well as similar work that indicates clearcutting may not regenerate oak. The Plan does not prohibit the future use of clearcutting on a site-specific basis, but neither does it suggest that clearcutting will regenerate oak unless advance regeneration is present. The Plan takes Fischer's results on the Hoosier National Forest into consideration, but moves beyond Fischer to consider other active management regimes that will, as indicated by the best available science, regenerate oak.

As explained in Response 63, conditions have changed since pre-settlement times. Fire was one of the disturbances that contributed to the maintenance of the pre-settlement oak-hickory forests. The control of fire during much of the last century has created conditions unfavorable for the establishment of oak regeneration, and has allowed shade-tolerant, fire-intolerant maple and beech to become established in the understory of the oak-hickory forest. This situation requires active management to regenerate oaks and control maples.

Although the literature review by Mills *et al.* (1987) reported that timber harvesting seems to reduce the component of oak in the next stand, this review did not consider the approach of combining the shelterwood harvest method with prescribed burning. More recent publications (Keyser *et al.*, 1996; Brose and Van Lear, 1998a and 1998b and Brose *et al.*, 1999) have shown promise for the use of the shelterwood method in conjunction with prescribed burning. At Land between the Lakes, Kentucky, Schneckpepper *et al.* (1988) found that the shelterwood harvest method resulted in 70-percent stocking of large oak-hickory regeneration and 100-percent smaller oak-hickory regeneration. If no actions are taken to regenerate the existing mature oak-hickory forest, maple-beech likely will become over time the dominant forest-type on the SNF. For these reasons, the Plan allows the use of the shelterwood harvest method to achieve the Forest's goals and objectives.

79. The EIS should develop and fully consider true uneven-aged management alternatives and not use "patch clear-cutting" in place of group selection. Group selection should not use area regulation but, rather, diameter-distribution regulation. The size of the groups listed for group selection in Plan guideline FW24.3.2.2 appear to be too large. Plan guideline FW24.1.1 seems to inappropriately rule out uneven-aged management, as plans should not make that determination.

RESPONSE:

An uneven-age management alternative was developed and considered in the EIS under Alternative 1, using the group-selection harvest method. We agree that diameter distribution should be calculated and incorporated into marking guidelines when preparing an area for uneven-aged management and the group-selection harvest method. The size of the group openings listed in Plan guideline FW24.3.2.2 should range from .05 to 0.6 acres, not from the 0.5 acre shown in the proposed Plan. Plan standard FW24.1.1 is correctly stated. This section describes the criteria for the use of even-aged management and the criteria for the use of clearcutting. The Plan does not determine when, where, or how timber will be harvested, if at all. Project-specific analysis that includes consideration of site-specific forest-resource conditions would be undertaken prior to the choice or final

determination of the appropriate timber-harvest method. This analysis would include consideration of the no-action alternative. There would be additional opportunity for public participation prior to the determination of harvest method, if any.

80. The Plan should consider selective harvesting in either pine or hardwoods; this seems to be the preferable silvicultural method for improving timber stands because it has less impact on the land than other methods and is the most pleasing to the eye. Since the loss of oak-hickory seems to be much less under uneven-aged management than even-aged management, the EIS should consider information on single-tree selection used on the Pioneer Forest in southern Missouri as it pertains to damage to residual vegetation, roads, number of entries and light conditions.

RESPONSE:

Although selection harvesting may have a low visual contrast, it may not always have the least effect on the land, as is discussed under the soil and water section of the FEIS. In regard to the claim that the loss of oak-hickory would be less under uneven-aged management, our long-term (150 year) projections show that, although the uneven-age management of Alternative 1 would maintain more oak-hickory in the old-growth age/size class, Alternatives 2 and 4 would maintain more acres in the oak-hickory forest-type overall.

We have reviewed the publication regarding the Pioneer Forest in Missouri and note that it is located in the Ozark Highlands of Missouri, where the soils are much poorer and the trees much smaller than here. The Pioneer Forest is a xeric to dry-mesic, oak-dominated ecosystem that is relatively stable successionally (Lowenstein *et al.*, 2000). This would be expected, since successionally stable oak-hickory stands occur on poor- to medium-quality sites that tend to be droughty, and where few non-oak species can persist as canopy-dominants (Parker and Merritt, 1995). Such stands have been referred to as "auto-accumulators" of oak reproduction (Johnson *et al.*, 2002). The application of single-tree selection on the SNF as it is used on the Pioneer Forest would not likely be suitable to our local conditions. Sites on the Forest are generally more productive and do not automatically accumulate oak reproduction.

81. It is unclear from the DEIS the scientific basis for determining what constitutes a healthy forest, and how the forest survived before the Forest Service managed it with timber removal. The EIS should address the effects of timber removal on adjacent stands and residual trees in times of high winds, as well as the effects of thinning, improvement cutting, salvage and sanitation cutting.

RESPONSE:

With regard to what constitutes a healthy forest: The EIS analysis of effects on forest ecosystem health and sustainability discusses the relative abilities of the alternatives to sustain the oak-hickory forest-type and the vigor of the trees. One of the main advantages of an oak-hickory forest over a maple-beech forest is related to the greater biological diversity associated with the oak-hickory forest ecosystem. This is discussed in the biodiversity section of the FEIS and in Response 60. The description and history of the forests of the Hoosier and Shawnee National Forests are presented by Parker and Ruffner (2004).

Harvesting can leave residual trees that have not developed a wind-firm root system to become susceptible to wind-throw. The shelterwood harvest method will gradually open the overstory, allowing the remaining trees to become more wind-firm. Thinning is an intermediate treatment that may be employed in the bottoms of forest-interior blocks to improve the interior habitat. Salvage and sanitation cutting would only be used to remove dead, dying, deteriorating or susceptible trees to promote forest vigor and to recover trees damaged by fire, wind, insects, disease or other injurious agents. Salvage and sanitation cutting are not scheduled, as the injurious factors that may require their use cannot be predicted. General effects are similar to those listed for other timber-harvest methods, and site-specific effects would be evaluated as activities are proposed.

82. The reasons for clearcutting presented in the Plan and DEIS are not convincing. Natural causes such as storms do not damage the forest. The Forest should provide the results of research that compares the recovery of an area that has been salvaged with one that has been left alone.

RESPONSE:

The rationale for the identified probable timber-harvest method is documented in the record and supported by the best available scientific information, as well as field-observation. The reasons for developing a framework that allows active management are clearly set forth in the effects discussion of the FEIS Chapter 3 Forest Ecosystem Health and Sustainability section, Plan Appendix C and the planning record. We have seen no evidence in this comment or elsewhere that the reasons supporting the probable methods of harvest identified in the Plan are unsound.

We disagree that natural forces such as windstorms do not damage the forest. We are not aware of any studies that specifically compare the recovery of areas that have been salvaged with those that have not. Although regeneration of an area that has been affected by a tornado or other windstorm may be similar whether the damaged timber is salvaged or not, the value of conducting a salvage operation may be in the reduction of extreme fuel-buildups and prevention of damaging wildfires. A similar situation could result from insect or pathogenic infestations.

TIMBER HARVEST

83. It is unclear why the Plan would allow timber harvest in any management area that is not part of the suitable timber base, especially in wilderness and natural areas. It is unclear what is being disclosed in the tables displaying volumes and acreages of suitable timber harvest.

RESPONSE:

Timber harvest for timber-management purposes is planned only in areas determined to be suitable for that use. About 117,300 acres, 41 percent of the Forest, are considered suitable for timber management. Timber harvest could be used as a vegetation management tool in areas not suitable for timber management if it is needed to help achieve desired future conditions, or for the protection of certain resources. Standards and guidelines for management areas are found in Plan Chapter V and specified in each prescription under the “2400” section on timber management.

Natural areas and wildernesses are both classified as unsuitable for timber production. However, Plan standard NA24.1 allows timber removal from natural areas only to maintain or enhance an area's unique features, and Plan standard WD24.1 prohibits any investment or practice in wilderness areas related to timber management unless necessary to protect wilderness values or adjacent property from fire or pests. There has been no timber harvest in natural areas or wilderness areas since their establishment. It is unlikely that any commercial timber harvest will be proposed or executed in these areas during the planning period.

84. The DEIS discloses how much timber has been harvested on the Forest, but it fails to disclose the effects. The EIS needs to address the effects of accelerating and bypassing natural processes and how this affects all other species besides trees and soils and the microorganisms living in them.

RESPONSE:

The Soil section of FEIS Chapter 3 discusses the overall minor effects on soil nutrients and microorganisms that could result from future harvesting decisions and offers a discussion of the cumulative effects of past timber harvesting as related to forest ecosystem health and sustainability (page 121). The individual resource areas in the FEIS also provide discussions of the effects of past timber-harvest activities.

85. The DEIS makes what appears to be an inaccurate statement regarding restrictive management (page III-64) because Alternative 3 does not allow timber removal in restrictively managed areas. Proposed Plan Table C-4 fails to display clearcuts and uneven-aged timber harvests.

RESPONSE:

Timber harvest is not allowed anywhere under Alternative 3, except for the protection of human health and safety. The statement in question refers to areas with restrictive management prescriptions, which are similar under all alternatives. It is unlikely that timber harvesting would take place in them unless needed to achieve the desired condition of the specific management area. As shown in Plan Tables 4-2 to 4-17, activities that involve timber harvesting are not scheduled for any management areas except even-aged hardwoods and mature hardwoods. Plan Table C-4 displays proposed timber harvesting on the acreage considered suitable for timber management. Clearcuts and uneven-aged harvest methods are not displayed in the table because the conditions set forth in the Plan for their use will likely limit the acreage on which they would be used.

86. The EIS and/or Plan should disclose the end-use of the timber harvested on the Forest and offer information on the most common uses for oak harvested on private land in the region today. The public has the right to know where the trees are taken and what they are used for.

RESPONSE:

It is difficult to identify what the end-use of timber harvested on the Forest will be, because so little timber has been harvested in the past ten years. However, in the past, smaller-diameter pine and hardwood trees were utilized primarily by the paper mill in Wickliffe, Kentucky for producing high-quality paper. Hardwood and pine sawtimber-size trees were utilized by local sawmills for lumber, landscaping timbers and other wood products. Some

vener-quality logs were utilized by veneer mills both in the United States and abroad. We expect that the end-uses of timber removed from private land, as well as from national forest land, would be similar to past uses.

TIMBER PRODUCTS

87. The Plan statement under the management goal for ecosystem health and sustainability (IV-4) that the Forest may produce some timber products as a by-product of vegetation-management activities should be removed. Timber products are not removed from healthy and sustainable forests. Forests evolved with trees dying and going back into the soil. This is healthy. The removal of timber by the Forest Service is not healthy.

RESPONSE:

We disagree. Healthy and sustainable forests can provide timber products as a renewable resource for society, and also help provide for the continued biological diversity of the oak-hickory forest-type. The EIS discloses at the programmatic level the soil-nutrient and other environmental effects of implementing the ecological restoration of the pre-settlement, oak-hickory forest. Based upon the best science available, as well as monitoring data and field-observations, the Plan provides a framework for a sustainable, multiple-use forest.

88. Regarding Plan standard FW24.8, the type of permit system that would be involved with special forest products is not specified. Additionally, the Plan should define “special forest products.” It is unclear if the collection of fruits, nuts, berries and fungi for personal use applies to (1), (2), or just (3).

RESPONSE:

We would use the Forest Products Removal Permit (FS-2400-1) for special forest products. A definition of special forest products has been added to the Plan glossary (Appendix A). The exception regarding the collection of fruits, nuts, berries and fungi for personal use applies in authorized situations, which do not include item (1), (2), or (3). We have revised this standard (now FW24.7) to clarify the intent.

89. In the discussions of allowable sale quantity and long-term sustained yield, the Plan should address all the timber removal and vegetation treatments that the Forest Service could do in other areas. For example, timber removal is allowed in natural areas, but the Plan does not disclose how much would be removed.

RESPONSE:

The scheduled management practices for the Forest and for specific management areas are listed in Plan Tables 4-2 to 4-17. Timber removal is not allowed in natural areas except to protect their unique features. No commercial timber harvest has occurred in natural areas since their designation. Timber harvest on the Forest must be preceded by additional, site-specific environmental consideration in compliance with NEPA. The Plan identifies allowable management practices, but does not authorize, fund, or execute any on-the-ground actions.

90. The Plan should disclose the methodology used to derive the numbers in Tables C-5 and C-6.

RESPONSE:

As stated on Plan page 135, Table B-5 (proposed Plan Table C-5) is based on the 1998 Forest Inventory and Analysis plot data and the proportion of suited and unsuited land on the Forest. Table B-6 is based on the Spectrum model projections for Alternative 2.

91. The Plan should disclose how much timber harvesting is expected from salvage sales, from sales on land that is classified as unsuitable for timber production and from firewood removals.

RESPONSE:

Plan Tables 4-2 to 4-17 present the acres of timber expected to be harvested from land classified as unsuitable for timber production. The volume of timber that could be harvested in these areas is presented in Plan Table 4-1, footnote 2. About 13 thousand cubic feet of firewood from downed trees is likely to be sold for personal-use firewood annually. The volume of timber from salvage sales is unknown because we cannot predict when and where they might be needed. There have been no salvage sales on the Forest during the last fifteen years.

92. The Plan statement, “The degree of modification will determine whether or not the Forest Plan needs to be amended” (C-5), should be more specific.

RESPONSE:

Forest Service Manual section 1922.5 governs whether an amendment would be needed.

93. The Plan should disclose how natural mortality is taken into account in Table C-6.

RESPONSE:

Mortality was incorporated in the Forest Vegetation Simulator (FVS) growth and yield model using the FixMort values for the maximum diameter at breast height by tree species (Vandendriesche, 2005). The values were derived using actual tree-measurement data from the Forest Inventory and Analysis plots for the 11-county region of southern Illinois.

94. The first sentence of the proposed Plan Appendix D states, “The Shawnee National Forest is coming under increasing pressure to provide more and better products and benefits for more and more people.” This appears to be code for “get the cut out.” If this is what is being discussed, please disclose the source of the pressure.

RESPONSE:

This is not what is being discussed. Many interest groups and individuals have made themselves heard in the forest planning process, demanding that the Forest be managed to meet their specific interests, ranging from amenity needs to product needs.

WILDLIFE OPENINGS AND LARGE OPENLANDS

95. The DEIS states, “...The methods of management (of openings and openlands) would have minimal direct or indirect effects under all alternatives.” While the DEIS claims that old growth is unhealthy, it now appears to be saying that artificial openings, including some with row crops and non-native species, do not affect forest health. Healthy forests do not contain “wildlife openings.” What is the scientific basis for asserting that the openings and non-native species do not affect the health of the forest?

RESPONSE:

Healthy, hardwood forests can and do include some forest openings and edges as a result of natural disturbances, such as wind, ice and, formerly, fire. These natural disturbance-related openings can include native grasses and other herbs, shrubs and small trees (Parker and Ruffner, 2004). Artificial openings in the forest to some degree mimic these natural forest openings. When these openings are actively managed, they can contain some non-native, non-invasive species planted specifically as food for some species and to attract native, game species. We have concluded that these actively managed wildlife openings are neutral for maintaining forest health. They do not promote forest health since they are not forest; however, neither do they detract from the health of the forest, as they do not promote the spread of non-native invasive species when they are actively managed. Active management, including disking, mowing and burning, keeps any non-native, invasive species from spreading into or out of these openings.

Non-native, invasive species adversely affect forest health. We know that when former wildlife openings are abandoned after construction and management and left to succeed on their own back to forest, they are highly susceptible to invasion by non-native, invasive species. Many of these openings that were not restored to native species after abandonment have become sources for the spread of invasives, such as autumn olive, into the Forest. Our statements on forest health and openings and openlands refer to actively managed areas and not to those that have not been restored to native forest species as part of their abandonment.

96. The proposed Plan states, “Openings and openlands management would involve fewer acres (under Alternative 2) than under Alternative 1...remaining wildlife openings in even-aged hardwood and mature-hardwood forest management areas over 500 acres in size would be managed to reduce cowbird feeding-habitats and nest-parasitism...” There are no management standards that require the openings to reduce the effects they produce from cowbirds. What are the effects of predation from these artificial openings? How do these openings and the cowbirds and nest-predators they produce benefit forest-interior species?

RESPONSE:

Plan guidelines for openings (page 46) were discussed in the DEIS. They require that openings in the 500-acre-or-larger areas be managed to reduce cowbird attraction and feeding use. These openings would be less than 400 meters from hard edges, such as cropfields, grazed pastures and developed roads, in the more fragmented buffer areas of these larger blocks of forest. All of these openings will be planted in the fall so that during spring and summer nesting seasons they are grown up and unattractive as cowbird feeding-habitats. This was a strategy that Dr. Scott Robinson recommended to make openings as unattractive as possible for cowbirds and to soften their edge effects.

There is no doubt that some nest-predators are attracted to these openings, as well as game species. The guidelines were not meant to totally eliminate predation effects but to reduce them. The reduction is to make the edges softer and less attractive to edge-predators. However, within a landscape with so much edge, reduction of predation effects maybe difficult to realize. The cited effects discussion takes that into account and states that the beneficial effects for interior birds, compared to Alternative 1, would result primarily from fewer openings and less cowbird-parasitism—fewer because openings would be abandoned and restored to native forest species, and less parasitism because it should be more effectively reduced with the proposed openings-management strategy, which is based upon local research (Hoover and Robinson, 2000).

D. BIODIVERSITY

ANIMAL PROTECTION LAWS

97. The Forest Service must address compliance with Illinois animal protection laws as they may relate to a timber sale and the presence of roads.

RESPONSE:

There is nothing in the Illinois animal protection laws that applies to cutting trees and maintaining roads by public agencies and their possible inhumane effects on wild animals. Additionally, the federal government is not subject to state laws unless they are incorporated into federal statutes or congress has waived sovereign immunity. State animal protection laws have not been incorporated into any federal statutes; therefore, there is nothing for the Forest to address.

BIRDS

98. The EPA believes that the mix of shelterwood, shelterwood with reserves, and intermediate treatments under the forest-interior standards and guidelines should result in a mix of habitat-types for migratory birds, including early-successional forest-interior habitats.

RESPONSE:

We agree. The intent of our vegetation management is to increase and/or maintain habitat diversity for all plants and animals native to the Forest, including migratory birds, by maintaining healthy and sustainable ecosystems and landscapes. (See Forest Ecosystem Health and Sustainability section, Plan pages 23-24.)

99. The DEIS makes no reference to the four national bird plans and their regional components: the North American Waterbird Conservation Plan, the US Shorebird Conservation Plan, the North American Management Plan and the North American Landbird Conservation Plan. Neither is there reference to the US Fish and Wildlife Service's Birds of Conservation Concern, an additional and regionalized effort to point out species that require conservation efforts in the Midwest.

RESPONSE:

All of these plans were consulted and discussed during Plan revision. Specifically, the US Fish and Wildlife Service's Birds of Conservation Concern (2002) was referenced, reviewed

and used as part of the *Hoosier-Shawnee Ecological Assessment* (McCreedy *et al.*, 2004). We have included them in FEIS Appendix F.

100. The Important Bird Areas Program is a national effort of the Audubon Society to identify state-by-state areas of particular importance to breeding and/or migratory birds. Two areas on the Forest have been nominated: The LaRue Springs-Pine Hills ecological station for Kentucky warbler and worm-eating warbler, and Oakwood Bottoms for waterfowl, shorebirds and yellow-crowned night heron. The US Fish and Wildlife Service recommends that the Forest Service coordinate with the Audubon Society in this program and, if appropriate, provide some additional discussion of the two nominated areas in the FEIS.

RESPONSE:

We have corresponded with the Audubon Society about their Important Bird Areas program and the two areas they have recommended on the Forest (Lentz personal communication, 2004). Both areas already receive special management in the Plan—in the OB and NA management areas. Implementation of the management prescriptions for these areas will maintain and improve habitats for the bird species of importance listed for each area (Plan pages 78 and 83 and Appendix D). We have included mention in the Plan of their Important Bird Area status.

101. The Plan should protect the scarlet tanager and monitor populations for forest health.

RESPONSE:

The scarlet tanager is included in our MIS (FEIS page 148 and Appendix F, page 115). The proposed management under the Plan will improve habitats for the species and should maintain populations for the species on the Forest in the future (FEIS Tables 3-17, 3-18a, 3-18b and 3-19). Populations and habitats of MIS, including the scarlet tanager, will be monitored as part of Plan implementation.

CAVE VALLEY

102. In Cave Valley, Plan standard CV24 should allow only non-commercial timber removal. Mineral activities should be prohibited. Pine and oldfield-successional land should not be part of the desired condition. These areas should be allowed to succeed to forest.

RESPONSE:

Plan standard CV24 states that the entire Cave Valley area is not suitable for timber production and that the only timber removal in this area would be for objectives such as the improvement of habitat for non-game birds and threatened, endangered, or sensitive species; the control of non-native invasive species; pest management, or the prevention of significant resource loss and/or to protect existing investments or developments. Commercial timber harvest is a viable option for any tree/forest management for the above purposes, and that is reflected in the standard.

No surface-occupancy for any mineral or oil and gas exploration or development would be allowed in Cave Valley. This prohibits any on-site, aboveground mineral activities in this management area.

The desired condition of the CV management area (Plan page 56) is a description of what the area would look like in the next 15 years, or life of the Plan. There would be no management of wildlife openings, except if needed for threatened or endangered species or RFSS management. Neither would there be management of pine plantations except for non-timber-related, management needs identified above. Both oldfields and pine plantations in this management area would be allowed to succeed during the life of the Plan; however, they would still be a visible part of the landscape of the area since their succession to native hardwood forest would take longer than 15 years. So, the future condition (in the next 15 years) in this area would include some oldfield-successional lands.

103. The EIS should disclose how Forest Service management led to extirpation of Swainson's warbler in Cave Valley.

RESPONSE:

The programmatic framework of the Plan was developed collaboratively with state and other wildlife experts and the best available published scientific information concerning Swainson's warbler. Our attempt to aid the last two birds in Cave Valley over 20 years ago informed, but did not control, development of the Plan. Other than for historical interest, this information is, at best, inconclusive. We have, however, included the facts in the FEIS. The comment implies that our attempt to aid the birds 20 years ago somehow caused an adverse effect, but provides no evidence in support of this supposition.

COUGAR

104. Cougars have been sighted in southern Illinois and are returning to the area. The EIS should address cougars.

RESPONSE:

The US Fish and Wildlife Service did not include the eastern cougar as a known species from the Plan area in either their letter in 2002 responding to our Notice of Intent to revise the Forest Plan or in their recent letter of comment on our DEIS and proposed Plan.

We know that a wild cougar was found dead northwest of the Forest boundary about five years ago. However, our biologists have never identified any signs of cougar populations on the Forest since that time (Widowski personal communication, 2005). We recently contacted Dr. Clay Nielsen of the Cooperative Wildlife Research Laboratory at Southern Illinois University and current director of the Cougar Network for his professional and scientific opinion on the status of the cougar on the Forest. He confirmed that there is no scientific evidence of wild cougar populations in southern Illinois at this time and there have been no confirmations of wild cougars in southern Illinois since the record five years ago.

Since the species has *not* been identified as known on the Forest by our field biologists, by the IDNR, by the US Fish and Wildlife Service or by local scientists and species experts, we did not address it in the DEIS or Plan. The comment provides no evidence that contradicts our findings concerning the cougar.

EARLY-SUCCESSIONAL HABITAT

105. Any justification that attempts to base timber removal on a need to create early-successional habitat rings hollow. As the map in the early-successional studies edition of the *Wildlife Bulletin* shows, over 20 percent of our region is already in early-successional habitats. That is much higher than what was here before European settlement. So it seems hypocritical of the agency to cite "presettlement" conditions to justify large acreages of burning, and then attempt to use counter-pre-settlement conditions to justify harvesting mature forests to create early-successional habitats at non-native levels. Additionally, there are thousands of acres of regenerating former "wildlife openings" in wilderness areas and elsewhere that are providing early-successional habitat, an important fact in a relative value analysis.

RESPONSE:

A review of the information on the patterns and trends of early-successional forests in the north central area of the country reveals that 20 percent of the *entire* region—Illinois, Indiana, Iowa, Missouri, Michigan, Minnesota and Wisconsin—was in early-successional forest in 1998, but this is declining from historical amounts (Trani *et al.*, 2001). More specifically, in the central plains area—Illinois, Indiana, Iowa and Missouri—of the north-central region, there was only 15 percent early-successional forest, with Illinois having the least amount, only 3 percent. Early-successional forests are predicted to continue to decline throughout the central plains area due to the lack of disturbances (Trani *et al.*, 2001).

Locally, we know that on the Forest there has been a decline in early-successional forests, from 13 percent of the forested land in 1985 to 3 percent in 1998 (Haugen, 2003). We know that there has been a large decline in early-successional forests in southern Illinois, from 209,400 acres in 1985 to 39,300 acres in 1998 (Schmidt *et al.*, 2000). We know that species such as the northern bobwhite, associated with early-successional forest as well as grasslands, have also declined in southern Illinois (FEIS Appendix F).

Our interpretation of presettlement information (Fralish *et al.*, 2002) indicates there were some relatively large areas of early-successional or shrubby habitats (barrens) in southern Illinois, especially in the Cretaceous Hills ecological subsections (Hutchinson and Olsen, 1986) and on southwest-facing slopes of most of the other ecological subsections in southern Illinois, including what is now the Forest. In addition, presettlement information documents the fact that oak-hickory forest was dominant in the landscape of what is now the Forest (Fralish *et al.*, 2002). Silviculturally, we know that in order for oak-hickory forests to persist as the dominant forest community in the past, all successional stages of oaks and hickories would have to have been well represented and relatively common and widespread. This condition is similar to what we describe in the Plan.

The former wildlife openings that are regenerating in the wilderness were included in the 1998 estimates on the age-classes on the Forest (Schmidt *et al.*, 2000), as they were deleted from the openings database upon establishment of the wildernesses. We have identified that regenerating wildlife openings and forest restorations on newly acquired farmlands will make up some of the early-successional forest of the future on the SNF (FEIS Table 3-15); however, some additional early-successional forestland will be needed each year to approach maintenance of the oak-hickory forest abundance that we have today (FEIS Table 3-15).

106. Although early-successional habitat may be decreasing on private land, it is still there. The EIS should disclose the quantity and address the level of currently available habitat compared to the natural level.

RESPONSE:

Parker and Ruffner (2004) have done this for forests on a regional basis and Fralish *et al.* (2002) have done this locally for southern Illinois and the Forest. Both are cited in the FEIS (page 90) and were consulted as part of the analyses for the EIS. They both include information on early-successional forests near the SNF. Schmidt *et al.* (2000) describe southern Illinois by land class and include acreages of a variety of early-successional habitats on both private and national forest land.

107. The DEIS states, “Prescribed burns and other management practices for early-successional habitat would be conducted outside the typical nesting season and any timber harvest would not affect existing early-successional habitat,” and “Prescribed burns would be conducted in the early spring and late fall, outside the MIS nesting season...” Standards or guidelines specifying this cannot be found. What of the species that nest outside the “typical nesting season”? That Alternative 2 would increase habitat for species such as the bobwhite is undisputed; but the discussion is on biodiversity. The EIS should address how management for an unnaturally high level of these species affects the overall biodiversity of the forest. When the Forest Service creates unnatural levels of habitat for species that benefit from timber removal, it takes away habitat from other species. The EIS should address this.

RESPONSE:

The statement reflects seasonal periods when weather conditions are conducive to burning in hardwood forests or grasslands in southern Illinois, and when most prescribed burning is done. No standards and guidelines are needed to make this statement. We have added the word “generally” to these statements to identify that annually some minor amounts of burning could be done during the nesting seasons in a few locations.

Very few species nest outside the typical spring and summer nesting season of April 1 to July 15, although some begin nesting earlier than most forest and grassland birds. These species are much fewer in number than the majority of the native birds. Prescribed fires during the early spring nesting season would temporarily disrupt the nesting attempts of tree-nesting species during the limited times of the burns (8 to 24 hours) and in limited areas, about three percent, of the Forest (Plan Table 4-2) each season or year. The remaining areas of habitat for these early-nesting species would not be affected by prescribed burning. In the three percent of the Forest affected, only ground- and shrub-nesting species could be directly affected by the burning and, of that, only 50 to 70 percent of the areas burned would be made unavailable (shrub cover would be burned up) as nesting habitat in any particular year. In summary, the adverse effects on these early-nesting species would be constrained by the short duration of the burning and/or limited areas affected annually. Short-term, adverse effects for some early-nesting species, such as the woodcock, may be offset by the longer-term habitat improvements of burning that maintain early-successional habitats or increase groundcover diversity and abundance. Overall, we anticipate that few of these early-nesting species would be adversely affected, with no measurable effects on overall populations on the Forest.

We do not agree that *many* early-successional species are at unnaturally high levels due to bad land management and over-cutting. We acknowledge that some, such as the white-tailed deer, are at higher levels than they may have been historically. However, many are considered rare and/or dramatically declining in the *Hoosier-Shawnee Ecological Assessment* area. These include migrant and resident bird species such as the northern bobwhite, Bachman's sparrow, migrant loggerhead shrike, Henslow's sparrow, yellow-breasted chat, prairie warbler, American woodcock and blue-winged warbler, to name a few (McCreedy *et al.*, 2004). Some of the above species are RFSS and others are species with viability risks (FEIS page 163). We are charged by NFMA with maintaining viable populations of all native vertebrates. As such, we are required to manage for all species, early- and late-successional and forest species alike, and especially rare species such as RFSS.

Presettlement periods can be considered "more natural" ecological periods (Fralish *et al.*, 2002). Early-successional forest, open woodlands and barrens are current and historical habitats for many of these species, and appear to have been common in the southern Illinois landscape of presettlement periods (Fralish *et al.*, 2002). Most of these habitats are not common today. They have been replaced only partially in the Forest landscape by farms and fields and their edges (Brennan, 1999 and see FEIS Appendix F). We know that on the Forest there has been a decline in early-successional forests from 13 percent of the forested land in 1985 to 3 percent in 1998 (Haugen, 1998). We also know that there has been a large decline in early-successional forests in southern Illinois, from 209,400 acres in 1985 to 39,300 acres in 1998 (Schmidt *et al.*, 2000). We also know that species such as the northern bobwhite, associated with early-successional forestland as well as grasslands, have also declined in southern Illinois.

We have adequately addressed in the FEIS the effects of timber harvest on the MIS, threatened, endangered and sensitive species and forest-interior habitats (pages 150-156, 165-168, 182-186, 204-215, 239-240). These effects discussions identify species that are both beneficially and adversely affected by timber harvest under any alternative.

108. The DEIS states, "The two communities, hardwood forest and openland, and the two forest-successional stages are vitally important in terms of their support of forest-interior species and the vigor of the oak-hickory forest, grasslands and oldfields." What is the scientific basis for this statement? How do fields support forest-interior species?

RESPONSE:

We have clarified this statement in the FEIS (page 130): Mature hardwood forests are vitally important as habitat for forest-interior species and in determining the vigor of oak-hickory forests, key issues for the Forest. Early-successional forests are vital to maintaining the vigor of oak-hickory forests and the early-successional wildlife species dependent upon them, also key issues for the Forest. The maintenance of grassland and oldfield habitats on the Forest is important to wildlife dependent on early-successional habitat. Maintenance of these three habitat-types is critical to meeting the population-viability requirements of all native species.

109. The Ruffed Grouse Society would like to see an increase in the early-successional habitat preferred by grouse. The ruffed grouse should be included as a species of viability concern. Timber removal should be prioritized in areas adjacent to ruffed grouse populations so that early-successional habitats are provided for this species.

RESPONSE:

We will manage in the next decade for approximately 1,000 acres annually of early-successional forest as part of shelterwood harvests in pine and hardwoods, and approximately 2,000 acres annually in the following decade (Plan page 28). This management would be done across the Forest, except that most of the pine shelterwood would be done on the east side, where most of the non-native pine plantations are located.

Some of the harvest/timber management would be done near areas of former grouse populations and reintroductions, primarily on the west side of the Forest, in Union and Alexander Counties. However, existing grouse populations in southern Illinois have diminished substantially to near-extirpation, due to the lack of early-successional forest habitats in or near former reintroduction areas on the Forest. As a result, by the time harvest and management are implemented under the Plan, there will be no grouse populations capable of responding to any planned, indirect habitat improvements.

Both the Shawnee and Hoosier National Forests analyzed the ruffed grouse as part of their species viability evaluation process. It was discussed and reviewed by evaluation-panel experts, including Dr. Woolf of Southern Illinois University, a local expert on introduced grouse populations. The panel did not recommend the species as one to consider for maintenance of viability in southern Illinois since it has not been successfully reestablished to date, and establishment and maintenance depends upon what would be an unpopular, aggressive, even-aged timber-management program to maintain populations. The latter has been and will continue to be non-implementable due to complex agency planning regulations and associated administrative and legal challenges. The State of Illinois has focused its ruffed grouse reintroduction program in another area, primarily on private and state lands where maintenance of early-successional forest conditions is more feasible.

110. DEIS Table 6-2, the monitoring matrix, states that the purpose of monitoring for the provision of key successional-stage habitats is to “determine if the balance between early-, mid- and late-successional habitat conditions is appropriate”; and, for aquatic habitats, to determine if the status and trends in aquatic habitat conditions are suitable.” The Plan should provide for field surveys as well.

RESPONSE:

Field surveys would support monitoring. Based upon the monitoring history and current monitoring program for the Forest, some of the reports identified in the Activity/Output Monitored columns of Plan Table 6-2 would be from field surveys.

FIRE

111. The DEIS states, “Most of the forests in the region dominated by oak-hickory species are a result of widespread human disturbance in the 1800’s” (DEIS III-63). The meaning of this statement is unclear, since fire has been a part of these systems since oak-hickory replaced coniferous forests 10,000 years ago, has it not? It seems that fire may have increased with European settlement, but this disturbance did not produce the oak-hickory forest.

RESPONSE:

We are accurate in stating that the disturbances in the 1800’s have produced the forests that we have on the ground today, including the many acres of oak-hickory-dominated forests. The comment is also correct in that the oak-hickory forest-type or community in general was maintained by fire and other natural and human-induced disturbances during presettlement periods for thousands of years. We have added a statement to that effect to the oak-hickory forest description at FEIS page 91.

112. The Plan describes fire-return intervals in natural areas that are longer on dry sites than wet. For example, the two-to-three-year fire-return interval in mesic-floodplain forests seems too frequent. If there is a scientific basis for the FRIs, consider disclosing the information in the EIS.

RESPONSE:

While some Plan guidelines may appear to be of short-duration intervals, such as those for dry woodlands, our intent is to allow management that is not artificially constrained. If we limited our burn options by prescribing a fire-return interval that was too long, we could lose the opportunity to apply repeated prescribed fire if it should be needed to meet management objectives. The application of prescribed fire on a shorter-return basis could be beneficial or, in some cases, essential, to control re-sprouting or for other natural-community restoration or maintenance needs.

113. Prescribed burning should be done in a “checkerboard” fashion to enable animals to escape the fire and to provide unburned areas that have seed sources to aid the recovery of the burned area.

RESPONSE:

The programmatic Plan does not authorize, fund, or carry out any prescribed burning action. Prior to any project-related decisions involving prescribed burning, we would conduct site-specific environmental analysis with public participation. The Plan does not specify checkerboard burning patterns as part of our management direction for prescribed burning because they allow us much less control of fire intensities and the amount of unburned areas within a burning unit. They would also require many more fire-lines and their associated direct impacts on the land. They are also more costly to implement. However, we do achieve all the benefits of multiple, adjacent, burned and unburned areas in our larger burn-units. All large fires, including both wildfires and prescribed fires, burn in mosaic patterns of burned and unburned areas (Debano *et al.*, 1998). This is because of the large diversity of fuel-load, microclimate, humidity and moisture, wind and topography (slope and aspect) within larger and more complex, topographical burn-units. Larger burn-units are much better ecologically because of all these natural variations (Lyon *et al.*, 2000c).

We are confident that most animals escape our larger burns based upon many years of observations during past burns, as well as study of the literature, where the effects of prescribed burning on fauna is well documented. Most animals survive fires by escaping the fire or burn-area. This is especially true for large mammals and most birds. Light-to-moderate-intensity fires and burns, such as our prescribed fires, have subsequent slower rates of spread, giving animals in the area ample time to escape the flames and heat by their various strategies of burrowing and flight (Lyon *et al.*, 2000a). They also provide unburned areas of denser woody and herbaceous vegetation for shrub and ground-nesting birds to use immediately or, at most, one or two seasons following the burns (Lyon *et al.*, 2000b; Huff and Smith, 2000).

Smaller mammals, some reptiles and amphibians, and many insects escape the effects of fires by moving underground or to other shelters in the fire area (Lyon *et al.*, 2000b). Mosaics of unburned areas in prescribed burns also provide refugia and cover for small animals, including insects, amphibians, reptiles and small mammals (Lyon *et al.*, 2000b). Small mammals and many insects also are able to rapidly recolonize areas after prescribed burns because of their high reproductive rates. Amphibians and reptiles usually survive low-to-moderate-intensity fires and also recolonize areas quickly (Lyon *et al.*, 2000b).

Recovery of burned areas on the Forest is rapid. The patterns and types of ignitions in prescribed burns have controlling effects on the amounts and locations of burned and unburned areas. Our prescribed burns generally affect between 40 to 70 percent of an area, leaving the remaining areas in a mosaic of unburned vegetative cover. These unburned “islands” provide many seed sources for the regeneration of plant species that require seed sources for reestablishment after burning (Miller, 2000). Under the light to moderate intensities of prescribed fires, most of our native vegetation follows the recovery patterns predicted in the prescribed burning literature and reestablishes itself quickly by resprouting from roots, buds and shoots that are undamaged by the burns (Miller, 2000).

114. While the DEIS makes many statements about the effects of fire on forest-interior habitat, there are no studies or monitoring data cited. For example, on page III-231, the DEIS states, “Fire management under (Alternative 3) would have no direct effects since little if any fire would occur in forest-interior areas. Indirectly and in the long term, interior areas would be less diverse in both the overstories and understories due to lack of burning.” The Forest Service should acknowledge that the effects of fire are unknown and propose small-scale burning to observe effects before deciding to do larger-scale burning.

RESPONSE:

The statements on DEIS III-231 are based on the facts that burning under Alternative 3 would be allowed only in some small natural areas, and that lack of burning in forests will reduce the oak-hickory species, especially on north and east aspects of slopes, and forbs and grasses in the understory associated with the oak-hickory forest (Wade *et al.*, 2000). These reductions of oak and hickory species-abundance and their associated native understory species, due to the lack of fire, predicated the statements about less diversity on DEIS III-231.

The Forest Service in fact knows a large amount about the effects of fire on flora, fauna, soil, water and air, including in oak-hickory forests (Brown *et al.*, eds., 2000; Smith, ed., 2000; Sandberg *et al.*, 2002). Our resources professionals also have observed directly the effects of past, prescribed burns. We have the knowledge and experience to proceed with the

prescribed burning program as proposed under any of the alternatives, including larger-sized burns where needed.

115. Wood thrushes typically nest in ravines, but frequently forage in leaf-litter on the forest floor. Prescribed burning could have temporary and localized adverse effects on this species, although the forest-wide effects of limited burning would likely be neutral. This information should be included in the Plan so that temporary, localized decreases in numbers following burning are a recognized possibility.

RESPONSE:

We agree that in some areas of the Forest prescribed fire as planned could have some short-term, localized adverse effects on wood-thrush populations, and identified this on pages III-117 and III-231 of the DEIS. There is also recent evidence that wood thrushes adapt well to prescribed burning in some central hardwood forest areas and do not decline following burning. They simply shift their nesting locations to remaining trees rather than the fire-affected shrubs (Artman and Downhower, 2003). The FEIS effects sections on wood thrushes (cited above) look at the species across the entire Forest. We expect no more than 12,000 acres to be burned annually, affecting about four percent of the Forest. So, with the remaining forest areas unaffected, overall wood-thrush populations across the entire Forest are predicted to increase, as most of the Forest matures and is unaffected by disturbances in the short term. In the long term (50 years), we expect more forested areas to be affected by burning and other forest-management activities; but, even then, relatively small amounts of the Forest would be affected, with even larger amounts of forest unaffected and maturing. The net results would be neutral or slightly beneficial effects on the species in the long term.

116. The DEIS states on page III-98, “Under all alternatives the direct and indirect effects of fire management would be the maintenance of upland and bottomland oak-hickory forest communities and habitats, a variety of barrens communities, and openlands and grasslands and the plants and animals dependent upon them.” This appears to contradict the Plan’s direction regarding the removal of oaks to maintain the oak-hickory forest.

RESPONSE:

This statement is entirely consistent with the intent of the Plan to maintain the oak-hickory forest, as shown and referenced in the narratives on pages 90-98, 114-125, 140-143, 249, and in Appendix E and other portions of the document. To summarize for clarification: oak-hickory perpetuation requires adequate amounts of light—usually obtained through moderate canopy openings or removal—and disturbance that helps oak maintain a competitive advantage once established.

FOREST COMPOSITION

117. The EIS and Plan should provide a clearer picture of the long-term vision for the composition of the forest. It should be made clear that there are significant differences between the historic composition of the eastern and western portions of the Forest. It should be clarified that there are ecological land-types in some subsections that were historically beech-maple and that will continue to be beech-maple even under the proposed management.

RESPONSE:

We agree and have included similar statements in the FEIS.

MANAGEMENT INDICATOR SPECIES (MIS)

118. The Forest proposes to reduce the current number of MIS. The proposed list is inadequate. It does not comply with the regulation that sufficient MIS be designated to monitor the condition of the Forest. The need for and the effects of the reduction must be disclosed. The list should be expanded to be more representative of wildlife species, including federally and state-listed threatened and endangered species, amphibians, reptiles and aquatic species. Is the number adequate to monitor forest habitats, including lakes and streams? How does the current list not provide “adequate and appropriate information”? How is a large number a burden on project planning and analysis? Explain the basis for eliminating each species on the current list. Additionally, the Plan should include the requirements of 36 CFR 219.14(f).

RESPONSE:

The regulations at 36 CFR 219.19(a)(1) do not require any particular number of MIS, nor do they require particular MIS for particular habitats. They provide suggested criteria or factors to guide in the selection of MIS. Section 219.19(a)(1) specifically states that MIS from the listed categories are to be selected “where appropriate,” providing discretion to local Forest Service officials. The choice or selection of MIS is within the discretion of the Responsible Official. Simply choosing more MIS for the sake of having a large number is neither wise nor efficient. It is not the number of MIS that is important, but rather the prudent selection of those species that will tell us what we need to know about the effects of management on wildlife populations. Having a large number of difficult-to-monitor species, or “habitat generalists,” is actually counterproductive to the intent of Section 219.19(a)(1). The planning record documents the reasons for our selection of the five MIS for the revised Plan and the rationale for why additional MIS were not identified and selected. This is all the planning regulation requires.

FEIS Appendix F and page 146 provide the rationale for our selection of MIS: We are focusing our monitoring resources on a smaller number of MIS while at the same time expanding other parts of our monitoring program. We are creating a more cost-effective program that will support a better evaluation of management proposals and substantiate management decisions. We have done all this in accordance with the MIS requirements at 36 CFR 219.19(a)(1), in the 1982 planning regulations under which we have revised the Plan.

We have addressed federally listed threatened and endangered plant and animal species and Regional Forester sensitive plant and animal species (RFSS) in the biological assessment and biological evaluation for the revised Plan that is part of the planning record, and in DEIS Chapter 3 (FEIS Chapter 3). These species and their habitat needs were included in Plan standards and guidelines and in the development of management unit guidelines. They also will be monitored by the Forest, the US Fish and Wildlife Service and the IDNR as part of Plan implementation.

Additionally, we addressed in the DEIS nine other, unlisted species of plants and animals with viability risks (pages III-127-136 and Appendix F). These species and their habitat needs were also included in Plan standards and guidelines and in the development of management-unit guidelines. They also will be monitored by the Forest and the IDNR as part of Plan implementation.

The federally listed threatened and endangered species, the RFSS and the additional species with viability risks include state-listed species, many of which are rare and declining and occur on the Forest. Among all these threatened, endangered and sensitive species occur invertebrates (9 species), vertebrates (19 species), amphibians and reptiles (3 species) and aquatic animals (9 species) found in lakes and streams. Among these species and our MIS, we are monitoring and protecting species that represent most classes of animals and families of plants that occur on the Forest and most, if not all, of the habitats and communities on the Forest, including those that would be affected by active management in the Forest Plan. Additional MIS are not needed.

119. The DEIS states, “For over ten years, there has been no management on the Forest and the populations (of northern bobwhite and yellow-breasted chat) are decreasing.” This is unclear. The Forest Service has approved the management of wildlife openings and large openlands for these species.

RESPONSE:

We have edited the text of the FEIS to include the history of openland management (FEIS pages 159-160).

120. The DEIS states, “Overall, implementation of Alternative 3 would indirectly and adversely affect habitats and so result in decreases of both species (northern bobwhite and yellow-breasted chat), especially pronounced in the long term.” How is it that allowing the habitat to reach a natural level can be considered an adverse effect?

RESPONSE:

We are not sure what the “natural” levels of northern bobwhite and yellow-breasted chat were, since “natural” is difficult to measure with certainty in the landscape of the Forest today. Simply leaving ecosystems alone in the highly modified landscape of today is not necessarily “natural” from an ecological perspective. The present landscape of the Forest is one that is highly modified by human developments, including dramatic land-use changes that prevent the inherent ecological disturbances with which our native plant and animal species have evolved. Presettlement land conditions are but one measure in time; however, they are a description of the Forest landscape before industrialized modifications, a landscape that included and evolved with inherent ecological disturbances of native

systems. These presettlement descriptions are more accurate representations of the historical or so-called “natural” ecosystems of the Forest.

Fralish *et al.* (2002) described the presettlement forest and communities of the Greater and Lesser Shawnee Hills on the ridge-tops and south slopes as woodlands or open forests over major areas of these ecological subsections. They also described woodlands and barrens over much of the Cretaceous Hills ecological subsections of southern Illinois in presettlement. These fire-dependent, open woodlands and barrens included native grasses, forbs and shrubs that undoubtedly were the historical habitats for northern bobwhite and yellow-breasted chat.

The Plan would provide approximately 13 percent of the Forest as early-successional habitat during the 15-year life of the plan (FEIS Table 3-15). This amount of early-successional forest, grassland and shrub habitats for early-successional species is reasonable, meets our viable-population management obligations and does not exceed the amount of historical habitat, based upon presettlement descriptions.

Alternative 3 would provide approximately 11 percent of the Forest in the next 15 years and 6 percent in the long term as early-successional habitat. Based upon presettlement habitat descriptions, this appears to be less than the predicted historical habitat amounts for the early-successional species, so our analysis describes this as an adverse effect, especially in the long term.

121. The DEIS states, “Overall, implementation of Alternative 3 would indirectly and beneficially affect habitat quantity, resulting in increases of local populations and population-trends of the mature-forest MIS.” What are the numbers? How many more individuals?

RESPONSE:

The statement is an estimate and a qualitative prediction based on improvements of habitat quantity and inferences from the scientific literature that habitat improvements, especially reductions of forest fragmentation, should result in increases in populations of interior and mature-forest MIS (Robinson, 1997). Actual monitoring of populations and nesting successes as part of Plan implementation would provide the numbers in the future.

Although the comment suggests that the Forest should have exact estimates of increases in the number of individuals of a particular species, this is, of course, impossible to do. Monitoring of actual population numbers is an important part our work each year, but this work only provides a rough estimate of the trend of the population. Analysis of management effects upon population trends—not exact numbers of individuals in a population—is all that is required by 36 CFR 219.19(a)(6). Moreover, neither NEPA nor any other federal law requires a Forest to know with certainty the exact number of individual birds that will be affected by a particular, proposed, programmatic course of action. The information provided regarding population-trend effects under the revised Plan complies with NEPA and the planning regulations.

122. The statement, “The Forest would likely harbor the ‘source’ population for the majority of the MIS in southern Illinois,” seems baseless. Much of the Forest is a population sink and other areas of the country are thought to be the source. Please provide the scientific basis for this claim.

RESPONSE:

The Plan’s estimates of bird population-trends are based upon the best available scientific and monitoring information. The line between “sink” and “source” is not known with exactitude, and the Forest is not required to establish what cannot be determined. The Plan sets forth the best estimate of the programmatic effects upon migratory birds, as required by NEPA and the planning regulation (36 CFR 219.19[a][6]). Identification of whether a particular area of the Forest, or of southern Illinois for that matter, is a sink or source is not required by law. As a practical matter, as our understanding increases of life cycles, habitats and other factors that affect populations, our view of sink and source changes.

We have reviewed evidence that some areas of the Forest, especially on the west side, currently are sink habitats for some interior-bird species. We also have evidence that some areas on the east side are not sinks and appear to be source habitats. The DEIS statement cited is based on future management to reduce forest fragmentation in interior habitats across the Forest. Robinson (1997) states that increasing the size of forest-interior areas by decreasing non-forested land uses in medium-sized habitat-blocks, such as those on the Forest, should improve these habitats and very possibly make them source-habitat areas.

The Central Hardwoods Joint Venture Concept Plan, built by scientists and managers specifically as a regional approach to management for all migratory birds, identified two areas of the Forest, one on the west side and one on the east, as future source habitats for forest woodland birds, including the cerulean warbler, worm-eating warbler, Kentucky warbler, Acadian flycatcher and wood thrush (Fitzgerald *et al.*, 2003). In that plan, landscapes greater than 70-percent forested are capable of producing source habitats for the cited woodland bird species (Fitzgerald *et al.*, 2003). Additionally, recent work by Cottam and Robinson (2004) on the east side of the Forest indicates a much lower rate of parasitism and predation than that on the west side of the Forest in earlier study areas (Trine, 1998). The recent study is based on a small sample of nesting-success data; however, the habitats sampled are indicative of much of the eastern part of the Forest.

Prior to, and with, the revised Plan, we have made interior birds an emphasis in our management across the Forest. We have improved, and will continue to improve, their habitats and populations across the Forest in “sink” habitats by eliminating edge effects through the application of interior-management guidelines and by land acquisition and associated reforestation. We and local scientists (Robinson, 1997) believe that this can work to re-create or maintain source habitats and reduce the number of sink habitats on the Forest for interior bird species. Drs. Robinson and Hoover (DEIS III-224), both noted local ornithologists very familiar with the Forest, helped us to review and build the Plan forest-interior management standards and guidelines that are designed to reduce or eliminate fragmentation problems in our largest blocks of forested land.

123. Regarding MIS population-trends, the DEIS should specify what monitoring has been done. It also should address nesting success, since increased populations of some species could indicate a larger population sink.

RESPONSE:

The DEIS included information on population-trends for MIS based upon breeding-bird survey data (1993-2003) for five routes within the Forest or Forest vicinity, and from bird-monitoring transects on the Forest done (from 1999 to 2003) by Dr. Scott Robinson and associates (FEIS pages 147-149, 234 and Appendix F, pages 111-118). The analyses and summaries of the trend information are included in the planning records. Nesting-success information on some MIS is included in the FEIS (pages 149, 159 and Appendix F, pages 111-118) and discussed in the effects analysis.

124. In addition to monitoring for acres of suitable habitat and populations of MIS, the Plan also should require the monitoring of breeding and reproductive success.

RESPONSE:

We agree. We have included monitoring of nesting success in the monitoring section of the Plan.

125. The DEIS states that implementation of Alternative 3 would “...eliminate early-successional habitat, reducing the amount of oak and hickory, providing a high-density canopy and decreasing the penetration of light to the ground.” What is the scientific basis for claiming that old-growth forests would have a high-density canopy decreasing light penetration?

RESPONSE:

The cited statement (FEIS page 162) was based upon information from Fralish (1997) and Fralish *et al.* (2002). These citations have been included in the FEIS.

126. The DEIS states, “Implementation of Alternative 2 would result in minimal direct effects on any of the mature-forest MIS. Indirect effects would result in more and higher-quality habitat...” What is the scientific basis for these statements? What monitoring data does the Forest Service have to support this? How can the agency contend that removing thousands of acres of mature forest would have minimal direct effects and beneficial indirect effects on these species?

RESPONSE:

The cited statement (FEIS page 152) is an interpretation of the HSI modeling results for the wood thrush, worm-eating warbler and scarlet tanager, documented in FEIS Tables 3-17 through 3-19. The bases for that statement are explained in the FEIS (page 152). The HSI modeling information was based upon the field sampling of wildlife-habitat conditions on over 260 forested and non-forested areas on the Forest in the fall of 2004 (FEIS Appendix F, page 118).

The Plan sets forth a programmatic framework to guide future decision-making. It does not authorize, fund, or carry out timber-harvesting decisions, nor does it propose when, where, or how timber harvest may occur on the Forest. The Plan describes potential management actions and programmatic goals and objectives. It is contrary to fact to assert that the Plan

authorizes removal of “thousands of acres of mature forest” during this 10-15–year planning period.

Very few acres have been harvested over the past decade, resulting in an emerging maple-beech forest with effects on biological diversity and wildlife habitat that were described in the DEIS. We have a baseline understanding of what the effects of little to no harvesting will do for mature forest MIS, but we have also analyzed biological-diversity effects more broadly. Habitat-modeling, supported by field work, indicates that sufficient habitat will be available for mature forest MIS over the planning period. We see no evidence in the comment or elsewhere that would contradict our modeling and monitoring conclusions. Viable populations of mature-forest MIS will be maintained under Alternative 2.

127. In order for the Forest Service to provide sufficient habitat for the breeding success of the species, there must be a fundamental understanding of the territorial requirements of at least the MIS in order to determine sufficiency. The agency’s planning does not address the territorial requirements of birds and other species. This should be done.

RESPONSE:

Territorial information on four of the five MIS—worm-eating warbler, wood thrush, northern bobwhite and yellow-breasted chat—was reviewed as part of the species-viability analysis (planning record). It was also considered and documented for all MIS in Appendix F of the DEIS as part of estimates of individuals or nesting pairs per acre or hectare. This information was considered in the preparation of the effects analysis for those species in the EIS (Widowski personal communication, 2005).

Although we presented territorial information in the analysis, there is no requirement in NFMA or the planning regulation (36 CFR 219.19) expressly requiring consideration of this information. The Plan uses the best available scientific information to address MIS requirements. The comment does not provide territorial information that we failed to consider, nor does it indicate how the territorial information used in the Plan revision was inappropriate.

128. In-field population counts of management indicator and sensitive species should be the basis of ecological planning. Computer models that have not been ground-truthed with many years of actual field data are useless in providing accurate baselines for assessing the effects of proposed actions. The NFMA requires in-field population counts of management indicator and sensitive species to determine the trends of the species in response to management activities. Anything less is not in compliance with NFMA.

RESPONSE:

In-field population counts of MIS and sensitive species are included in the Forest Plan monitoring program. Years of actual population data for the MIS selected in the Plan were used to evaluate and verify modeling results. However, we note that neither NFMA nor the planning regulation require “in-field counts of MIS and sensitive species to determine trends of the species in response to management activities.” The comment conflates the Forest Service sensitive species and MIS programs. Monitoring of the population trends of sensitive species are not addressed in the planning regulations. (See CFR219.19[a][6].)

129. The Nature Conservancy is concerned with the use of the scarlet tanager, wood thrush and worm-eating warbler as MIS. The Forest Service could be setting itself up to appear unsuccessful by the proposed approach to monitoring or measuring the success of the forest-nesting MIS. How common are wood thrushes and worm-eating warblers currently? If they are not common, detecting any kind of trend would be difficult. Perhaps Kentucky warbler (a ground-nester) and Acadian flycatcher (mid-canopy nester) would be better choices. Secondly, how will these species be monitored? By point counts? How widespread would be the point counts? They should be extensive in order to cover annual variations.

RESPONSE:

We appreciate the concern; however, the cited three species are good candidates for MIS, based upon a number of factors discussed in the DEIS (Appendix F). All three species are considered common summer residents in southern Illinois and on the Forest (Robinson, 1996; Robinson and Cottam, 2004). We currently have 25 point-count transects that we are monitoring across the Forest. We also have variable amounts of data on many of these since 1995. All three species are commonly detected on these transects. We have current, actual, population data, as well as habitat information and analysis of population-trend information for the three MIS of concern here. We have a documented history of successful population-monitoring for these MIS and intend to continue to monitor bird populations to gather actual population data over time.

Robinson and Cottam (2004) identify the wood thrush as a key species for conservation planning on the Forest. Two of the three species are declining in the Hoosier-Shawnee Assessment area and, thus, we have concerns for their present and future viability. Therefore, there is a need to monitor and manage for these species in the future.

Both the Kentucky warbler and the Acadian flycatcher are common species on the Forest (Robinson, 1996). They are also common in our monitoring data (Robinson and Cottam, 2004). Population data will continue to be collected on these species, as well as on our MIS, from our bird point-count transects. We plan to continue at least 25 of them scattered across the Forest, in both openlands and forest. We may also add some additional areas in the future to more closely monitor selected pre- and post-project implementations.

Dr. Robinson and his associates have studied the nesting success of almost all the above species and have reported on them in many publications (Hoover and Robinson, 1999; Robinson *et al.*, 1995; Robinson and Robinson, 2001; Trine, 1998). We have included nesting-success monitoring with population (point-count) monitoring as part of Plan implementation. This will give us added information on nesting success, along with population levels, and enable us to better determine the long-term viability of species on the Forest and successes of our management actions.

130. What will be the system for monitoring the status of non-native and native invasive species on the Forest? Perhaps a good management indicator species would be one of the invasives.

RESPONSE:

The Plan includes annual monitoring of non-native invasive species by a variety of monitoring activities. We focused our selection of MIS on natives that relate to the habitats of most importance upon which many species depend, could be most affected by

management actions and are associated at this time with credible monitoring protocol (FEIS Appendix F). Because the 1982 planning rule (36 CFR 219.19[a]) specifies the establishment of objectives for the maintenance and improvement of MIS habitat, we do not think that the identification of a non-native invasive species as a MIS is appropriate.

131. The SNF may be able to achieve greater abundance of management indicator species, including yellow-breasted chat and northern bobwhite, and recreationally important species such as wild turkeys, while sacrificing little interior area for mature-forest management indicator species, including scarlet tanager and worm-eating warbler, by transitioning gradually from forest habitat into open woodland and successional habitat on all uplands.

RESPONSE:

The resource management described in the Plan framework, including prescribed burning, is likely to result in complexes, or a mosaic, of forest habitats that transition from mature forest, open woodland and early successional forest. Our forest-interior management guidelines (Plan pages 45 and 46) range from shelterwood harvest with reserves on ridge-tops and adjacent upper slopes to limited or no harvest or only thinnings on adjacent lower slopes, coves and bottoms. This would create transitional habitats of open woodlands and early-successional forest grading into mature forest, especially when coupled with prescribed burning in these same areas. The results would be similar to what is being proposed. We also have the opportunity to provide similar habitat complexes in areas where pine plantations would be managed with shelterwood with reserves and prescribed burning adjacent to existing mature forest. The HSI model results for yellow-breasted chat and scarlet tanager in Alternative 2 predict the benefits for these species from planned management, similar to that described in the comment.

MIGRATORY BIRD TREATY ACT

132. Burning during the nesting period could have adverse effects on migratory birds, as well as many other species, particularly if done on a landscape scale with several thousand acres affected. Assuming such burns would be a rare event, most migratory bird populations should be able to sustain the losses. However, the Forest should develop specific criteria that would dictate the timing and frequency of growing-season burns to ensure that effects are minimized.

RESPONSE:

Under the Plan, about 12,400 acres, or four percent of the Forest, could be affected by prescribed burning annually. The vast majority of the Forest (96 percent) would not be affected at any one time, so the vast majority of migratory birds would not be affected. The Plan does not, however, authorize, fund, or carry out any prescribed burning. Rather, it provides a programmatic framework of direction that allows for future site-specific decisions that are likely to include the continuation of prescribed burning on the Forest. Site-specific analysis guided by the Plan, as well as years of experience with prescribed burning and monitoring information, would indicate where, when, and how prescribed burning is used on the Forest. The Plan is not self-executing, but anticipates site-specific environmental analysis, public participation and decision-making prior to any on-the-ground disturbance involving prescribed burning.

Almost all burning under the Plan would be outside of nesting seasons for native birds, October 1 to March 31, because weather and fuels are more conducive for burning during that period. Some small amounts of burning could be done in April and early May and still smaller amounts from August 1 to September 30. These latter small amounts of burning are needed in some areas of the Forest to reduce woody encroachments in grasslands or to improve oak-hickory management by reducing competitive, shade-tolerant, thin-barked species such as sugar maple. Growing-season burns work best at controlling woody encroachment in grasslands and forests.

The Plan also includes guidelines to lessen the effects of burning on migratory birds during growing seasons: Growing-season burns should be done as early or as late in the growing season as possible (preferably from April 1 through April 15 and after August 1) to avoid effects on nests and nestlings of migratory birds. These growing-season dates are well before or well after most species of migratory birds have either started or completed nesting in southern Illinois (Robinson, 1996). Prescribed burning in the Cave Valley management area, the most important nesting-area on the forest for the migratory cerulean warbler and Swainson's warbler, both Regional Forester sensitive species, would be prohibited from April 1 through July 15 (Plan page 58) primarily to protect any nesting Swainson's warblers from disturbance. We have given much consideration in the Plan to lessening or eliminating the direct effects of prescribed burning on migratory birds.

133. The proposed timber-management practices and normal operating season discussed in the proposed Plan standards and guidelines for these activities would result in the loss of migratory bird nests and/or young. This would affect migratory birds that nest in the canopy, sub-canopy and ground layers. Direct loss could occur due to the death of individuals. Additionally, sub-canopy and ground-layer nesting species could be affected either directly or indirectly through changed habitat characteristics that could alter foraging habitats or influence nest-predation.

RESPONSE:

The DEIS included statements about possible, direct, adverse effects on some individual migratory birds as a result of timber-harvest actions (FEIS pages 150, 152, 154, 155). We have increased the discussion of effects to include more detail, as suggested by the US Fish and Wildlife Service. We have also added a more detailed discussion of effects in the Forest Interior Habitat section (FEIS pages 237 through 243).

134. The Forest Service must comply with the Migratory Bird Treaty Act. An alternative should be developed that does not allow timber removal during the nesting season. A supplemental DEIS should be prepared to include this alternative.

RESPONSE:

The Forest has taken, and continues to take, many planning and administrative actions to conserve populations of migratory birds as part of Plan revision. We are complying with Executive Order 13186 that directs all federal agencies, including the USDA Forest Service, to work with the US Fish and Wildlife Service to conserve populations of migratory birds.

The Forest has historically been a leader in Illinois and the Midwest in management to benefit and conserve many species of migratory birds on the Forest. The 1992 Plan included forest-interior management units to reduce fragmentation and benefit the

Neotropical-migrant bird species that benefit from management of large, unfragmented blocks of hardwood forest. The revised Plan could expand the amount of the Forest on which we will emphasize management to reduce forest fragmentation and improve forest diversity for migratory birds, especially those that need unfragmented forest (Plan pages 45-46). This expansion represents an 89-percent increase in habitat, or 99,400 acres managed with emphasis for migratory bird species that are primarily forest-interior species, versus 52,700 acres in management areas that benefit forest-interior, migratory birds in the 1992 Plan. The Plan also emphasizes management for both resident and migratory grassland birds with the inclusion of the Large Openlands management prescription and its direction and guidelines.

We used the best science available to develop the Plan management strategies and direction for migratory birds. We were assisted by avian, wildlife and forestry scientists, researchers and managers from the University of Illinois, Southern Illinois University, US Fish and Wildlife Service, the IDNR and Illinois Natural History Survey, The Nature Conservancy and the Forest, all with local experience on the Forest and in southern Illinois (planning record). Major threats for all the Neotropical, migratory bird species were identified as habitat loss and fragmentation. Plan management directions and strategies evolved as countermeasures to these major threats by ensuring forest interior, early-successional forest and grasslands in the Hoosier-Shawnee ecological assessment area.

We have consulted with the US Fish and Wildlife Service on our proposed management of migratory birds (planning record) and have received no indication that possible Plan actions do not comply with the Migratory Bird Treaty Act and meet fully the intent of Executive Order 13186. DEIS Alternative 3 does not allow any timber removal. This adequately portrays the effects of no timber removal during the nesting season on migratory birds.

The comment presumes that the Migratory Bird Treaty Act applies to a programmatic land management plan developed by a federal agency. While we have, as described above, taken migratory bird conservation very seriously in the development of the revised Plan, we do not believe that the Act applies to this type of federal action. Since the 1992 Plan amendment, courts have held that the Act is a hunting and poaching statute that was not intended by congress to apply to the land-management-planning context. Indeed, the Multiple Use Sustained Yield Act and the NFMA, enacted subsequent to the Migratory Bird Treaty Act, both contemplate the harvest of timber without seasonal restrictions for migratory birds. No provision of the Plan was developed to directly take migratory birds. Moreover, we have taken reasonable precautions to mitigate any indirect effect on migratory birds; bird conservation is of paramount importance to the Forest. Additional mitigation, and consideration of a seasonal restriction on actions, may be considered, as appropriate, during project-level decision-making.

MODELING

135. Alternative 2 proposes to remove many pines. Do the models indicate that this will eliminate the pines, or do they acknowledge that, when the Forest Service removes pines, pines return?

RESPONSE:

The HSI model assumptions (planning record) imply that the future condition in former pine plantations following shelterwood-with-reserve treatments would be hardwood-dominated areas with some pine remaining in the overstory, similar to what has already been implemented on the ground in the south Pope and One Horse Gap areas of the Forest. Shelterwood-with-reserves harvests for visual-quality purposes were done in these areas of the Forest in the late 1980's and early 1990's. There has been some pine regeneration in these areas, predominantly in places disturbed by skid trails and landings; but, for the most part, understory hardwoods were released and now dominate the overstory.

MONITORING

136. Data on the nesting success of target species, or of species that would likely represent what the nesting success is of a particular target species, is necessary to speak to the quality of the habitat and the effects of particular management actions on bird populations. Census data is valuable in that it can indicate how many species are present (biodiversity) and how abundant is each species (density), but data on nesting success is critical for a true habitat evaluation. The goal is to have birds present at stable or increasing densities, with areas within the Forest having reproductive success at or above levels associated with source habitat. Accordingly, the monitoring protocol should include not only bird surveys and census, but also some attempt to determine reproductive success.

RESPONSE:

We agree. We have included monitoring of nesting success along with population counts in the monitoring section of the Plan.

137. Breeding-bird survey data from a few routes that may only touch upon the Forest are probably not accurately portraying what is happening to numbers of birds within the Forest and will be a poor indication of how local or Forest-wide management is affecting the quality of habitat.

RESPONSE:

We looked at a variety of population data to determine both the local and regional population trends of our MIS species (FEIS pages 34-37 and Appendix F, pages 111-118). This included a look at local breeding-bird survey data from the vicinity of the Forest. This latter dataset was the oldest data and we used it as one measure of past, baseline populations for the species around the Forest before we began active management for forest-interior species. It is common scientific practice to extrapolate from datasets for similar habitats or vicinities and to draw some conclusions for a much larger area. We are relying more on bird-monitoring transects on the Forest for present and recent-past (since 1995) population inferences and trends. We know that the breeding-bird survey data is not perfect and that there are not many routes, some of which do not include the Forest;

however, it is among the best data from the pre-1986 era for the Forest vicinity on breeding, migratory birds.

Neither NEPA, nor NFMA, nor the planning regulations define or specify the use of particular datasets. The Forest is required to use the best available scientific data, which we have done. We have disclosed the weaknesses of this information, as well as the uncertainties, if any. The comment does not specify data that we failed to consider, or indicate where better information might be found. This is because we did, in fact, use the best field information on migratory birds in the state. We have used all the information available from state agencies, as well as our own monitoring information. The Forest has limited resources; but, even so, we have dedicated tens of thousands of dollars annually to the collection of basic resource data. The record documents our success in monitoring and inventorying Forest resources.

In a perfect world there would be perfect information—detailed, current, without error. But we do not live or develop land management plans in a perfect world and do not have perfect information or abundant funds or time to collect ever more information. Federal law requires the Forest to use the best information available, not develop new and better information. The record demonstrates that the Forest has adequate information to develop a programmatic framework for management over a 10-15 period. No ground-disturbing actions are authorized by this decision. Additional field data will be collected during the development of site-specific projects. The Plan uses the best scientific information available, and we have received no evidence to the contrary, in this comment or elsewhere.

138. The Forest Service should commit to the use of actual population data, not computer models.

RESPONSE:

We have used some of both in the EIS analyses (FEIS pages 147-149, 236) and are confident that this combination of habitat modeling and measures, combined with population-trend data, is the best measure of the effects of Forest activities. Habitat analyses are especially important since we are primarily habitat managers and can influence habitat most directly by our planned actions. We also believe that the HSI model is a good and accepted measure of habitat quantity and quality for the Forest (FEIS Appendix F).

Modeling used to develop the Plan was evaluated with field observations and professional experience during development of the 1992 Plan amendment. The limits of the model were disclosed, as were the assumptions underlying the model. The HSI model was used as intended, i.e., to forecast the habitat implications of various management alternatives. Neither NEPA, nor NFMA requires the Forest to rely exclusively on actual, wildlife-population data to disclose environmental effects. To the contrary, NFMA regulations contemplate the use of computer models in the development of forest plans. The Forest has implemented an aggressive resource-monitoring program since adoption of the 1992 Plan and the record documents the success of that program, including the collection and evaluation of volumes of actual, wildlife-population data. We have seen no evidence that we used models inappropriately in lieu of data; to the contrary, the planning record documents the integrated use of both habitat and population data in Plan revision.

139. Reptile and amphibian populations have been declining worldwide. Effects on these species should be evaluated. Baseline data should be gathered Forest-wide and a monitoring plan developed. Research indicating that timber removal adversely affects salamanders should be considered.

RESPONSE:

We have addressed effects on various reptile and amphibian species throughout the EIS and Plan, including in the monitoring plan (FEIS pages 131-133, 143, 204, 208-210, 222-226, Appendix F, page 120; Plan pages 74, 82, 102, 103 and Appendix H, pages 193-195). We have baseline data on amphibian use of ponds and waterholes (O'Neill, 1998) across the Forest and are expanding this to include reptile and amphibian population-monitoring in Forest wetlands.

We do not address salamanders specifically in effects analyses; however, we address the mature-forest habitats where they exist in the effects analysis for mature-forest MIS (FEIS page 150, 152-153, 154, 155). No salamander species are federally listed as endangered or threatened, none is identified as RFSS, and only one on the Forest, the dusky salamander, is considered rare. It is known from only one localized area of the Forest that is minimally affected by Forest management. All other salamander species on the Forest are considered common (Phillips *et al.*, 1999) in spite of past timber-harvesting actions (pre-1992) that were more common and widespread than those currently planned.

We reviewed recent research on the effects of timber harvesting on salamanders (Herbeck and Larsen, 1998). It is clear from this study and others it references that salamander populations are lower in harvested areas than in unharvested areas. This is similar to the effects of harvest on mature-forest MIS in localized areas. However, overall, across the Forest, harvest would occur on less than half the Forest over the next 50 years (Spectrum model, planning record) and so few acres annually (0.4 to 0.7 percent of the Forest) that effects on salamanders in the short and long terms would be similar to the effects on mature-forest MIS. More forested areas would mature than would be harvested under all alternatives and result in more old-growth forest than currently exists (FEIS Table 3-15). Riparian filter-strip standards and guidelines under all alternatives would maintain the integrity of the more-mesic habitats that are generally the highest quality habitat for salamanders.

Even though salamanders could be adversely affected by timber harvests in the short term, species would be maintained in viable numbers on the Forest by Plan implementation as mature-hardwood forest acreage would increase or decline slightly (no more than four to six percent) in the long term (FEIS Table 3-15) and old-growth hardwood-forest habitats (high-quality habitats for salamanders) would increase substantially compared to current conditions (FEIS Table 3-15).

140. Many early-successional species are at unnaturally high levels due to bad land management, over-cutting and other activities. It is natural to expect their populations to decrease when the land heals and forests mature. The Forest Service should not undertake activities that provide habitat for these species, particularly providing fields of non-native species or row crops. The Forest Service should allow the land to support more-natural levels of these species.

RESPONSE:

We do not agree that *many* early-successional species are at unnaturally high levels due to bad land management and over-cutting. We acknowledge that some, such as the white-tailed deer, are at higher levels than they may have been historically. However, many are considered rare and/or dramatically declining in the Hoosier-Shawnee ecological assessment area. These include migrant and resident bird species such as the northern bobwhite, Bachman's sparrow, migrant loggerhead shrike, Henslow's sparrow, yellow-breasted chat, prairie warbler, American woodcock and blue-winged warbler, to name a few (McCreedy *et al.*, 2004). Some of the above species are RFSS and others are species with viability risks (FEIS pages 146-169).

We are charged by NFMA with maintaining viable populations of all native vertebrates. As such, we are required to manage for all species, early- and late-successional and forest species alike, and especially rare species such as RFSS. We are not intentionally managing to increase or maintain unsustainably high levels of early-successional species, such as the white-tailed deer. Our concern is with those species whose populations are at risk and are truly dependent upon high-quality, early-successional habitat, as noted above.

The planting of milo or sunflowers in our large openlands management areas to be left standing/unharvested provides a much-needed winter food-source for many declining, early-successional, bird species. This food-source is not present in any quantity on private lands in southern Illinois and, although both milo and sunflowers are non-native species, they are not invasive. Some of the plantings are an intermediate step in the conversion of non-native grasslands to native grasslands, utilizing cultivation in place of herbicides to reduce the non-native grassland acreage prior to planting with native species. The plantings are also a way of providing early-successional grassland/shrubland habitats within larger expanses of late-successional perennial grasses.

Presettlement periods can be considered "more natural" ecological periods (Fralish *et al.*, 2002). Early-successional forest, open woodlands and barrens are current and historical habitats for many of these species, and appear to have been common in the southern Illinois landscape of presettlement periods (Fralish *et al.*, 2002). Most of these habitats are not common today. They have been replaced only partially in the Forest landscape by farms and fields and their edges (Brennan, 1999).

NATURAL COMMUNITIES

141. Hill prairies and shale glades should be included in the Plan. Hill prairies and glades are mentioned early in the Plan, but there seems to be no discussion later. Are they called something else in the Plan? The management prescription for the maintenance and restoration of Ozark Hills-type loess barrens (Plan Appendix E) would be beneficial for hill prairies and shale glades, but this is not specifically stated. If this management is intended to apply to the hill prairies and glades, it should be specified.

RESPONSE:

Hill prairies and glades are considered part of barrens communities in Plan Appendix E. We have added distinct references to each to ensure that the reader will be able to identify these unique community-types in the Plan.

142. The DEIS states, “Management under all alternatives would maintain the habitats and communities in their current conditions during the first 20 years of the planning period...” and, “Alternatives 2 and 4 would maintain the greatest amount of the oak-hickory forest-type and the species dependent upon it. They would maintain the communities, vegetation types and successional stages important to all native species on the Forest, including many at-risk species.” Where does the DEIS provide the scientific analysis to support these claims? How is the Forest Service able to assert this when the alternatives do not have enforceable guidelines?

RESPONSE:

The statement is based on information in FEIS Table 3-15, which is derived from the Spectrum model results for the existing situation and alternatives in both the short and long term. This modeling, supplemented by field observation and experience working under the 1992 Plan for nearly 15 years, indicates that adequate habitat will be available under Alternatives 2 and 4 for native wildlife species, including at-risk species. These alternatives focus upon providing oak-hickory habitat—the best habitat for both biological diversity and wildlife (Fralish *et al.*, 2002). The best scientific information indicates that arresting the succession of the Forest to maple-beech is the best thing we can do to help at-risk wildlife species. Thus, we collaborated with state and university scientists, as well as other resource professionals, to develop the programmatic framework of the Plan that is intended to protect migratory birds and other wildlife of concern. At the same time, the Forest has worked to provide multiple-use resources, such as recreational access. The revised Plan balances competing public desires for use and protection.

On the enforceability of guidelines, see Response 291.

143. The DEIS should address what is considered a “natural” level of species. Many species are present in high numbers due to past bad management practices. The lowering of their populations should be considered a good thing (e.g., in the case of the cowbird).

RESPONSE:

We are not required to consider a “natural” level of species in any of our planning regulations. We are required by NFMA to maintain viable populations of all native and desirable non-native vertebrate species in the planning area. We have discussed viability in the FEIS (pages 164-172). As stated above in another comment, “natural” is a concept that is extremely hard to define and manage for, especially in the context of the highly modified environments of the Forest in the 21st century.

We agree that some native plant and animal species, such as the cowbird, may be present on the Forest in higher numbers than in presettlement periods. We agree that lowering the populations of cowbirds is beneficial and have included plans to reduce their edge habitats in forest-interior areas.

NON-NATIVE INVASIVE SPECIES

144. The Plan should provide for the monitoring of invasive species to determine the activities that promote their introduction and spread.

RESPONSE:

This is provided for in Plan guideline FW34.2.2 and in the monitoring requirements.

145. The DEIS states that, “Under all alternatives, existing roads could provide opportunities for the dissemination of non-native invasive species and the displacement of native species. This adverse, indirect effect can be mitigated as described above in the discussion on non-native invasive species.” The EIS should discuss and quantify the effects that prohibiting ATV/OHM have on preventing the spread of invasive species.

RESPONSE:

We have added a discussion to the FEIS regarding ATV/OHMs and the spread of non-native invasive species.

146. The DEIS discussion of non-native invasive species is meaningless without identifying the subject species. The Plan should define what is meant by “invasive species” and include a listing of them in an appendix. Should additional species be found to meet the Plan’s definition, they should be added to the list. The list should be reviewed annually. The Plan should also require that all project-level environmental analyses address any effects a proposed project would have on the introduction of invasive species.

RESPONSE:

We disagree. The EIS presents some of the most common and problematic species that were identified in the *Hoosier-Shawnee Ecological Assessment* (Olson *et al.*, 2004). We have approached the subject in general terms for this programmatic analysis. Specific species to be controlled would be addressed at the project-level analysis. We prefer to continue to gather information about non-native invasive species problems on the Forest and to monitor the situation as part of our monitoring program.

OAK-HICKORY FOREST

147. The Forest Service should prepare a supplemental DEIS disclosing which species the agency contends are dependent on oak-hickory and the basis for the claim. The previous basis given seems to violate NEPA and the USDA data quality guidelines. Mere use of a habitat by a species does not indicate the species is dependent on it.

RESPONSE:

Our definition of “dependent” is from the dictionary: “relying on or requiring something for support.” Based on that definition, our use of the word “dependent” is appropriate for animals whose life-history requirements (one or all) include oak-hickory forests for breeding, feeding and/or resting. There are many native animals that rely on the oak-hickory forest on the SNF for all or part of their breeding, feeding and resting.

148. The DEIS does not adequately discuss the role of trees other than oaks in the ecosystem. The DEIS and Plan give the impression that oaks are the only plants that provide food for wildlife. This is false. In fact, although oaks do provide a very important winter food source in some years, they do not provide much food during the summer. Trees such as elms, maples, mulberries, dogwoods, hackberries and others provide this important function. Their importance is de-emphasized in the documents, while the importance of oak is over-emphasized. For example, what support is there for the assertion that a shelterwood harvest is more biologically diverse than an old-growth beech-maple forest? What is deficient about an old-growth beech-maple forest?

RESPONSE:

Elms, maples, mulberries, dogwoods, hackberries and ash are common species in the understories of the Forest. Elms, maples, mulberries and ash produce soft-mast seed or fruit primarily in the summer. Dogwoods and hackberries produce a seed that stays on the trees through winter; however, the seeds are small in comparison to acorns and hickory nuts. Seedlings and saplings of all of these species survive well under full canopies and thus are considered shade-tolerant. These species produce soft mast that is a food source for forest wildlife. However, most, except for dogwoods and hackberries, produce their foods in summer when many alternate food sources (herbaceous plants and invertebrates) are also abundant and available to forest wildlife (Healy and McShea, 2002).

On the other hand, oak and hickory mast is indeed a very important fall and winter food source at a season when other foods (most soft mast, herbaceous foods and invertebrates) are generally unavailable (Healy and McShea, 2002; Rodenwald, 2003). Therefore, oak and hickory mast is more important, or limiting to survival, abundance and reproduction for some forest animals. Most soft-mast species are presently in no danger of being lost from much of the Forest, while oaks and hickories may be lost without our planned management (Fralish *et al.*, 2002).

According to Fralish (2004), and based on his work in southern Illinois and throughout the Hoosier-Shawnee ecological assessment area, oak-hickory stands with a maple-beech understory of saplings and small trees show a 90-percent drop in plant-species richness and cover due to losses in photosynthetic radiation and increases in litter-weight at ground level. In light of this, it would be reasonable to expect that an old-growth, beech-maple forest with an understory of maple-beech saplings and small shade-tolerant trees would produce similar results and a subsequent loss of biodiversity. The deficiency in the old-growth beech-maple forest is the lack of light on the forest floor and the subsequent lack of shade-intolerant plants (Fralish, 2004). Less plant diversity generally translates indirectly into less animal diversity. Rodenwald and Abrams (2003) have documented that the total abundance and species richness of birds in maple-dominated forests is 50-to-200-percent less than that in oak-dominated stands in the same landscape.

Old-growth beech and maple have less coarse, woody debris than old-growth oak forests because oak and hickory decay-rates are slower (MacMillan, 1988). Thus they would have fewer ecological disturbances such as fire because their debris is more fire-resistant and decomposes quickly. These habitat and ecological factors contribute to ecological deficiencies of old-growth beech-maple forests dominating on historical oak sites.

Based on all of the above, it is reasonable to conclude that oak forests growing on historical oak sites are more biologically diverse than old-growth, beech-maple forests growing on the same sites. This conclusion is included in our effects analysis and comparisons between forests dominated by beech-maple in the overstory versus oak-hickory.

149. The DEIS states, “Restrictive management under all alternatives would provide for mature and old-growth hardwood forest habitats, with the most provided under Alternative 3—in 100 years, about 261,000 acres, or 92 percent of the Forest.” If 30 percent of the forest is going to die and convert to beech-maple in the next 100 years, how could there be trees on 92 percent of the Forest old enough to be considered old growth?

RESPONSE:

The cited statement should have been: “...with the most provided under Alternative 3—in 100 years about 224,000 acres, or 79 percent of the Forest.” We have corrected it in the FEIS (page 136). The statement refers to the data in FEIS Table 3-15 that were based for the most part upon Spectrum model information, where available. This included how much old-growth, deciduous-hardwood forest (over 150 years old) there would be on the Forest in the future under each alternative.

150. The DEIS states, “These alternatives (2 and 4) would also maintain the most (70 percent of the Forest) oak-hickory-dominated forests in the long term for the species dependent upon this habitat.” A few paragraphs earlier, the DEIS claimed 100 percent would be maintained. Which is correct? Of Alternative 3, the DEIS states, “Of all the alternatives, this alternative would maintain the least amount (40 percent of the Forest) of oak-hickory forest in the long term.” A few paragraphs earlier, the DEIS stated “...70 and 60 percent...” Which is correct?

RESPONSE:

Both statements are correct in the context in which they were written. The commentator takes them out of context and, so, misinterprets them. The DEIS (FEIS page 137) stated that Alternatives 2 and 4 would maintain 70 percent of the Forest as oak-hickory (FEIS Table 3-15): Under Alternative 2, 196,200 acres out of 284,600 acres (approximately 69 percent, rounded to 70 percent, of the Forest) in the second decade and, under Alternative 4, 194,300 acres out of 284,600 acres (approximately 68 percent, rounded to 70 percent, of the Forest).

We stated that Alternatives 2 and 4 would maintain *over* 100 percent of the existing oak hickory habitat in the long term. This statement refers to figures in DEIS Table 3-14 (FEIS Table 3-15) and our expectation that these alternatives would maintain 197,300 acres and 199,200 acres of oak-hickory, respectively, in 100 years, compared to the 192,800 acres of oak-hickory forest that is the existing condition. Mathematically, the 197,800 acres under Alternative 2 represents about 102 percent of the total 192,800 acres of oak-hickory, which we rounded to 100 percent, and the 199,200 under Alternative 4 represents about 103 percent of the 192,800 acres, which we also rounded to 100 percent.

The next statement in the comment is also taken out of context. We stated in the DEIS that in 100 years Alternative 3 would maintain 139,700 acres of oak-hickory forest out of the total Forest acreage of 284,600. This refers to data in DEIS Table 3-14. 139,700 acres is approximately 49 percent of the 284,600 acres, which we rounded to 50 percent. The

statement in the FEIS (page 138) now indicates that Alternative 3 would maintain the least amount (50 percent of the Forest) of oak-hickory in the long term.

We also stated in the DEIS that Alternative 3 would maintain 70 percent of the existing oak-history forest in 100 years (131,400 acres) and 60 percent in 150 years (about 115,800 acres). This reflects the data in FEIS Table 3-15 and Spectrum model information (planning record).

151. The DEIS states, “Alternatives 2 and 4 would maintain almost 100 percent of the existing oak-hickory forest habitat and community in the long term (100 years), while Alternatives 1 and 3 would maintain less—7 percent and 30 percent less—respectively.” It also states that, “Alternative 3 would maintain the oak-hickory forest on only 10,000 acres of natural areas and dry sites, as a result of natural, wind events, or about 70 and 60 percent of the oak-hickory forest in 100 and 150 years, respectively, following implementation.” Please provide the scientific basis and monitoring data for these claims.

RESPONSE:

The numbers in the statements in the above comments are based upon data and assumptions in the Spectrum model and its outputs, most of which form the basis of what is reported in FEIS Table 3-15. Some of the information in Table 3-14 was based upon queries of the data within the Forest vegetation database. Both are simple mathematical interpretations of existing and modeled data based upon actions or inactions proposed under each alternative.

The percentage statements in the first sentence of the comment were based upon Spectrum model projections and data in DEIS Table 3-14 (FEIS Table 3-15) and basic math associated with those numbers. The Spectrum model is a vegetation growth and optimization model based on simple aging of forests and assumptions based upon local scientific information: Maple now dominates the understories of all but the driest oak sites and will assume canopy dominance once the oak overstory dies (Fralish *et al.*, 2002).

The statement that Alternative 3 would maintain only 10,000 acres of oak forests in natural areas and dry sites is based upon the facts that the alternative would allow prescribed burning only to maintain oak woodlands in natural areas and that only oaks on xeric sites outside of natural areas, and in tornado or wind damage events, would maintain canopy dominance without fire disturbances. These assumptions were built into the Spectrum model (planning record) vegetation growth and optimization model and resulted in 139,700 acres of oak-hickory forest remaining in 100 years out of the 192,800 acres of existing oak-hickory (FEIS Table 3-15), or about 73 percent, rounded to 70 percent, of the existing amount, and 115,800 acres in 150 years (Spectrum Model, planning record), about 60 percent of the 192,800 acres of existing oak-hickory.

OAKWOOD BOTTOMS GREENTREE RESERVOIR

152. Some disturbance-regime is encouraged for Oakwood Bottoms, whether prescribed burning or timber removal, in order to set back succession and support oak-hickory regeneration.

RESPONSE:

The floods of 1993 and 1995 resulted in heavy disturbances in the overstory and vegetation dominance at the Oakwood Bottoms Greentree Reservoir. We have determined from field evaluations that there is no opportunity in this planning period (15 years) to remove any additional overstory trees and still retain some oak, mast production and native seed sources for reforestation of the area. We plan instead to use prescribed burning and timber-stand improvement as disturbance factors to augment flood disturbances and maintain oak dominance into the future.

153. Oakwood Bottoms seems to be managed basically as a pin-oak monoculture. The EIS should address the effect of this management on biodiversity. A supplemental DEIS should consider alternative management for the area that would result in a more diverse forest and the effects of this on biodiversity.

RESPONSE:

We disagree. The oak dominance of this area is a result of soil-type and past disturbance factors in Oakwood Bottoms Greentree Reservoir and is part of the overall diversity of floodplain forests on the SNF (Fredrickson and Lauhban, 1990). The contribution of the area to biodiversity on the Forest is highlighted by the endangered and threatened species, RFSS and species with viability concerns that are relatively common in Oakwood Bottoms. These include Indiana bats, bald eagles, timber rattlesnakes, *Eleocharis wolfii*, redheaded woodpecker, river otter, rice rat, yellow-crowned night-heron and red-shouldered hawk, to name a few.

154. Plan guideline MO 26.4 should be eliminated. This management may be appropriate in many areas, but there are trade-offs. Managing for waterfowl habitat generally conflicts with managing for fisheries and species like salamanders. Often, waterfowl management is actually management to facilitate hunting, and this also has trade-offs. Rather than make this decision in the Plan, the EIS should address the trade-offs programmatically. The Plan should offer a general guideline as to what percentage of the areas will be managed for which resource. While some should be managed for waterfowl, some should be managed for things like fisheries.

RESPONSE:

The Mississippi and Ohio Rivers floodplains management area prescription includes provisions for fisheries management (Plan guideline MO26.3), as well as ephemeral and permanent wetlands (Plan guidelines MO25.1 and MO26.1). This variety of wetlands will provide a diversity of habitats for many native, wetland species, including salamanders and other amphibians, as well as fish, reptiles, waterbirds and shorebirds, resident and migratory songbirds, mammals and invertebrates.

We have clarified the direction of Plan guideline MO26.4 to state that the area “may” be managed for waterfowl, allowing active management specifically for waterfowl where and

when needed. To date there has been no active management of wetlands for waterfowl in these areas. The majority of wetlands and other habitats in the area will be passively managed after their construction to benefit all native, wetland species in the management area. To date we have observed only positive use, specifically recolonization, by wetland species, including some fish, native amphibians, reptiles, mammals and birds, including songbirds, waterbirds, shorebirds and waterfowl. Plan direction allows management for all native, wetland species.

155. The “Oakwood Bottoms Greentree Reservoir Wildlife Management Plan” should be offered for public comment and included in the Plan. No comment can be made on the Oakwood Bottoms management prescription guidelines since this management plan is not available.

RESPONSE:

The Oakwood Bottoms Greentree Reservoir Management Plan, prepared by Dr. Leigh Fredrickson and Maury Lauhban, is included in the planning record and available on the Forest website and to the public on request. Dr. Fredrickson is considered the national expert on the management of greentree reservoirs and prepared the handbook for their management that is used by the US Fish and Wildlife Service. All of the general provisions of the management plan are included in the Forest Plan MO management prescription. The management plan includes more details on the management of the vegetation, water and future development-needs of each management unit within the 3,400-acre greentree reservoir.

OLD-GROWTH FOREST

156. It is critical that commercial logging not be allowed on the Forest. All of the Forest should be managed so that it can revert to old growth (160 to 200 years). Currently, private timberland in Illinois produces a sufficient amount of 60- to 80-year-old saw logs. Old growth will be of extremely high value in the future, providing expansive, wild, natural areas with large-diameter trees. Both environmentally and economically, a mature, old-growth SNF would provide the most benefit to citizens. Very little old-growth forest exists in Illinois today and the SNF is the only place where such a forest could emerge over time. The Forest Service should be bold and manage for a restoration of old growth.

RESPONSE:

We have evaluated an alternative that includes no commercial logging on the Forest (DEIS II-4). It was not the alternative selected as the Forest Plan because it failed to aid in essential oak-hickory forest regeneration. Old-growth hardwood forests (greater than 150 years) would be present under all alternatives in the long term, with the most occurring under Alternative 3 (FEIS Table 3-15). Old growth would be present on the Forest in the future as a result of management under the Plan. While there are no old-growth hardwoods on the Forest currently, implementation of the Plan would result in old-growth hardwood forest on 46 percent of the Forest, or 131,000 acres, in the long term.

157. The DEIS states, “Existing biodiversity would decline to some extent under all alternatives, considering the general decline of the oak-hickory and early-successional forest communities and habitats, with the least decline expected under Alternatives 2 and 4 and the most under Alternative 3.” The Forest Service provides no science to support this

claim. Old-growth forests are more biologically diverse than cut-over forest and fields of non-native grass. What science has the Forest Service to dispute this?

RESPONSE:

Our discussion of the effects on biodiversity is based on the definition we provided in the DEIS (FEIS page 126): “Biodiversity, simply stated, is the variety of life and living things and the many processes associated with them.” Biodiversity is not just the sum of all these factors but also includes their distributions and geographical interrelationships. We agree that there is no easy or one measure of biodiversity; however, statements in the FEIS are based upon mathematical information and projections that indicate some alternatives would conserve more of the biodiversity factors on the Forest than others. They are also based on the fact that some alternatives more than others maintain more of the parts and functions of biodiversity in locations and distributions similar to what we, and most scientists, believe is closer to how and where they occurred in the naturally functioning ecosystems pre-European settlement (Fralish *et al.*, 2002; Parker and Ruffner, 2004).

158. All old-growth opportunities should be evaluated independently of potential timber stands. Opportunities should be based on both landscape and structural characteristics. Any stand that meets either or both characteristics should be designated old growth. Riparian areas deserve priority for inclusion in old-growth designations to promote watershed protection and wildlife benefits.

RESPONSE:

Old-growth forests, as defined in the *Hoosier-Shawnee Ecological Assessment* (Parker and Ruffner, 2004) are greater than 150 years old. We have used this definition to describe old growth on the Forest. Presently there are no tree-stands on the Forest over 120 years old, according to our vegetation database and, thus, none that would be over 150 years, no matter what the management 20 years from now. FEIS Table 3-15 reflects this for all alternatives. One hundred years from now, forested areas not modified by timber management would be old-growth by definition. This is similarly predicted in the *Hoosier-Shawnee Ecological Assessment* (Parker and Ruffner, 2004). Riparian forests, if they meet the age criteria, would be considered old-growth in the future. Our discussion of effects on wildlife throughout the FEIS reflects the benefits of old-growth forests for appropriate species.

RESTORATION OF NON-NATIVE PINE PLANTATIONS

159. The Forest should reconsider the ecological restoration of non-native pine plantations to hardwoods. Research since the 1992 Forest Plan EIS was done shows that pine forests are being utilized by native, forest-interior species at a regular and increased level. The Indiana bat has been found utilizing pine plantations.

RESPONSE:

We are familiar with the most recent information on the use of non-native pines by nesting, native songbirds on the Forest (Cottam and Robinson, 2004). We commissioned Dr. Robinson and his associates to undertake this study in pine stands on the eastside of the Forest. They found native songbirds successfully nesting in non-native pine plantations, although most species were less abundant in pine plantations than in native hardwoods. This was thought to be because pine-stands are generally younger than their hardwood

counterparts. Cottam and Robinson recommended thinning in shortleaf and loblolly pine plantations to retain some pine in the overstory and to also release native, hardwood understories. They recommend the complete elimination of white pine plantations and their restoration to native plant communities.

Our ecological restoration guidelines propose the use of shelterwood or shelterwood with reserves in pine plantations. Shelterwood with reserves is essentially a thinning of the overstory trees to release the hardwood understory, as recommended by Cottam and Robinson (2004). Either shelterwood or shelterwood with reserves would leave both mature pines and dense hardwood understories in the short term—the planning period—and, with shelterwood with reserves, would be a mixture of mature pine and hardwoods in the long term, as recommended. The planned management would enhance the native bird communities on the forest, including most interior species that utilize pine-stands. This is reflected in the effects discussion sections of the FEIS for mature-forest management indicator species and for effects on forest-interior habitats.

We are also very familiar with recent information on the use of pine trees as roost trees for Indiana bats in some areas of the central hardwood region (MacGregor *et al.*, 1999; Hoosier National Forest, 2000). However, local studies of Indiana bats and their roosting habitats on the Forest have not identified any pine trees as roosts or feeding areas for the species (Carrol, 2001; SNF Monitoring Reports 1992-2002; Carter, 2003; Feldhamer and Carter, 2005). These same local studies identify a number of hardwood species being used as roosts. Restoration work in pine plantations, as identified in the Plan, would include primarily shelterwood-with-reserve harvest. This would leave some (30 to 50 percent) of the non-native pines to continue to mature and die and then become potential bat-roosting habitat during the next 15 years (planning period). This management would also release the native hardwoods that are documented to provide Indiana bat-roosting habitat as well as foraging habitat. This is the best management approach for Indiana bats in our pine plantations.

SPECIES VIABILITY EVALUATION

160. Regarding the identification of plant and animal species whose viability is of concern, simply because past management practices have brought species to unnatural levels and they are now going back to a more natural level does not indicate a viability issue. The EIS should address this issue specifically with regard to the northern bobwhite. If there is a viability concern for this species, why is it hunted?

RESPONSE:

The status of, and management conditions for, the northern bobwhite are addressed in the FEIS (page 147 and Appendix F, pages 111-113). The species is also discussed with regard to species viability evaluation (SVE) in the FEIS (Appendix F, pages 120-122). Information on the population status of the species in Illinois is also included in a species-specific literature summary developed as part of the SVE analysis in the *Hoosier-Shawnee Ecological Assessment* area (McCreeley *et al.*, 2004). We feel the status of the northern bobwhite is more than adequately addressed in this information.

We cannot address the hunting of the northern bobwhite. This issue is beyond our scope, since the IDNR manages the populations of this species in Illinois, including on the Forest, and determines hunting regulations for it.

161. The revised Plan provides habitat management guidelines that “...provide for viable populations of native species on the Forest...” Nothing in the DEIS supports this claim. For example, there is no explanation of how these guidelines would provide for a viable population of Indiana bats, particularly with guidelines to cut down their habitat. To ensure a viable population, the Forest should have adequate management indicator species and monitoring of species populations.

RESPONSE:

The referenced statement (Plan V-16) responds to USDA Regulation 9500-4 that directs the Forest Service to manage *habitats* of all native and desired non-native species in order to maintain viable populations of such species (FSM 2620.1 and 2670.12). The direction links and identifies habitat management with maintenance of viable populations.

The habitat management guidelines in the Plan are direction for the Forest to manage the rare habitat areas as well as the abundant areas in order to benefit all native species. These habitat guidelines, as well as the other Plan standards, guidelines, strategies and direction on wildlife-habitat management are intended to maintain at least viable populations of all native and desired non-native plants, fish and wildlife within their geographic range, including the Forest. The habitat guidelines themselves were not meant to be the only measures providing for viability of species but to be one of the measures.

We made reference to the role and connection of habitats to population viability throughout the DEIS (FEIS Chapter 3). We hope the above explanations clarify our management direction for viable populations and the part that habitat-management guidelines play in our total program and mission to manage habitat as directed. The effects on population viability of all planned actions are discussed and displayed in the FEIS (164-168). Specific effects of timber-management activities on Indiana bats are discussed and displayed in the FEIS (pages 182-186). Effects on Indiana bats and their populations are also included in the biological assessment in the planning record.

We agree that MIS are part of management for viable populations. We have identified habitat objectives for MIS in the Plan and provided additional management direction in Plan standards and guidelines (page 44). Implementation of this direction will contribute to the maintenance of viable populations of all species on the Forest. The monitoring of MIS, in addition to other species and habitats, has been and will continue to be part of our strategy for the conservation of biodiversity and for providing for viable populations.

162. Addressing species whose viability is at risk, the DEIS states, “Conserving these species, along with all the ecological units that are part of the Forest landscape, would result in the maintenance and/or improvement of the biodiversity of the Forest.” What is the scientific basis for this statement?

RESPONSE:

Our approach to providing for and measuring biodiversity was addressed in the DEIS (FEIS Chapter 3). The many references to biodiversity identify the linkages of habitats—including forest-interior habitats—with communities, species viability, MIS, threatened and endangered species and RFSS in providing biodiversity on the Forest. Conserving and measuring both species and their habitats and ecological communities, or units, as a total measure of biodiversity is basically a coarse-filter–fine-filter based upon the scientifically proposed approaches to conserving biodiversity in Baydack *et al.*, eds. (1999). Providing for all the ecological communities is the coarse-filter approach and measurement, and providing for or conserving all the specific habitats for all species, especially those at risk, is our fine-filter approach and measurement. Together they are our practical and scientifically based approach to conserving and measuring biodiversity. Quite simply, if one conserves all the large and small parts, especially the rare parts, one should be conserving the whole or the system or, in this case, the biodiversity of the Forest.

163. The Plan should include strong species-viability standards and mandatory monitoring requirements for population counts. Only by maintaining viability can the Forest avoid the necessity of considering the effects of species being listed as threatened or endangered. Together with this should be a comprehensive analysis of the size of forest patches that will remain following implementation of the Plan and what species currently occupy these areas. The list of monitored species should include frogs, bats, snakes, salamanders and perhaps other groups of species that occur on the Forest.

RESPONSE:

The Plan includes standards and guidelines for habitat management for MIS, RFSS, threatened and endangered species and species with viability risks that will contribute strongly to maintaining viable populations of all native and desired non-native species on the Forest (Plan pages 44-45 and Appendix H).

The Plan also includes monitoring of populations, habitats and nesting-success for MIS, RFSS, threatened and endangered species and species with viability risks. These include some frogs, bats, snakes and others, including birds, fish and invertebrates (Plan Appendix H). A species does not have to be listed as an MIS to be monitored. MIS are designated to fulfill a particular purpose regarding the evaluation of management effects. We will be monitoring animal species that are not on the MIS list.

We have performed various landscape-scale analyses of habitats for forest-interior species and for Indiana bats as part of the Plan-revision process (planning record). Some of the information is provided in FEIS Tables 3-40 and 3-41 and Appendix H.

164. Regarding management for the redheaded woodpecker, the revised Plan states, “All of these (management) activities promote habitat management favorable for maintaining oak forests and woodlands and dead trees and thus are favorable for the species.” How does removing trees before they can die promote dead trees? The EIS should compare the

alternatives in terms of how many dead trees they would create. The Plan also concludes that, “Implementation of Alternatives 2 and 4 would result in the maintenance of more oak-hickory forest in both the uplands and bottomlands...and, thus would have greater, beneficial, indirect effects on this species...Alternative 3 is the least favorable for the species due to its lack of timber harvest to maintain oak...” Cutting down its habitat does not benefit or maintain oak-hickory. The DEIS presents no discussion or citation to any studies that the woodpecker will not use beech-maple or that it is a lower-quality habitat for the species. This should be addressed.

RESPONSE:

The habitat requirements for this species were discussed in the DEIS (FEIS page 165) as “open, upland and bottomland, oak woodlands and forests with many dead trees for nesting and foraging.” The key words in that statement from the literature on the species are “open,” “oak” and “dead trees.” To attain open, oak forests and woodlands in most areas of the Forest, some removal of individual trees is required, either through harvest or natural factors, such as floods, fires, insect/pathogens, tornados or other wind events. Dead trees and cavity-tree requirements in any harvested area are included as Plan standards and guidelines (Plan Appendix H, pages 189-191). Dead and cavity trees are common throughout the Forest currently and would be in the future, even with planned harvests. However, open, oak-forest conditions are not. Therefore, at present, the limiting factors for the species are oaks and open-forest conditions and not dead trees and snags. Alternatives that improve those conditions are most favorable for the species, as indicated in the EIS effects discussion.

There are references to the species utilizing beech groves and forests with maple species (Smith *et al.*, 2000); however, oaks and their acorn mast are discussed more often as winter food sources (Smith and Scarlett, 1987), especially in Illinois (Graber *et al.*, 1977).

165. Regarding management of the spring cavefish, the revised Plan states, “Standards and guidelines would protect springs and seeps and caves across the Forest under all alternatives. Compliance with these standards and guidelines should protect the species and its habitats from any degradation, no matter the activity.” The EIS should identify the standards and guidelines to which it refers.

RESPONSE:

There is a general standard for springs and seeps and a more specific standard for the spring cavefish in Plan Appendix H, pages 197-199.

TIMBER HARVEST

166. The Forest should consider the research done in Illinois on group selection (*with citation to Scott Robinson paper*). This research identified group-selection openings as “ecological traps.” That is, many species were attracted to the openings, which appeared to be suitable habitat; however, they did not successfully reproduce due to predation and cowbird parasitism. The study concluded that, if land is to be logged, single-tree selection with low-volume removal (less than 20 percent) and extended cutting intervals (15-20 years) is the method with the least adverse effects on forest-bird communities.

RESPONSE:

The most recently published version of Dr. Robinson's research work on selectively harvested forests in Trail of Tears State Forest is Robinson and Robinson, 2001 and is included in the planning record. The Drs. Robinson summarize their research with this statement from the abstract: "Overall, the results suggest that selective logging added little to existing fragmentation effects in this landscape in which levels of nest-predation and brood parasitism are chronically high. Although the creation of internal edges appeared to have few detrimental effects on these two measures of songbird productivity, effects may differ in landscapes with greater forest cover or different predator and brood-parasite assemblages." In the article's summary, the Robinsons state: "From the perspective of forest birds breeding in the southern Illinois region, the selective-logging methods used in the study area appear to have relatively few costs. The nesting success of some species actually increased, perhaps as a result of the greater structural complexity of vegetation created by selective logging."

Evidently the commentator has interpreted the Robinsons' research work in a different manner or has only reviewed preliminary or unpublished reports. We found no reference in this most recent article of openings being "ecological traps," as suggested. Following ten years of evaluating management effects in forest ecosystems of the Missouri Ozarks, Kabrick *et al.* (2004) found that neither nest-predation nor parasitism increased following harvest treatments.

167. The EIS should consider the secondary/indirect effects of timber removal, such as effects on the balance of interdependent species populations. The DEIS also ignores the effect timber removal has on biodiversity. For example, Forest Service research indicates that dead and decaying wood accounts for about 25 percent of a forest's biodiversity. The timber removal proposed under Alternatives 1, 2 and 4 remove trees before they can become dead and decaying wood. How does the removal of such a vital component of the ecosystem increase biodiversity?

RESPONSE:

The interdependency of species, that is, the reliance of one species upon another for its abundance or very existence, is discussed in the FEIS section on MIS, specifically regarding one species representing many interdependent species (FEIS pages 146-149). The effects of timber harvest/ management on MIS are also discussed in the FEIS (pages 146-163). The effects of timber harvest on biodiversity are discussed throughout the FEIS Chapter 3 Biodiversity section.

We agree that dead and dying wood is an important diversity element in forest communities and an important habitat component for many forest-wildlife species. The Plan includes standards and guidelines for snag and cavity-tree retention in harvested areas to ensure that this habitat will be present in the future for dependent species (Plan Appendix H, pages 189-192). Therefore, we would not allow the removal of all dead or dying wood and would retain much of what exists for the future, even in harvest areas. This is considered in the description of the desired condition of the land in the EH management area. In non-harvest areas, all dead or dying wood, except identifiable safety hazards, would be retained. We have added projections of old-growth forest and snag and dead-tree habitat conditions to other management area descriptions and desired condition statements to make our

future management more explicit for old growth, including the dead- and dying-wood habitat components.

168. The EIS should address how much mast production is lost by removing the mast-producing trees. The DEIS points to the wildlife benefits of mast but it does not disclose the impact of losing the mast.

RESPONSE:

FEIS Table 3-18b displays the acreage of mature oak-hickory forest (over 50 years old) under all alternatives in the short and long terms. This is an indirect measurement of the amount of mast available on the Forest under each alternative. Mast is lost under all alternatives due to the conversion of oak-hickory forest to maple-beech in the absence of disturbance or active management. We estimate that the loss of mast and mast-producing trees will be least under Alternative 2, and greatest under Alternative 3. This reflects the difference in the rate and extent of conversion of historical oak sites to maple and beech.

We have included a discussion of mast and mast trees and dependent species in the effects on forests (FEIS page 40). We have also included a table within this discussion with estimates of the acreage of mast-producing trees on the Forest by alternative and as compared to existing conditions. These data are summaries from FEIS Table 3-15.

169. The analysis should consider the cumulative and site-specific effects of timber removal on biodiversity. It should consider the effects on these levels of diversity: the regional landscape, community-ecosystem, population-species and genetic. The area of analysis should be large enough to consider biodiversity on all these levels.

RESPONSE:

The EIS on the Forest Plan is a programmatic document; site-specific effects are not considered at this level. Site-specific environmental effects, including the cumulative effects of actions, are addressed at the project-level of decision-making. The Plan merely allows for management actions across the Forest. It is not a self-executing document, i.e., it does not authorize any on-the-ground disturbance.

The programmatic effects of timber harvest on biodiversity, including cumulative effects, are included in the FEIS for communities and habitats and species (throughout the Chapter 3 Biodiversity section). All considered together are measures of biodiversity.

Regional landscapes are considered in the cumulative effects on communities, habitats and species. These regional landscapes considered in each effects analysis range in size from all of southern Illinois to the Hoosier-Shawnee assessment area, depending upon the species or biodiversity element. Populations are considered in cumulative effects analyses for most species. Genetics and the maintenance of genetic diversity are implied in cumulative effects discussions of the maintenance of viable populations of species throughout their geographic ranges.

Following ten years of evaluating management effects on forest ecosystems of the Missouri Ozarks, Kabrick *et al.* (2004) found that, overall, harvest treatments have changed the faunal communities at landscape scales and that even-aged treatments (clearcuts) had the greatest effect. However, harvesting was not necessarily detrimental to plant and animal

communities. In general, forest management objectives, including regeneration, do not appear to conflict with other management objectives, such as sustaining diverse forest overstories, ground flora and wildlife communities.

170. An effect of timber removal is the reduction in food supply for some wildlife. One study (provided with the comment) demonstrated that ovenbirds chose territories based on the availability of food, and that proximity to edge affected the food supply, which affected their choice of territories. This effect on territories and choice and habitat is not properly addressed in the DEIS.

RESPONSE:

The EIS discloses at the programmatic level the potential, future effects on ovenbirds as part of the discussion of MIS (mature-forest species). This information is based upon the best scientific information available, actual population data, and our experience working under the 1992 Plan. The amount of edge habitats in the surrounding landscapes is a factor included in the HSI analysis for mature-forest MIS (planning record). The results of this modeling were reviewed and verified using existing information. Further, site-specific, consideration of the potential effects of harvesting on ovenbirds (and similar species) is more appropriately done when a project is analyzed on the ground, using local or site-specific field information.

171. Of effects on the cerulean warbler and Swainson’s warbler the DEIS states, “Timber harvest in all alternatives would not occur in any of the known habitats for either species and thus would have no direct effects on existing populations of both species.” What about unknown habitats?

RESPONSE:

Vanderah and Robinson (1992) studied the distribution of the cerulean warbler in southern Illinois, including the Forest. Robinson and Cottam (2004) identified locations where the species is found on the Forest, based upon monitoring surveys. Eddleman *et al.* (1980) studied Swainson’s warbler in southern Illinois and on the Forest. We also have a conservation assessment for each species (Eddleman, 2005; Burhans *et al.*, 2002). Conservation assessments for both species identify known and potential habitats for the species on the Forest and throughout their range.

Existing habitats and potential habitats for the Swainson’s warbler occur in the CR, CV, MO and NA management areas. The species is neither known nor expected in habitats outside of these management areas in the near future. No timber management is planned in these management areas. However, some vegetation management, including tree-cutting, could be done specifically to improve habitats for the species in all four management areas if required.

Existing and potential habitats for the cerulean warbler are included primarily in CR, CV, NA, NM and WD management areas. No timber management is planned in these management areas. However, some vegetation management, including tree-cutting, could be done specifically to improve habitats for the species in all management areas, except WD, if required. A few individuals may be found in the EH or MH management areas as well, primarily in floodplains and stream bottoms protected from any large-scale timber management by filter-strip guidelines. These potential habitats most likely would be included

in forest-interior areas and, thus, managed by guidelines that promote oak-hickory forests and limit timber management to ridge-tops and upper slopes. Harvest techniques on ridge-tops and upper slopes would be limited to shelterwood with reserves, which should benefit the species in the long term by creating multi-storied stands dominated by large oaks. These are preferred habitats for the species in uplands in southern Illinois (Robinson and Cottam, 2004).

Based upon the above, we have concluded that known populations of both species would not be affected by timber harvesting and that most potential or unknown populations would also be protected, and most likely enhanced, in the future.

WILDLIFE

172. The Illinois crayfish, *Orconectes illinoiensis*, and its known locations (Big Grand Pierre, Lusk, Upper Bay and Hayes Creeks) should be added to the watch list in Plan Appendix I.

RESPONSE:

NatureServe assigns this species a rating of S3, indicating that the species is vulnerable and at moderate risk within a particular state or province, even though it may be more secure elsewhere. Because its geographic distribution is limited to Illinois, there is a greater vulnerability. However, this species is not included on the most recent State of Illinois threatened and endangered species list; thus, we have no reason to believe that the populations are in danger. The Illinois Natural History Survey crustacean database lists 83 locations of the species—many recently documented—which indicates that the species is relatively widespread and common. Thus, we see no reason to add this species to the list.

173. Within the Oakwood Bottoms management area, what is the status of fisheries?

RESPONSE:

Plan guideline OB26.4 states, “Existing ponds not affected by flooding should be managed for sport fish.”

WILDLIFE OPENINGS AND LARGE OPENLANDS

174. We generally accept and support the revised Plan’s reduction of the number of small, maintained wildlife openings on the forest to about one third (700 acres). However, we support this effort only as a result of logistical considerations and the fact that the Plan also calls for the restoration and maintenance of roughly 3,700 acres of large openlands. We do not subscribe to the belief that small forest-openings are detrimental to forest-interior birds and do not support reductions in these important forest components based on this reasoning. In recent years the needs of forest-interior birds and the importance of non-fragmented forests to reproductive success for these species has been emphasized, particularly in the central hardwoods where extensive forested acres still exist. The primary concern regarding forest fragmentation has focused on the nest-parasitism of forest-interior birds, which dramatically affects reproductive success. However, the majority of the problem exists where forests are fragmented by urban or agricultural forms of land use. Thompson and Dessecker (1997) recommend encouraging the succession of non-forested lands to oldfields and forest for interior-bird management. Once these openings are reclaimed and maintained with fire,

they will essentially provide oldfield habitats excellent for turkey brood-rearing and recommended by Thompson and Dessecker as also positive or at least neutral to forest-interior birds.

RESPONSE:

We agree that the major cause for both nest-parasitism and nest-predation of forest songbirds is landscape-scale fragmentation from urban and agricultural land uses near the forests. We have reviewed Thompson and Dessecker (1997) in creating our wildlife management strategies for other early-successional and mature-forest species. We have included it in our literature review information for our species viability analysis, and Dr. Thompson and members of his staff participated in our workshop and literature review.

However, we also know that there is some edge habitat and added attraction for edge predators and nest parasites created by small grassy openings, especially those in relatively unfragmented, forest locations well away from agricultural and urban land uses. Our openings-management guidelines in larger, interior-forest areas (Plan V-18) take this into account.

We have also included openings-management guidelines to lessen the attraction of these areas to the brown-headed cowbird, the major nest-parasite (Plan page 46). This openings management, along with our active large openlands/oldfields management, is the best management mixture and strategy for grassland and early-successional species, as well as forest-interior species (FEIS pages 146-163, 205, 223-245).

175. The small, artificial openings are detrimental and unnecessary because the forest already has extensive forest-edge areas and there are sufficient forest openings on private land. The emphasis on the Forest should be the creation of large blocks of unbroken forest canopy that provide habitat for forest-interior wildlife. The creation of the wildlife openings is unnatural, serving to further fragment the Forest and reduce the size of uninterrupted regions of wildlife habitat. Allowing all artificial openings on the Forest to revert to natural vegetation or to be planted to oak-hickory would decrease the amount of non-native species invading the forest interiors and decrease the predators that greatly reduce forest-interior species populations. Rare and threatened, non-game wildlife deserve protection and should take precedence over common, edge species. Although some natural openings contain important ecological niches, the systematic maintenance of openings for no other purpose than to facilitate game species and hunting should be eliminated. It is not appropriate to justify openings as wild turkey habitat. The Forest should not be providing aid to turkey hunters.

RESPONSE:

We disagree that wildlife openings and large openlands/oldfields are detrimental in all locations or are unnecessary because the Forest already has extensive edge areas and openings on nearby private lands. Most agricultural and urban openings on nearby private lands provide habitat edges, but do not provide the high-quality habitats needed by all native, early-successional species (FEIS Appendix F). They do not add much additional edge habitat in already fragmented landscapes, yet they can provide high-quality foraging habitats for some desired edge species, such as the wild turkey.

Each alternative includes management emphases of varying degrees for forest-interior habitats, and the effects on interior species are analyzed in the FEIS. We also included in the three action-alternatives management to improve habitats for forest-interior species in all of the best interior habitats presently available on the Forest. We developed and analyzed an alternative (Alternative 3) that would eliminate all artificial openings on the Forest. The effects of that alternative on early-successional and interior habitats and mature-forest species are discussed in the EIS.

Rare and threatened species and forest-interior species were emphasized in the Plan revision process, including in the preferred alternative. Habitats for all threatened and endangered species, RFSS and species with viability concerns will be protected and/or managed to maintain and/or improve their quality and quantity for these species (Plan Appendix H).

We have developed the Forest goals from public issues, management concerns and resource opportunities and plan to provide a balance of public uses, including management to enhance opportunities for both consumptive and non-consumptive uses of wildlife and fish. Management of a small amount of the Forest (0.2 percent) in wildlife openings to attract some game species for hunting and viewing meets this goal.

176. Openings should be limited to large openlands and to those areas with natural openland communities not being encroached upon by forest succession. Large, open grasslands planted in warm-season grasses should be provided for grassland birds, whose populations have been declining alarmingly.

RESPONSE:

Openings are addressed under the Plan LO management prescription (Plan V-18 and V-39), specifically under the wildlife-habitat management portion of that prescription.

Openings under the Plan are much reduced from the existing condition and 1992 Plan allowances (1,600 acres to 700 acres). They are included in six management areas besides LO: the CR, EH, HR with restrictions, MH, MM and WW. They will be located primarily in the more fragmented areas of the Forest to limit their effects on forest-interior species. Management of large openlands under the Plan includes management of large areas of native grasslands for declining grassland birds.

177. The management prescription for large openlands is justified largely to improve and maintain these areas and to complement habitats available in the surrounding private, agricultural landscape. However, rows of shrubs and other woody vegetation should not be established, and existing linear plantings ought to be eliminated within large openlands. The establishment of shrub patches should be encouraged when appropriate.

RESPONSE:

We agree, and have removed “wooded fencerows” from our description of goods, services and uses in the LO management prescription (Plan V-39). We have also added guidance to the wildlife-habitat management section to establish shrubs in patches where possible (Plan LO26.4).

178. Wildlife openings adversely affect many species, particularly forest-interior birds. The DEIS offers no discussion of the effects of the artificial openings on biodiversity. A supplemental DEIS should be prepared to address this.

RESPONSE:

The EIS includes a discussion of cultural communities, including wildlife openings and oldfields and effects of these communities on biodiversity and on forest-interior species (DEIS III-232, 234-235). We have reviewed this information and made some minor edits of the FEIS sections identified above to clarify the discussion related to wildlife openings.

The EIS discloses, at the programmatic level, the potential effects upon forest-interior species as a result of edge and fragmentation. Alternative 2 does not authorize or create any new wildlife openings. In recognition of the valid purposes and efficacy of attaining other wildlife management goals, the Plan allows for a very small portion (0.2 percent) of the Forest to include such openings. The effects on interior species of the elimination of these openings is also disclosed. The effects information in the record allows a reasoned decision, balancing the competing needs of wildlife species.

179. The creation and maintenance of openings on the Forest have led to an increase in non-native invasive species. The 18-acre kudzu patch near Cedar Lake was a wildlife opening. Most of the wildlife openings are now filled with alien invasive species that now often out-compete with native plant populations.

RESPONSE:

Some former wildlife openings now include non-native, invasive species such as tall fescue, autumn olive, Japanese honeysuckle and kudzu. Some of these species, such as tall fescue and autumn olive, were planted in some wildlife openings as part of their management prior to 1987. However, most of the spread of these invasives has been from adjacent roadsides, pastures and home-sites intermingled throughout the Forest. Tall fescue in particular was planted on most roads as part of erosion-control seed mixtures following any soil-disturbing work. Seed- and fruit-eating birds and other wildlife species spread autumn olive and Japanese honeysuckle.

We agree that many abandoned wildlife openings that were not restored to native trees and shrubs immediately after abandonment can harbor source populations of these invasives. However, in the fragmented landscape of the Forest, they are not the only source of invasion. Adjacent roadsides, pastures and private land developments are more abundant and most likely the largest source. Any opening in the forest, engineered or natural, is susceptible to invasion from non-native, invasive plants.

Actively managed wildlife openings do not contain source populations of invasives. Regular management with cultivation, prescribed burning and mowing and/or seeding with non-invasive, herbaceous species will serve to control invasive species on the managed sites. Invasive species management, including eradication and prevention, is identified in the Plan (V-21) and will be a part of the implementation of all projects, to include wildlife-opening management.

180. It makes no sense that the Forest Service would maintain wildlife openings in a large openland.

RESPONSE:

The management intent for some small amounts of managed openings in large openlands is to provide early-successional, grassland conditions dominated by annual plants, including crop-plantings such as sunflowers and milo, that are part of intermediate management steps to provide annual grassland habitat conditions. Native annuals and the food plantings would provide for the needs of grassland species, such as many native sparrow and finch species that utilize annual, herbaceous plants and their abundant grass and forb seeds.

181. The DEIS states that, under Alternative 3, “Openings and openlands management would not be allowed. The resulting elimination of wildlife openings and reduction of forest edges would reduce the effects of nest-parasitism and some predation-effects on interior species.” The EIS should quantify these effects.

RESPONSE:

The HSI-modeling results and discussion of mature-forest species, including wood thrush, scarlet tanager and worm-eating warbler, and the effects under Alternative 3 consider the elimination of wildlife openings and oldfields and the elimination of the fragmenting effects of these openings. The effects are especially evident in the 50-year model projections in which openings edges are eliminated and replaced with mature-forest habitats.

182. Management of large openlands would provide long-term habitat for grassland-nesting birds. However, the revised Plan calls for mowing for hay to assist in openlands management. Mowing from April to August could adversely affect ground-nesting grassland birds. The US Fish and Wildlife Service recommends a standard that would prohibit mowing in openlands prior to August 1.

RESPONSE:

A large part of the initial management of the openlands is the conversion of non-native fescue to native grasslands. Management of the large openlands will include annual food-plot plantings to maintain some annual grassland plants and winter foods. These will take cultivation, including mowing prior to cultivation, in April and May. This mowing is needed prior to cultivation of seedbeds for planting to aid in more efficient disking and elimination of the fescue sod. Therefore, we do not want a blanket standard to prohibit mowing in openlands prior to August 1 as suggested. We have, however, added a standard that prohibits hay mowing prior to August 1 annually. This would ensure that the largest expanses of perennial grasslands in the openland areas would be protected from mowing during nesting seasons and still allow mowing for cultivation purposes if necessary.

183. Management of openlands might help restore Bachman’s sparrow (*Aimophila aestabalis*), a species that occurred until 1975 on the Forest or adjacent lands. Should this species recolonize southern Illinois, the US Fish and Wildlife Service believes that the Forest would not provide enough openings to support a viable population.

RESPONSE:

We have conferred with various university scientists, the US Fish and Wildlife Service and IDNR biologists as part of our species viability analysis (FEIS Appendix F) and our RFSS risk-assessment process and have determined that Bachman's sparrow has been extirpated from Illinois, including from the Forest, and is, therefore, not considered a RFSS or species with viability concerns for the Forest. Accordingly, the species was not addressed in the EIS or Plan.

We concur that our openland areas could be potential habitat for the species, but are not large enough in themselves to allow the species to re-colonize Illinois or support viable populations of the species. However, most of our openland areas are part of larger openland-dominated landscapes that include relatively large amounts of barrens, glades, woodlands, oldfields and grasslands on both private and public lands. These larger openland complexes were identified and included as grass-shrubland focus areas in the Central Hardwoods Joint Venture Concept Plan (JVC Plan page 5-27).

We will actively manage barrens as part of our natural areas management, as well as large openlands in central and south Pope and eastern Massac Counties. Bachman's sparrow could eventually benefit from our hardwood restoration management in pine plantations near our openland focus areas. These openland complexes may allow for successful populations of Bachman's sparrow and other rare, grass and shrubland birds to reestablish in Illinois and be part of viable regional populations. If our monitoring of managed openlands should identify nesting Bachman's sparrows, we would confer with our partner wildlife agencies (IDNR and the US Fish and Wildlife Service) on our management strategies at that time.

184. The DEIS states, "Alternatives 1, 2 and 4 would allow for the expansion and/or long-term maintenance of populations of species dependent upon large openlands, including the Henslow's sparrow, loggerhead shrike, northern bobwhite and yellow-breasted chat." The Forest Service neither discloses in the DEIS the species it believes are dependent on large grasslands and oldfields habitats nor the scientific basis for that belief.

RESPONSE:

Our definition of "dependent" is from the dictionary: "relying on or requiring something for support." Based on that definition, our use of the word "dependent" is appropriate for animals whose life-history requirements (one or all) include oak-hickory forests for breeding, feeding and/or resting. Life-history requirements for the yellow-breasted chat and northern bobwhite are identified in the FEIS (Appendix F) and include oldfields and grasslands (openlands) for feeding, breeding and cover. This information includes many scientific references on the use of openland habitats for these species. We also have a multitude of scientific information for each species in the planning record, including literature reviews. Effects on both species are included in the FEIS.

Henslow's sparrow and the loggerhead shrike are also identified as species of openland habitats in the FEIS, and effects of openland management on both species are discussed. The biological evaluation of RFSS includes extensive scientific references on Henslow's sparrow and loggerhead shrike and their use of grasslands and oldfields (openlands) habitats. This and other information in the planning record, including a literature review for Henslow's sparrow and a conservation assessment for loggerhead shrike, form the

scientific basis for our reference to these species as dependent upon large-openland habitats.

E. FOREST-INTERIOR HABITAT

FRAGMENTATION

185. The Nature Conservancy lauds and supports the Forest Service effort to consolidate and reduce fragmentation on the Forest. The Conservancy believes that the DEIS does well in speaking to the problems associated with fragmentation. However, a statement in the forest-interior habitat section should be strengthened: “...ornithologists suspect that fragmentation harms many woodland birds by increasing their susceptibility to predation and nest-parasitism.” First, since the DEIS and proposed Plan differentiate woodlands from other community types, the document should refer to “forest-nesting” birds and, second, ornithologists and ecologists don’t simply suspect that fragmentation interferes with nesting success, multiple studies indicate that the edge-effects associated with fragmentation result in lowered avian nesting success.

RESPONSE:

We have clarified the language on FEIS page 233.

186. The SNF is a highly fragmented forest, so it is important that it not be further damaged with new roads, logging or mineral leasing and development. These would further fragment an already-overfragmented resource. The proposals to increase timber removal for various reasons and to restore one-third of the wildlife openings within large blocks of forested areas would most likely further fragment the Forest and work against the goal of providing habitat for forest-interior species.

RESPONSE:

We have acknowledged that the Forest is fragmented in places and discussed the effects of roads, timber management and minerals management in the DEIS. The effects of timber harvests and wildlife openings on forest-interior habitats under all alternatives are discussed in the FEIS Chapter 3 Forest-Interior Habitat section. We disagree that the Plan would work against the goal of providing habitat for interior species. Rather, we are confident that it would improve habitat for interior species over existing conditions, including through the contemplated reduction of wildlife openings (from primarily interior habitats) from 1,630 to 700 (based on project-specific analysis). The number of wildlife openings envisioned by the Plan, while far less than existing, is simply an estimate for planning purposes. On-the-ground planning and analysis would precede the decision to specify precise numbers.

Over the past decade, we have eliminated many wildlife openings by allowing them to succeed to early-successional forest or by planting them to trees. This has resulted in less forest fragmentation than before and, under the revised Plan, this trend should continue. In general, populations of interior-bird species have remained stable or increased on the Forest, even with poor nesting success for some in some areas of the Forest (as is discussed in the FEIS), while early-successional species have declined (FEIS Table 3-40 and Appendix F).

The revised Plan does not propose to “increase timber removal” relative to the 1992 Plan, include any site-specific proposals for timber harvest, or authorize any site-specific actions that would fragment the Forest. The timber harvest that may (or may not) occur in the future is for ecological restoration, forest health, or similar purposes. Based on the best scientific information available, the revised Plan was designed to continue the healing of the existing fragmentation of the Forest. The viability of forest-interior species populations will be maintained as required by NFMA regulations. Much has been accomplished over the past six decades or so with regard to wildlife habitat restoration, but much work remains. The Plan’s programmatic management direction will continue the process of healing the land.

187. The analysis should consider the degree to which the alternatives would impede the movement and dispersal of closed-canopy, forest wildlife species between stands and larger areas. The analysis should present and quantify the degree of fragmentation on the Forest that has already occurred, and that which will occur under each of the alternatives. This should be compared with historical patterns existing prior to human disturbance. The issue of biodiversity and forest fragmentation should be considered in greater depth.

RESPONSE:

Our analysis of biodiversity and fragmentation used the best scientific information available and concluded that forest management that includes some timber harvest and prescribed burning to maintain forest diversity is important for some forest-interior species in the long term (Thompson *et al.*, 1992; Anders *et al.*, 1998). Under any alternative, however, populations of forest-interior species would remain at least stable, if not improve minimally. Substantial improvement in numbers is not expected, due to the fragmentation of land uses on private land surrounding the Forest and, in the case of Neotropical migratory birds, the adverse effects on their winter-habitats from deforestation.

Neither NEPA nor NFMA nor their regulations prescribe the analysis suggested. NEPA requires informed decision-making; we have met this requirement through our in-depth analysis of the fragmentation issue. Diversity under NFMA and fragmentation are complex scientific issues, and we have undertaken a thorough and comprehensive analysis to understand and disclose the effects of the programmatic management direction. Overall, the effect of the selected alternative will be beneficial with regard to reversing the fragmentation of the Forest.

The comment provides no evidence to contradict this conclusion: The selected alternative will enhance diversity over the 10-15 year life of the programmatic revised Plan. Timber harvest, if and when it occurs, would be focused on improving, not harming, the diversity of plant and animal communities. Where harvest may open the canopy, it will be to the benefit of other wildlife species, forest ecology, or ecosystem health. NFMA planning involves trade-offs between competing uses and wildlife needs. NFMA clearly contemplated that even-aged management would continue on the national forests. Under the selected alternative, future site-specific projects would be analyzed for their effect upon wildlife and fragmentation prior to any on-the-ground disturbance.

INTERIOR-HABITAT MANAGEMENT

188. I (Jeff Hoover, Illinois Natural History Survey) commend the Forest Service on the adaptive strategy of forest-interior management. I believe the consolidation efforts to “un-fragment” the forest will be especially beneficial to the forest birds because, by reducing private inholdings, especially those that are predominantly agricultural in nature, the nesting success of forest birds should improve because of reductions in nest-predation and cowbird parasitism. However, I suggest that the forest-interior management criteria be written more clearly, following a descriptive progression: 1) increased rates of nest-predation and cowbird parasitism are associated with “hard” edges (e.g., row crops, pasture, etc.) and the adverse effects of hard edges on forest birds can sometimes extend more than a kilometer into the forest; therefore, 2) areas managed under forest-interior standards and guidelines to provide forest interior—“source”—habitat for birds should be located as far from hard edges as possible. Additionally, 3) forest-interior areas should be buffered from secondary edges (e.g., roads, wildlife openings, etc.) by at least 400 meters. I believe this is what (Dr.) Scott Robinson and I intended as the best-case scenario for what forest-interior areas should be.

RESPONSE:

In the FEIS we have made changes in the description of the recent research work and its conclusions related to forest-interior bird habitats (page 234). We have based the revised Plan on the best scientific information available concerning forest-interior bird species and their population dynamics. We consulted with leading bird experts and developed a Plan that reflects their findings. Given that the recommendations of these experts form the scientific foundation of the revised Plan, we are aware of no evidence that the Plan will adversely affect forest-interior bird species. The applicable standards—which function to control the development of future site-related projects—reflect these scientific recommendations. Monitoring will continue to allow us to analyze the population trends of forest interior as well as other wildlife on the Forest.

189. The DEIS states that under Alternatives 2 and 4, “Interior habitats could be improved or maintained on about 125,000 acres. These habitats would include the largest possible amounts of core, unfragmented, interior-forest acreage.” It does not seem this can be true. If the Forest Service does not cut down the interior habitat, there would be more of it. In the same place the DEIS states, “Alternative 2 would provide more unfragmented, high-quality, forest-interior and core-area habitats for forest-interior birds than would Alternative 1 in the long term. This management would have indirect and beneficial effects on forest-interior species and their habitats in both the short and long terms.” How is cutting down the interior habitat construed as a beneficial effect? The guideline for forest-interior habitat states that, “Managed forest-interior habitats that maintain oak-hickory forest as well as an abundance of forest-interior bird habitat are provided through management direction for contiguous forest areas greater than 500 acres.” If this were true, the Plan would not provide for cutting down these areas.

RESPONSE:

The interior management as prescribed under both Alternatives 2 and 4 is described on Plan pages 45-46. For the most part, actual interior habitats (those areas 400 meters from hard edges) would not be subject to harvest. Research by wildlife (songbird) experts at sites

on the Forest has defined “forest-interior” in southern Illinois as those areas greater than 400 meters from hard edges (Hoover and Robinson, 2000; Hoover, 2001).

Forest-interior species are considered area-sensitive; that is, they are adversely affected by fragmenting activities in forested landscapes, such as cropfields, pastures, major roads and urban developments, that make more hard edges and, thus, less forest interior. They may not necessarily be adversely affected by various timber-management activities that maintain forest cover (Robinson and Robinson, 2001). Timber harvest and management may not cause forest-fragmentation effects for all species, and may even be beneficial for many interior species dependent upon oak forests and shrub and regeneration patches within hardwood forests, especially in the central hardwoods region (Thompson *et al.*, 1992; Anders *et al.*, 1998; Robinson and Robinson, 2001; Rodewald, 2003; Rodewald and Abrams, 2002; Fitzgerald *et al.*, 2003). Harvesting some mature trees in some areas to foster regeneration of future oak-hickory stands is important in maintaining the oak-hickory forest community and the habitat diversity this provides for a number of forest-interior species.

The comment appears to reflect a misapprehension of the intent or purpose of any future timber harvest that may occur in forest-interior habitat (the revised Plan does not authorize or contain site-specific proposals for any such action). Natural ecological systems are not static. Forest-interior habitat changes over time; for example, without disturbance the existing oak-history forest naturally succeeds to maple-beech. In order to provide management flexibility to respond to threats to forest resources, enhance diversity of plant and animal communities, or provide for public health and safety, the Forest requires timber cutting as a management option. We do not know where, when, or how much (if any) timber cutting would occur in forest-interior habitat in the future. We do know that such cutting, if and when it occurs, will promote sustainable forest-resource management in a multiple-use context and provide for plant and animal community diversity.

Plan standards (as well as site-specific mitigation) will protect other forest resources, including wildlife. The revised Plan does not contemplate, let alone allow, “cutting down the interior habitat.” The comment implies that the revised Plan would allow the destruction of habitat in the name of ecological restoration, but this is simply not the case. Forest-interior habitat, like all resources, will change over time. Our management is intended to provide for NFMA diversity and protect the ecological integrity and function of interior habitat, not destroy it.

The revised Plan’s strategy for forest-interior habitat management is to provide more acreage across the forest managed to reduce the effects of fragmenting activities such as cropfields, pastures, major roads and urban developments, as well as include more acreage that would be structurally and biologically diverse, with such native species as oak and hickory. This latter part of the strategy includes some timber harvest in historical oak sites and prescribed burning throughout, and was developed with much scientific collaboration. The areas that will be actively managed are primarily in the EH and MH management areas, along with many acres of mature forest areas that now are relatively unmanaged except for fire. These areas—in the CR, NM, WD, WW and some NA management areas—are mostly succeeding to mature forests, including many to mature maple-beech forest, that best provide for the habitat needs of the largest suite of forest-interior species in both the short and long terms, including many that depend on mature forest habitats.

190. Areas managed under the forest-interior standards and guidelines should be protected from timber removal. Timber removal creates fragmentation of the interior, destroying the integrity of the habitat. The DEIS statement in the description of Alternative 2, “Biological diversity and wildlife and aquatic habitat would be enhanced through new standards and guidelines for the management of forest-interior habitat,” is not accurate since the Plan calls for cutting down and destroying forest-interior habitat.

RESPONSE:

The interior habitats greater than 400 meters from hard edges will not see much, if any, timber harvest, as noted in the previous response. Also, as noted, timber harvest is not necessarily a fragmenting action and does not destroy the integrity of the habitat for many forest-interior species. For many interior species (see references above), timber management, including harvest, will maintain and improve their forest habitats and subsequent populations. See references in the above response.

191. The DEIS does not disclose how many acres are far enough away from the edge to actually provide interior habitat. The Forest Service proposes to cut down lots of the interior habitat, but the DEIS gives the impression that the forest being removed will still be interior habitat after the Forest Service removes it. The DEIS states that, “Alternative 2 would apply forest-interior management guidelines...to even-aged hardwood and mature-hardwood forest management areas, providing about 60,000 acres of diverse, interior-forest habitats.” The Forest Service does not indicate how this number was derived. Is the agency counting removed forests as interior-forest habitat? Is the agency counting the land outside the core as interior habitat?

RESPONSE:

Approximately 35,250 acres of the Forest are greater than 400 meters from hard edges and in forested areas larger than 500 total acres in size (planning record). See Response 189 for a discussion of interior species and the studies that have determined that harvests of various sorts, including the removal of mature hardwood trees, are not degradations of habitats for all forest-interior species, including some of those generally dependent upon mature forest (Robinson and Robinson, 2001). It could even be habitat improvement for some interior species, such as the hooded warbler and Kentucky warbler.

Shelterwood timber harvesting is not the total removal of all the forest or all the mature forest trees. Many trees of various ages remain following this type of harvest. About 56,000 acres of even-aged hardwood and mature-hardwood habitats are included in 500-acre or larger forest-interior areas (planning record). The amount of acreage was derived from GIS mapping of all 500-acre or larger areas on the Forest that currently have no major roads, cropfields, powerlines or pastures within them (planning record).

192. The replacement of forest-interior management units with management of areas one square mile or larger “with forest-interior characteristics” is vague and should be better defined.

RESPONSE:

The main difference between the two definitions of forest-interior blocks is that the forest-interior management units are fixed and susceptible to forest-health threats, whereas the areas with forest-interior characteristics retain the value of interior habitat; but the

definition acknowledges that such habitat is dynamic and, so, allows for management to protect the overall character and value of such land. We have geographic information on these areas, as they currently exist, in our planning record. We created maps of these areas to generate acreage figures in the Plan and EIS. These will be reviewed during implementation of forest-interior habitat guidelines following Plan approval.

193. The Nature Conservancy believes the Forest Service used good science to shape its approach to addressing migrant breeding needs; however, the trend-data presented in the DEIS on pages III-110 and -226 are confusing when comparing the same species and do little to make the agency's case for creating interior habitat. The Forest Service should consider using existing data on the reproductive success of several forest-nesting migrants—wood thrush, Acadian flycatcher and Kentucky warbler. The parasitism and nest-predation rates offer irrefutable evidence that these birds are not doing well on the Forest. According to Trine, who has studied wood thrush reproductive success on the Forest, that species is not viable under NFMA regulations.

RESPONSE:

Our trend-data is representative of the populations of interior MIS across the entire Forest in the last 5-10 years. Our habitat modeling for these species reflects similar and parallel trends, with habitat generally improving for the species and fragmentation declining. However, these data, as stated in Response 122, may not reflect whether the Forest is a source or a sink for some bird populations, as they do not match some nesting-success information from studies on the Forest. Certainly we know and agree that the three species identified above are not doing well in fragmented areas on the west side of the Forest; but there is evidence they may be doing much better on the east side of the Forest, where there are less agricultural edges. Recent work by Cottam and Robinson (2004) on the east side indicates a much lower rate of parasitism and predation than that identified on the west side in Trine's study areas. The study by Cottam and Robinson is based on a small sample of nesting-success data; however, the habitats sampled are indicative of much of the eastern part of the Forest.

Prior to, and with, the revised Plan, we have made interior birds an emphasis in our management across the Forest. We have improved and will continue to improve their habitats and populations in sink-habitats by eliminating edge-effects through the application of interior-management guidelines, and by land acquisition and associated reforestation across the Forest.

We do not refute Trine's assumptions and conclusions that the west side of the Forest is a population sink for the wood thrush. However, there is good evidence that the east side of the Forest likely supports a source population for the wood thrush and some other interior species. We conclude, then, with evidence that some populations are relatively unaffected by predation and parasitism, that continued reductions in fragmentation of the Forest, and management to improve forest diversity, would support viable populations of the species.

The various studies indicate that migratory-bird population-dynamics is a complex, emerging area of science. We have assessed the methodology, findings and implications of Trine, Cottam *et al.*, and other work by experts at local sites. We are aware that these studies must be taken in the context in which they were undertaken. Determining the presumptions, statistical validity and applicability of the studies, particularly where the

outcomes and recommendations seem to conflict, involves a high degree of expertise. The revised Plan does not ignore any of this scientific information. Instead, the Plan is a balanced, cautious approach to providing habitat, with the goal of providing for the diversity of plant and animal communities in a multiple-use context.

194. The SNF is the most complete forest ecosystem in Illinois and should be preserved for future generations. Species such as the scarlet tanager, Acadian flycatcher, Kentucky warbler, worm-eating warbler and others require large tracts of uninterrupted forest in order to breed successfully. Openings in the forest allow greater predation and parasitism by cowbirds to occur.

RESPONSE:

The goal of the Plan is to maintain the forest ecosystems into the future, including their native wildlife species. We are aware of the needs of the scarlet tanager, Acadian flycatcher, Kentucky warbler, worm-eating warbler and other interior bird species for large, unfragmented forests. Our Plan forest-interior management guidelines are designed to improve habitats for these species.

We know that artificial wildlife openings in large blocks of unfragmented forest can cause further fragmentation of the Forest. Openings can allow greater predation and parasitism by cowbirds, especially if managed as summer cropfields or mowed grasslands. However, managed artificial openings can provide for recreational hunting of deer and turkey and high-quality bugging habitat for turkeys, helping to maintain hunt-able populations of this species in many locations on the Forest. The number of openings allowed in the Plan is a compromise to reduce wildlife openings to manageable levels for hunting demands and to improve forest-interior habitats.

Less than one-third of the openings allowed under the 1992 Plan would be allowed under the revised Plan: Approximately 700 openings, only 700 acres, could be maintained across the Forest. Most would be in the EH and MH management areas, and many would be in the buffer areas of interior-management areas. None would be allowed in the interior-most areas of these units (Plan guideline FW26.6.4). All the openings in the buffer areas of interior habitat would be managed to reduce parasitism and predation, as recommended by collaborating scientists (FW26.6.4).

The revised Plan does not create, authorize, or mandate any new wildlife openings. The wildlife openings that are described in the Plan are those that have been in existence for at least a decade and have served the Forest well (based on monitoring information and field observations) in maintaining plant and animal community diversity. Although there is a slight effect from these openings on interior characteristics, this effect is far outweighed by the beneficial effects to the Forest from maintaining—not creating—these wildlife openings. Recognizing the concern over wildlife openings, the revised Plan allows for gradual reduction in their number over the next 10 to 15 years. This is a measured response to the concern for interior management. During the life of the revised Plan, and certainly during future revision efforts, the utility of the remaining openings will be reviewed.

195. The US Fish and Wildlife Service supports implementation of forest-interior management standards and guidelines in order to manage for this unique type of habitat to the benefit of migratory birds. However, we recommend a no-surface-occupancy stipulation for minerals management as part of the forest-interior habitat management. This would further reduce the potential of adverse effects on forest-interior migratory birds.

RESPONSE:

Past mineral-leasing activity on the Forest has been minimal and development has been associated primarily with some hardrock-mineral extraction. There also has been some extraction of private minerals. These latter actions have caused some minor disturbances to migratory bird habitats in a few locations; however, over these the Forest has very little control and no jurisdiction. We agree that there could be some adverse effects on migratory birds from mineral-leasing actions, primarily indirectly from fragmentation caused by opening the canopy for drilling and production facilities in a few forest-interior areas. This would not be widespread across the Forest, but localized in the more mineral-rich areas. However, any new mineral lease of federally owned minerals would be subject to site-specific environmental analysis, during which we can reduce some of the effects on migratory birds by limiting the size and locations of any facilities.

No development of federally owned minerals is allowed in the WD management areas. These areas include the largest, relatively unfragmented forested areas on the Forest and provide over 28,000 acres of habitat for many forest-interior species that would be unaffected by mineral-management actions. Surface occupancy for minerals management is not allowed under the CR, CV, DR, HR, NA and WW management areas (54,000 acres), or within riparian areas and filter strips (approximately 20,000 acres) Forest-wide. This would eliminate the adverse effects of mineral leasing and extraction on migratory birds in those areas. All the habitats, including forest-interior management areas within the MH and MO management areas (33,500 acres), have a limitation on surface use for the protection of migratory birds from April 1 to July 15 (Plan Appendix H). This would also limit noise and annual vegetation-management disturbances and their direct and indirect effects on nesting, migratory birds in these areas.

With all of these standards and guidelines and anticipated, limited and localized minerals management on the Forest, federal mineral leasing and extractions are expected to have only minimally adverse effects on migratory birds, including many forest-interior species, and have few overall effects on populations of migratory birds on the Forest. Furthermore, since federal mineral leases usually cover more than 1,000 acres, we have added a Plan guideline that would direct exploration or development actions to the most-fragmented portion of the leased area (FW28.1).

196. The DEIS states of Alternative 3, “Most of the Forest...would be managed restrictively, resulting in indirect and beneficial effects on most forest-interior species...This alternative would include interior core-areas and acreage equivalent to that under Alternatives 2 and 4. Even though more area would be managed restrictively, the number of blocks of interior habitat greater than 500 acres would not increase...In the short term, this alternative would provide interior habitat equivalent to Alternatives 2 and 4, with comparable beneficial effects for interior species.” How did the Forest Service arrive at this conclusion? Alternatives 2 and 4 propose to cut down core habitat, so how can the Forest Service conclude there would be the same amount among all three alternatives? If the agency does

not cut down the interior habitat, there is more interior habitat. Once the Forest Service removes timber, it is no longer interior habitat.

RESPONSE:

Because of the scattered ownership of the Forest, there are only so many possible, unfragmented, 500-acre blocks of forests within its ownership. Alternatives 2, 3 and 4 include all of these in their management for interior species. So the overall quantity of interior habitat does not change under any of the three alternatives. What changes is the quality of the habitat. Alternatives 2 and 4 would have more species diversity and mixtures of successional stages of hardwood forests that are beneficial to many interior species. Alternative 3, on the other hand, would include less species diversity within hardwood forests, but would provide more old-growth maple and beech forest habitats.

As we stated in an earlier response, timber harvest and management, including the removal of mature trees, may not cause forest fragmentation effects for all species and may even be beneficial for many interior species that are dependent upon oak forests and shrub and regeneration patches within mature hardwood forests, especially in the central hardwoods region (Thompson *et al.*, 1992; Anders *et al.*, 1998; Robinson and Robinson, 2001; Rodewald, 2003; Rodewald and Abrams, 2002; Fitzgerald *et al.*, 2003).

197. While the Forest is a source for some forest-interior birds, it is a sink for others, and for other species. This should be determined and, for those species for which the Forest is a source, that source should not be disturbed. For those species in a “sink-mode” compared to historic population levels, the habitat should be recovered.

RESPONSE:

We know from past and early studies done by researchers on the Forest (Hoover and Robinson, 2000; Trine, 1998) that some areas of the Forest, primarily on the west side, appear to be population sinks, or may not support self-sustaining populations of some interior bird species. We also know from more recent studies on the east side of the Forest that some of these same species appear not to be affected by predation and parasitism, and may be self-sustaining (Cottam and Robinson, 2004).

Prior to and with the revised Plan, we have made interior birds an emphasis in our management. We have improved, and will continue to improve, their populations in sink habitats across the Forest by eliminating edge effects through application of interior-management guidelines, land acquisition and reforestation, and maintenance and further improvement of likely source habitats. In short, limited management for the benefit of wildlife improves interior habitat, and does not destroy it, as the comment implies. The best scientific information available and resource experts, including state wildlife biologists, support this view, and our development of a balanced, revised Plan, recognizing that action, or inaction, that benefits one wildlife species may be detrimental to another. In reviewing forest plans, scientists, the courts, and many resource professionals recognize that limited management does not harm, but enhances, interior-habitat characteristics.

198. The DEIS discussion of effects on forest-interior habitat focuses only on birds. What about other species? The analysis should address all species, not birds only. The degree to which forest-interior blocks provide biological corridors and their value should be addressed. The effect of cowbird parasitism and predation on forest-interior birds should be prominently considered.

RESPONSE:

Most of the discussion of forest-interior habitats indeed focuses on migratory songbirds associated with large blocks of unfragmented, hardwood forest. This is because forest-interior birds and their habitat needs have been studied locally on the Forest and have been the dominant focus of forest-interior habitat management issues on the Forest since 1992. They continue to be the dominant focus of the forest-interior issue for this Plan revision. Other species of animals and plants that are dependent upon forest-interior habitats have not generally been at issue on the Forest. However, the intent of the analysis of forest-interior habitats in the EIS is that forest-interior birds would be the indicators for all interior species dependent upon mature hardwoods. Specific habitat-management needs for many of these species have not been identified in the scientific literature.

All three species of forest-interior birds (scarlet tanager, wood thrush, and worm-eating warbler), discussed heavily in the FEIS Chapter 3 Forest-Interior Habitat section, are MIS representing understory, midstory and overstory habitat niches within interior, hardwood forests. The EIS discussion of interior habitats includes reference to other species of plants and animals dependent upon these same habitats being affected similarly to interior birds. The discussion of the effects on interior habitats includes both effects on interior birds and on forest-interior habitats.

The DEIS did not discuss the effects of forest-interior blocks and their management on biological corridors and connectivity for native forest animals in southern Illinois. We have, however, included discussion of the connectivity effects of forest-interior habitats in the FEIS (page 244). Effects of cowbird parasitism and predation on forest-interior birds is included and considered in a number of sections in the FEIS.

199. The DEIS should address the effect of timber removal on predation, specifically the effect of increased populations of nest-predators such as blue jays, raccoons and black snakes. The analysis should also consider the effect of logging roads on forest-interior species, as they provide feeding areas, a source of calcium, to cowbirds. The DEIS claim that “No effects are anticipated” on forest-interior habitat and ecosystem health from roads and trails management and developed recreational site use seems baseless. A drive on Pine Hills Road would reveal cowbirds eating gravel. The Pine Hills campground also seems to contribute to the cowbird problem. Dr. Robinson has documented these types of effects and has made recommendations to minimize them. They should be included in the Plan as standards.

RESPONSE:

Timber-harvest methods can create edges in forested habitats. These edges can attract edge-predators such as the blue jay and others identified in the comment. However, in some studies in the Midwestern, hardwood forests, timber management, including harvest, does not appear to increase edge-predators (Annand and Thompson, 1997; Thompson *et al.*, 1992; Robinson and Robinson, 2001). Overall, the edges that timber harvests create are different than hard edges, like agricultural fields and pastures, which are especially attractive to edge-

predators. Edges created from timber harvest generally have lesser effects on nest predators than hard edges (Hoover and Robinson, 1999). The effects of increased populations of most of the nest-predators identified in the comment are due primarily to hard edges. These are addressed in the FEIS (page 233) and described for interior bird species in FEIS Appendix F. These hard edges appear to be the chief factor affecting nest-predation on the Forest (Hoover and Robinson, 1999).

Monitoring has been conducted as part of the long-term, landscape-scale Missouri Ozark Forest Ecosystem Project to evaluate the effects of even-aged, uneven-aged, and no-harvest management on flora and fauna of oak ecosystems in southern Missouri. Findings from ten years of evaluating management effects on forest systems established that mature-forest songbird abundance, particularly that of ovenbirds, decreased, and early-successional songbird-abundance increased on harvested sites. However, neither nest-predation nor parasitism increased following harvest treatments (Kabrick *et al.*, 2004).

There is no scientific evidence that logging roads are providing a source of calcium to cowbirds and, as such, are increasing or improving cowbird egg-laying capabilities in any specific area of hardwood forests in the eastern or Midwestern hardwoods. In southern Illinois and within the landscape of the Forest, there are so many gravel roads on private lands or municipal areas, including county or state roads, that logging roads would not contribute substantially to what is already available for the species, even if calcium sources are ever determined to be a limiting factor for reproduction of the species. We do not consider calcium on roads a measurable effect on cowbird parasitism in the Forest and, thus, have not included this in our analyses. This issue of gravel providing calcium for cowbirds has been discussed for at least a decade. There is no scientific evidence to substantiate this supposition.

We consider roads with substantial breaks in the canopy, such as maintained level 3 or higher roads, as having fragmenting effects based upon the edge habitats that they create. Level-3 and higher roads were analyzed in our effects analyses related to forest-interior habitats. Roads constructed and still maintained as level 3 and higher were considered as fragmenting factors in our GIS analysis of 500-acre or larger unfragmented forest areas, and were included in our HSI model evaluations of fragmentation. Most historical logging roads on the Forest have not been level 3 or higher roads or, if they were level 3 originally, they have not been maintained as level 3 after construction and original logging use. Their edges have been allowed to revegetate and the forest canopy to grow back to original densities.

The FEIS considers fragmentation from a programmatic perspective. As a programmatic document, the revised Plan does not authorize or mandate any new road construction. Prior to any decision to build a new logging road, project-level, site-specific NEPA evaluation is required, which could include analysis of the issue of fragmentation.

200. The DEIS states that Alternative 2 or 4 would cumulatively “...provide the most forest-diversity for those interior species dependent upon mixtures of successional stages of hardwood forests and habitats for optimum habitat quality and use.” Please identify the species to which is this referring and the basis for the statement.

RESPONSE:

Interior species such as the wood thrush, Kentucky warbler, and hooded warbler have been documented to be more abundant in oak forests, in forests with more shrub and regeneration patches, and in forests with mixtures of early mid-successional forests in close proximity to mature forests (Thompson *et al.*, 1992; Anders *et al.*, 1998; Robinson and Robinson, 2001; Rodewald, 2003; Rodewald and Abrams, 2002; Fitzgerald *et al.*, 2003).

201. In the forest-interior habitat effects discussion, the DEIS states that, under Alternative 3, because timber harvest would not occur, no effects are anticipated. There would be an effect in that the forests would be able to grow larger and provide interior habitat. The EIS should compare the number of acres actually in the interior (far enough from the edge) under the alternatives.

RESPONSE:

The effects of no timber harvest under Alternative 3 on forest-interior habitats are discussed in the cumulative effects discussion for the alternative in the DEIS. Additionally, we have clarified the timber-harvest methods effects discussion in the FEIS (page 239).

We estimated the acres of actual interior habitats as part of our GIS analysis for the Plan revision. There is no difference among Alternatives 2, 3 and 4 since our interior analysis measures only the distances from hard edges and includes all available forested habitat over 500 acres. Studies have shown that hard edges have the real effects on interior species, and these are primarily dependent upon land ownership and non-forested land use within the 500-acre forested areas.

Each of the three alternatives provides approximately 99,400 acres of interior-habitat areas, with 35,250 acre of buffered interior habitat. Alternatives 2 and 4 would include timber management on approximately 56,000 acres of the 99,400 acres in order to improve diversity in the long term, and Alternative 3 would not. We have included this in the effects sections of the FEIS (page 238-239).

202. The DEIS should have identified all the forest interior blocks under each alternative and addressed them.

RESPONSE:

The DEIS included this information in the cumulative effects section (now in FEIS pages 244-245).

203. The DEIS states that no effects are anticipated under any alternative on forest-interior habitat from the recreational use of trails and roads. Alternatives 1 and 4 allow ATV use; Alternative 2 allows administrative use of ATVs, to include the permitted use by visitors with disabilities. The EIS should address the effects of these uses.

RESPONSE:

We have included the effects of authorized ATV use in this section (FEIS page 239) and other sections of the FEIS where needed.

F. NATURAL AREAS

204. The Plan should protect natural areas from incompatible uses, such as horseback riding, motorized vehicle use and camping, and provide an adequate level of law enforcement to enforce closures of the natural areas to these uses. Bell Smith Springs National Natural Landmark deserves the highest protection. There should be no timber removal, oil and gas drilling, off-road motorized vehicles, commercial equestrian traffic or other detrimental activities allowed. Stock-confinement facilities should be located outside natural areas. If trails are allowed, they should be monitored closely for damage and closed if necessary to protect the areas.

RESPONSE:

Natural areas are managed and protected under the natural area management prescription, which is designed to preserve, protect or enhance the unique scientific, educational or natural values found within research natural areas, geological areas, zoological areas, ecological areas and botanical areas. The FEIS describes the affects of the alternatives in Chapter III. In addition, a Research Natural Area analysis was conducted and is presented in FEIS Appendix E.

Law enforcement personnel are not managed at the Forest level, but the Forest Supervisor can focus their activities. It would not be appropriate to address levels of law enforcement since the decision-maker does not control the allocation of personnel. Law enforcement is an administrative procedure that follows existing statutes, regulations and Forest Service policy (FSM 5302, 5309.11 and others).

Decisions to allow or prohibit horseback riding at one or another natural area, or to require specific monitoring, should be taken at the project level during site-specific environmental analyses. Bell Smith Springs National Natural Landmark would be protected under the natural area management prescription and closure order. As in other natural areas, timber could be removed as needed to maintain or enhance the area's unique features. A no-surface-occupancy special stipulation for oil and gas drilling may be applied for portions of natural areas where occupancy could adversely affect the special features for which they were established.

The revised Plan does not authorize or mandate any site-specific development actions in Bell Smith Springs or any other natural area. Prior to such action, analysis of site-specific effects of proposed actions would be evaluated, including the possibility of additional site-specific mitigation protection measures. This process has improved the condition of natural areas over the past decade; it is a proven measure of protecting the 80 areas scattered across the Forest in an efficient and effective manner. Based on monitoring information and the unique characteristics of the Bell Smith Springs Natural Area, it is very unlikely that any development actions will occur in Bell Smith Springs over the next 10-15 years.

205. The Plan should require the protection of natural areas from all forms of destructive recreation. The EIS does not disclose the adverse effects of allowing recreational use to destroy natural areas.

RESPONSE:

The Plan directs certain management for the natural areas, including the prohibition of activities that could be detrimental to an area. It is unreasonable to assume that natural areas can be protected at all times from all forms of recreation that could adversely affect their unique features, understood as “destructive” recreation. FEIS pages 247-248 disclose the effects of recreational use in natural areas under each alternative. Although there could be adverse effects associated with recreational use, these uses are not expected to “destroy” any natural area. Through the monitoring and management of natural areas, detrimental uses will be identified and corrected.

Where monitoring of natural areas has indicated unacceptably adverse effects from recreation, including equestrian use, administrative action, including closure and posting of damage, has been implemented with success. Monitoring and experience have proven that our recreating visitors respond favorably if they are informed of potential harm to unique characteristics of these areas. We acknowledge the unique sense of place and ecological characteristics many of these areas have. There is no evidence that our recreating visitors should universally be locked out of these areas. Where harm to the resource should indicate that closure is necessary, it would be done; otherwise, these areas will be managed within a sustainable, multiple-use framework. Protection of resource characteristics is our paramount concern; however, it does not require that we bar our visitors from these areas indefinitely, as the comment suggests. Monitoring and field observation indicate that the protection of these areas has improved over the past decade.

206. The DEIS states, "Alternative 3 would have negative direct effects on these (natural) areas because limited prescribed fire would allow natural areas to succeed to more aggressive native and non-native species and non-desirable community types..." This seems to contradict what the EIS says Alternative 3 calls for; it appears to provide for burning in natural areas.

RESPONSE:

All alternatives provide for prescribed burning in natural areas. The FEIS has been changed to reflect this. FEIS Table 3-13 presents the number of acres that could be burned under each of the alternatives. Alternatives 2 and 4 provide for the most prescribed burning outside of natural areas.

Please note, however, that these values in the FEIS are merely projections. The revised Plan does not authorize or mandate any prescribed burning, but rather allows such actions to be taken. Based on this, we project or estimate that burning might occur in some locations at some time over the next 10-15 years. Many factors, including budget, management priorities, national policies and weather, affect what level of prescribed burning will actually be proposed over the life of this revised Plan. The Plan is not self-executing; it contains no site-specific proposal for prescribed burning. Prior to the execution of any prescribed-burning proposal, site-specific NEPA analysis will be completed.

207. The DEIS states, “Forest Supervisors have signed closure orders for the protection of the natural areas.” Nothing in the Plan prevents the Forest Service from opening up these areas. Unless the Plan is changed to include standards that require these closures, the EIS cannot assume they will stay closed.

RESPONSE:

The closure orders have been issued to enforce the 1992 Forest Plan; they would be issued to enforce prohibitions found in Plan standards FW23.4, FW23.6, FW23.7, FW23.9, NA23.2, NA23.4 and NA23.5.

208. The DEIS states, "Alternatives 1, 2 and 4 could have negative direct and indirect effects...Although trail construction would require the removal of vegetation along a corridor, the natural area management prescription would prevent possible community fragmentation...and the potential for unauthorized off-trail activities." This seems implausible. Nothing in the Plan prohibits a trail from destroying natural features. The EIS should disclose the effects of trails in natural areas. The EIS should address the effects of horse hooves and manure on invasive species and quantify the effects. Passive management of recreation damage should be considered. The EIS should present and quantify the effects of dispersed recreational use.

RESPONSE:

We disagree that there is nothing in the Plan prohibiting a trail from destroying natural features (see Plan standard NA23). The EIS discloses the anticipated effects of a management program. The revised Plan does not authorize any new trails or close any trails; it is a programmatic framework to facilitate future, site-specific, trail-management decisions. The Forest has years of monitoring information on trail use by equestrians and will likely undertake further site-specific analysis of trails in the future. The programmatic revised Plan provides a foundation for future trails analysis, but does not determine where trails should be located, or when use should occur. This is deferred to decisions based on NEPA-compliant site-specific analyses of local resource conditions that involve the public.

209. The Plan (in Appendix E) should explain the difference between a state natural area and a natural area under the Plan, and should explain the role of the IDNR and the FS in natural areas.

RESPONSE:

The Forest and the state both identify and protect natural areas for essentially the same reasons. However, the Forest Service and IDNR may adopt different approaches to management, as well as different restrictions. The Plan addresses only natural areas on the Forest.

210. In the DEIS, it appears that Alternative 3 allows burning for the control of invasive species. The EIS should disclose the effects of this, along with the effects of using herbicides, as well as of not controlling invasive species. With regard to minerals management, the effects of subsidence, the effects on groundwater and of water going into a natural area and the effects of dust should be considered. The DEIS also should disclose the effects of cut-and-swap land exchanges if they are not prohibited by the Plan.

RESPONSE:

Alternative 3 provides for prescribed burning in natural areas only when it is necessary to protect or enhance the native vegetation they may contain. Prescribed burning can be a useful tool in controlling invasive species and reducing shade-tolerant, woody species that can out-compete desirable shade-intolerant native species. Alternative 3 restricts the use of prescribed fire outside of natural areas.

Prescribing burning is one of many management methods or tools available under the revised Plan that allow for protection of native plant and animal communities. The Plan does not prescribe or mandate the use of any particular tool, but facilitates site-specific environmental analysis and decision-making that will consider need, inventories and resource conditions. Prescribed burning may or may not be used to control invasive species in natural areas. This is a future, site-specific determination that could include the consideration of project-related mitigation to protect the resources of the natural area involved, as appropriate. The effects of various methods of management available for natural areas are disclosed at the programmatic level in the FEIS. The revised Plan includes no site-specific proposals for prescribed burning or other management practices in natural areas and, therefore, can disclose no site-specific effects of any action.

The use of herbicides and its effects will be analyzed on a species- and site-specific basis for proposed projects. The effects of any proposed activities related to minerals management would also be disclosed in a project-specific environmental analysis prior to any action.

With regard to “cut-and-swap land exchanges,” the Plan guideline NA54 states that the highest priorities for land adjustments related to natural areas include “...increased efficiency of management and enhanced protection and manageability of area values.” It is highly unlikely that the Forest would proceed with an exchange that did not comply with this guideline.

211. The Plan standard NA24 allows the removal of timber by commercial or non-commercial means. If the Plan allows timber harvest, the EIS should address its effects. In addition, minerals management should not be allowed in natural areas (NA28). Under NA27.1, on what basis will the Forest Service issue or deny the permits? NA51 calls for the use of leaf-blowers for fire-lines, but the DEIS does not address the effects on air of leaf-blower use.

RESPONSE:

Timber removal would be allowed only to maintain or enhance an area’s unique features. The effects of any timber removal will be addressed in project-specific environmental analysis. Minerals management in natural areas is subject to restrictions that protect the area’s values. Proposed projects will be analyzed on a site-specific basis. We have been considering and will continue to consider requests for permits. Permits will be granted with conditions specific to each request. The effects of leaf-blower use are included in the FEIS discussion of the effects on air quality of equipment used for Forest management activities. We anticipate them to be “minimal to non-existent” (FEIS page 88).

NFMA and other applicable federal laws do not prohibit the use of commercial timber harvest in special areas of a national forest, such as the natural areas at issue in this comment. In fact, NFMA contemplates the judicious use of timber harvest, and that is our

intent under the revised Plan. Where appropriate, timber harvest is a management tool that can improve wildlife habitat and the diversity of plant and animal communities. The FEIS discloses the programmatic effects of allowing harvest, as well as other management, in the natural areas. Plan standards carefully control effects on other resources in these areas. This is consistent with federal laws, such as the NFMA, that contemplate wise and sustainable multiple use of the national forests.

G. CANDIDATE WILD AND SCENIC RIVERS

212. The DEIS does not explain why the 3.5-mile section of Hutchins Creek within the wilderness is not eligible for Scenic or Wild status, with the remainder being Recreational.

RESPONSE:

The FEIS provides our rationale for not considering Hutchins Creek eligible for the Scenic status: The interspersed private ownership along the shoreline, presence of powerlines and ready accessibility to the stream were the main disqualifiers. The entire corridor of Hutchins Creek is eligible for classification as a Recreational wild and scenic river. Note, however, that the portions of Hutchins Creek that pass through Clear Springs and Bald Knob Wildernesses are part of those wildernesses and, so, are managed under the Wilderness management prescription, affording them a level of protection equivalent to that of a Wild river. This will protect the qualities of the creek for a possible, future suitability nomination.

213. The Plan should require that all segments of candidate wild and scenic rivers be managed as Scenic, except those portions that qualify for Wild, due to their proximity to roadless land. The EIS should disclose the effects of allowing these areas to degrade to a lower designation than that for which they were originally qualified.

RESPONSE:

FEIS Appendix D provides a classification analysis of the candidate wild and scenic rivers. “The potential classification of a river is based on the condition of the river and the adjacent lands as they exist at the time of the study” (FSH 1909.12, 8.22). Classification of the eligible stream segments under management prescription CR was based on the highest potential classification under 1909.12, 8.2. Appendix D documents the reasons that several segments of these streams are not eligible for the Scenic or Wild classification. The CR management prescription standards and guidelines provide adequate protection on national forest lands to prevent the possible degradation of the streams.

We found no evidence from the information and analysis developed during Plan revision, or provided by this comment, that all eligible segments should be managed as Scenic. FEIS Appendix D discloses the rationale for the potential classification of each stream, and explains why a higher classification was not given to some segments.

214. The Plan should specify management of Bay Creek as Scenic above the impoundment. Private land should not disqualify the creek.

RESPONSE:

We agree that private land, as a sole factor, does not disqualify a stream from consideration for the Scenic classification. As documented in FEIS Appendix D, private land, along with roads (some under other jurisdictions) and the level of development on some parcels of private land makes this segment of Bay Creek ineligible for the Scenic classification. Also, see response to comment above.

Monitoring and evaluation over the past ten years has indicated that similar programmatic direction is adequate to successfully protect eligible segments. There is no evidence that the revised Plan standards will not protect the outstandingly remarkable values associated with the eligible stream segments.

215. It appears that the management activities allowed by the Plan in candidate wild and scenic river corridors could have an adverse affect on the corridors. The EIS should address these effects.

RESPONSE:

The standard requires that “...the outstandingly remarkable values of these waterways shall be maintained.” Management practices allowable fall within the appropriate classifications of either Recreation or Scenic, and we do not expect them to have an adverse effect on the outstandingly remarkable values within the corridors.

216. The EIS should explain the relevance of cave and river resources as outstandingly remarkable values.

RESPONSE:

As we explain in FEIS Appendix D, for a river corridor to be considered eligible for the wild and scenic management system, it “...must be free-flowing and, with its adjacent land area, must possess one or more ‘outstandingly remarkable’ values” (FSH 1909.12, 8.21). An outstandingly remarkable value should be so rare or unique that it is significant at a regional or national, rather than local, level (FSH 1909.12, 8.21c).

217. The Plan should protect Big Creek and Lusk Creek as natural areas to retain their high quality and to preserve the native plants and animals found in them.

RESPONSE:

We agree. Standards and guidelines are in place to protect these streams as natural areas and as candidate wild and scenic rivers. Monitoring by the Forest and the state indicates that the water quality in Lusk Creek is of high quality, classified by the state as at the level of “full support” for its beneficial uses. Likewise, despite heavy recreational use, the Lusk Creek watershed resource-condition is not degrading. We have developed the management direction for natural areas, including Lusk Creek and Big Creek, in collaboration with state and other resource experts. We used the best scientific information available to develop standards and guidelines that will ensure sustainable use of these resources for future generations. Under the multiple-use framework of the revised Plan, monitoring will gauge the effectiveness of the standards, and adjustments will be made as necessary. We

anticipate that the areas will continue to be available for recreation and multiple uses while maintaining or improving the resource qualities that attract so many visitors.

218. The DEIS should explain why the history of Brasher Cave is not considered an outstandingly remarkable value of Barren Creek.

RESPONSE:

The planning team did not consider the history of Brasher Cave to be *regionally or nationally* significant (see FEIS Appendix D).

219. The Plan should provide that candidate wild and scenic river corridors be managed for non-roaded, natural experiences, rather than roaded as noted on Plan V-25.

RESPONSE:

For the most part, the lands within the stream corridors provide non-motorized recreation. However, Forest Service and non-Forest Service roads are located within the corridors. Management of existing roads does not conflict with either the Scenic or Recreational classification as long as the outstandingly remarkable values are protected.

220. The DEIS should explain why the high number of mussels in Barren Creek is not considered an outstandingly remarkable value, why “almost all recreational activity is primarily local” is a balance factor for Barren Creek, and why Barren Creek is not considered Scenic regionally.

RESPONSE:

The Forest Service found no threatened and/or endangered mussels in the 2002 survey (Welker personal communication, 2004). The biological evaluation of Barren Creek (planning record) indicated that populations of rare mussel species were not found in the stream where it flows on national forest ownership, but may be found within its lower reaches that are inundated by the Smithland Pool of the Ohio River, outside Forest Service jurisdiction. This would not qualify for regional or national significance in order to be considered an outstandingly remarkable value.

“Although several rivers on a National Forest may possess values which are similar to each other, each river’s values may not be outstandingly remarkable when considered in the context of the State or Nation” (FSH 1909.12, 8.21c). The Wild and Scenic River study process (planning record) describes the eligibility criteria for the outstandingly remarkable value of recreation: “Recreational opportunities are, or have the potential to be, popular enough to attract visitors from throughout or beyond the region of comparison or are unique or rare within the region. Visitors are willing to travel long distances to use the river resources for recreational purposes.” Barren Creek does not contain outstandingly remarkable values of regional or national significance, or values that are outstandingly unique when compared to other corridors and which attract visitors from beyond the local area. See also the discussion in FEIS Appendix D.

H. WILDERNESS

ROADLESS INVENTORY

221. The Forest Service should recommend for wilderness study Ripple Hollow, Camp Hutchins, Burke Branch and Murray Bluff. It appears that the Forest followed incorrect Regional guidance in conducting a roadless inventory and not proceeding to wilderness evaluation. The conclusions in DEIS Appendix D that no area of the Forest outside existing wilderness met roadless standards and that no area would be put to wilderness evaluation appear faulty. The four areas mentioned above seem to have been excluded by the Forest in violation of regulations and obvious congressional intent to allow wilderness areas of a smaller core-size than considered by the Forest. Management prescriptions for these areas do not protect them adequately.

RESPONSE:

We are required by regulation to address wilderness evaluation in two phases: First, we must confirm that areas previously identified as “roadless” are roadless in fact; and, second, we must perform a wilderness evaluation of the areas that we determine are roadless. In accordance with relevant laws and regulations, as well as our Regional Office guidance, we conducted the roadless inventory. As described in FEIS Appendix C, we found no areas of the Forest that met the qualifications for designation as roadless and, so, no area was considered for wilderness evaluation.

Based on the comments we received related to this issue, we reviewed the inventory and improved the discussion we offer in FEIS Appendix C. The comment suggests a mistaken view or interpretation of the Forest Service Handbook hierarchy found in the table of contents for each chapter within the Handbook. For the “Inventory of Potential Wilderness,” the directives hierarchy is as follows: 7.1 Inventory of Potential Wilderness, 7.11 Inventory Criteria, 7.11a Criteria for Including Improvements, 7.11b Criteria for Roadless Areas in the East, and 7.12 Listing and Mapping Roadless Areas.

The analysis process involves data-gathering or inventory and an evaluation of parcels identified as roadless. The data-gathering process was used to identify roadless areas that quality for placement on the inventory of potential wilderness in accordance with the criteria found in chapter 7, section 7.1. After placement on the Roadless Inventory, the area is then evaluated for its potential as wilderness in accordance with the guidance of chapter 7, section 7.12. We used the data-gathering step to determine if the RARE II areas are “essentially roadless and undeveloped.” These areas are discussed in FEIS Appendix C. The planning record contains detailed information for each of the areas analyzed.

The inventory and evaluation of roadless areas involves a complex methodology and analytical-process questions that require considerable technical expertise to resolve. We worked with regional and national experts to ensure that our approach to the roadless inventory and evaluation process was adequate, given the complex Handbook requirements and in the light of local conditions and resource information. Considerable effort was made to ensure that the spirit (or intent) as well as the letter of the Handbook was understood and fully satisfied. We considered the opposing and alternative interpretations of the Handbook submitted during Plan development, but concluded that the letter and intent of the Handbook mandated the approach to roadless evaluation set forth in FEIS Appendix C.

The approach taken and rationale documented in detail in Appendix C is both reasonable and consistent with the approach taken by other eastern national forests during forest plan revision. Our analysis and methodology reflects the agency's longstanding interpretation of its own directives regarding roadless-area inventory and evaluation.

Based upon the limited information provided in the comment, we can discern no evidence of a legal violation. We are cognizant of congress' intent with regard to eastern wilderness areas, and believe our methodology reflects that intent and a reasonable interpretation of the relevant Handbook provisions. The documentation in FEIS Appendix C is thorough with regard to the analysis of each of the areas of concern in this comment. All relevant factors were analyzed, and a rational connection between that analysis and the conclusions and findings is readily seen. We considered various public viewpoints with regard to the areas listed in this comment during this analysis.

Ripple Hollow and Camp Hutchins are in non-motorized roadless management areas, which will protect their wilderness potential until the next review. Burke Branch and Murray Bluff are in mature hardwood management areas, which will allow the appropriate balance of management and recreational use in each.

222. The DEIS Appendix C addresses written comments on the roadless inventory that were received at the public meeting on the evaluation. It should also address the substantive comments that were made verbally at the same meeting.

RESPONSE:

For the protection of the individual making comments, we do not accept verbal comments at public meetings. Those who attend our meetings know that we provide forms for the expression of comments or, if an individual declines to write the comment, we will write it for that person and obtain a signature to confirm the comment was transcribed correctly. No such comments were offered or received at the subject meeting.

WILDERNESS MANAGEMENT

223. The Forest Service should maintain a trail-density standard for wilderness; trail density influences solitude. The EIS should address unauthorized user-developed trails and disclose the effects on users of denser trails.

RESPONSE:

A trail-density standard for each wilderness area was evaluated in the DEIS under Alternative 3. Trail density is a mathematical calculation of miles divided by acreage that has little correlation with solitude. Well-located and -designed trails and the numbers of users have greater influence on solitude than density, especially in dense, hardwood forests. The effects of unauthorized user-developed trails on wilderness are discussed on FEIS pages 64-65, 263. The effects of equestrian use are further described on FEIS pages 107, 204-205, 247-248, 266, 281-284, 288, 290-291, 295-296.

There is no legal requirement in the Wilderness Act, NFMA, or elsewhere to include a trail-density requirement in a forest plan. Trail-density standards are not mandated by any Forest Service policy. The density standards were included in the 1992 Plan based upon the information available at that time, but they have not contributed meaningfully to sustainable

recreation management. Over time, the basis for establishing particular density values has been challenged, and now appears antiquated.

Based upon new information and our experience under the 1992 Plan, the revised Plan (following the lead of other national forests) proposes to protect solitude and wilderness values by designating trails and restricting cross-country riding (with its potential to increase the miles of user-developed trails) during site-specific decision-making. There is considerable evidence that proper trail design, location and construction effectively mitigate effects and protect wilderness character.

The comment suggests that trail density will increase as a result of the elimination of the trail-density standard. This is speculative and may or may not be the case. The actual miles of trails per acre will be determined based upon site-specific resource information (e.g., vegetation available for screening, topographic screening, etc.) after further project-level environmental analysis. Trail density may in fact be considerably less than the 1992 Plan standard, depending upon local conditions.

224. Please identify the “restrictive management” cited on DEIS page III-253.

RESPONSE:

“Restrictive management” refers to the Non-motorized Recreational Area management prescription under which Ripple Hollow will be managed.

225. Please identify the legal basis for allowing fish ponds in wilderness, as well as the fish ponds to which this applies.

RESPONSE:

Plan standard WD26.3 prohibits the construction of new ponds as well as maintenance of existing ponds.

226. The Plan should clarify the management of natural areas within wilderness. It is not clearly stated that administrative access is allowed to state-owned natural areas within wilderness areas. The Forest Service should take reasonable precautions to ensure equestrian use is controlled to prevent damage to significant ecological features within natural areas.

RESPONSE:

Access to private inholdings within wilderness is addressed in Forest Service policy, FSM 2325. Means of access would be arranged on a case-by-case basis. The Plan restricts equestrian use in natural areas to designated trails.

I. RECREATION

ATV USE

227. The EIS should consider the history and enforcement issues of ATV use on the Forest.

RESPONSE:

These issues are considered and identified in the FEIS: Pages 48-49 identify past actions on the forest, including ATV and OHM use, both authorized and unauthorized, and the use of off-highway and sport utility vehicles and trucks; page 276 includes discussions of law-enforcement problems with ATV use.

The FEIS analysis is based on the history of ATV use and the enforcement issues the Forest has experienced concerning ATVs since the first Plan was adopted in 1986. Much of this story is documented in the monitoring reports used in development of the revised Plan. We were also informed by what is occurring on nearby national forests (*e.g.* Hoosier, Mark Twain, Land Between the Lakes), as well as on state lands.

While ATV/OHM use is a permissible recreational use of the national forests, it must be properly managed to protect resource values. Recreation, like other multiple-use activities on the Forest, must be sustainable. The Forest reviewed the trail-corridors analysis in the 1992 Plan and other available information. The demand for riding opportunities was carefully considered, as was the cost (in both dollars and staff) of developing, after site-specific analysis, a designated trail system. The cost and personnel requirements of maintaining and enforcing an ATV/OHM system were considered. The potential effect of a designated system upon chronic unauthorized use was also discussed. There is no clear indication that trail designation would reduce illegal use (studies show that this may or may not occur). We noted that the Mark Twain National Forest is working on a detailed administrative study to shed light on the management issues associated with ATV/OHV use on national forests.

Both historical and law-enforcement ATV/OHM information were an important part of the development of the FEIS. Based upon that analysis, the selected alternative determined that resources were not available to properly plan, designate, construct, maintain and enforce an ATV/OHM trail system during this planning period. Competing recreational demands would exhaust the budget and recreation staff resources available to the Forest during this planning period.

CAVE MANAGEMENT

228. Cave management should be separated from recreation management in the Forest Plan.

RESPONSE:

We disagree. The flora, fauna and geology within caves warrant special protection from the people that enjoy recreational activities associated with caves. The standards and guidelines associated with cave management are designed to protect sensitive resources from recreational visitors; consequently, their place in the recreation management section

of the Plan is important. Any additional protection of caves for sensitive species is provided under other standards and guidelines.

229. Timber removal can have an adverse affect on caves and springs by increasing water flow and sediment, resulting in adverse effects on caves and springs more than a mile away. Clearcut harvest changes water flow into caves and the EIS should analyze this possibility. The Forest Service should develop a standard to protect the microclimates of caves.

RESPONSE:

Caves are a sensitive resource that can be affected by a variety of activities on the ground surface. Potential effects on caves would be considered during the site-specific analysis of proposed surface actions. The land-ownership pattern near some caves provides little potential for protecting or affecting the microclimates within these caves. The revised Plan standards and guidelines specify appropriate actions that, when implemented, would protect the microclimate in caves.

The revised Plan does not authorize any timber harvest on the Forest. It simply identifies potential harvest methods for future, site-specific decision-making. The FEIS for the revised Plan discloses, in a programmatic, broad fashion, the potential effects of allowing harvesting on the Forest. Since the Plan contains no site-specific harvest proposal, the FEIS offers no analysis of site-specific information, such as effects on particular caves, as there may never be any timber harvest in their watersheds. The potential effects upon caves are best analyzed by considering the size, type and season of harvest, and a myriad of other site specific-factors that are not appropriate at this level of programmatic environmental analysis.

GENERAL RECREATIONAL USE

230. The DEIS states on page III-286, “Since vegetation treatments aid in the restoration and maintenance of natural areas and the oak-hickory forest-type, the eventual loss of species diversity (under Alternative 3) could adversely affect recreational users,” and on page III-287 (in reference to the lack of timber removal under Alternative 3), “This would result in large trees becoming larger, offering a greater amount of shade than other alternatives, but would offer less diversity of plant and wildlife in the long term. The loss of wildlife habitat in the long term would have an indirect effect on hunting and other wildlife-related recreational activities.” The EIS should provide the scientific basis for these statements. It seems that timber removal would have a greater, long-term adverse effect on recreational use than the conversion of the forest from oak-hickory to maple-beech.

RESPONSE:

The decreased visitor-use estimate for Alternative 3 in FEIS Table 3-54, as compared with Alternative 2, is based in part on fewer miles of trail available, mandatory seasonal trail closures and the closure/obliteration of all existing trails in natural areas and some trails in wilderness. In addition, reduced visitor use is expected due to the overall reduction of plant and animal diversity under Alternative 3 and the fact that over 50 percent of Forest visitors have identified wildlife-oriented recreation as a desirable activity (USDA Forest Service, 2002). While a mature beech-maple forest would attract visitors, it is estimated that hunting opportunities and some wildlife-viewing opportunities would decline with the loss

of available habitat. The degree of decline is a professional estimate, however, and is not confirmed by data collected.

Timber-harvest activities are expected to adversely affect recreation in the short term; however, with the use of shelterwood with reserves, large trees will be retained, reducing the adverse effects on recreation described. Adverse effects are still anticipated in the area of harvest and for the first 15 years until the understory provides shade for recreational users. However, we expect that recreational use will improve in the long term with restoration of native oak-hickory forest communities, the maintenance of natural areas and the enhancement of biodiversity.

231. The DEIS states, “Alternative 2 would restrict horseback-riding to designated system trails and allow the seasonal closure of equestrian trails not constructed for all-season use.” Since the restriction will only apply after site-specific analyses and decisions, the EIS should disclose the effects that will occur until the restriction is implemented in each area.

RESPONSE:

The effects of off-trail or cross-country equestrian use are disclosed in the FEIS under the “Dispersed Recreational Use” section of the effects analysis for each resource area.

J. HERITAGE RESOURCES

232. The EIS should disclose how many archaeological sites (heritage resources) are being protected. The Plan gives no indication of the magnitude of the job of protecting heritage sites. Data on the number of sites by type and the acreage involved should be included in the Plan. If no comprehensive inventory exists for the forest, the Plan should identify this as a goal for the future.

RESPONSE:

There are about 3,000 archaeological sites recorded on the Forest. Of these, four are listed on the National Register of Historic Places (NRHP): Millstone Bluff, the Great Salt Springs, the Illinois Iron Furnace and Battery Rock. Forty-three sites have been determined to be eligible for the NRHP by the Keeper of the Register or through documented consultation with the State Historic Preservation Officer (SHPO). Another 566 sites have been determined ineligible for the register by the Keeper or through documented consultation with the SHPO. The remaining 2,369 sites are potentially eligible for inclusion on the NRHP. Further evaluation is needed before a formal determination of eligibility can be made. Projects are designed around these sites in order to preserve and protect their values.

233. All significant heritage resources should be managed automatically under the Heritage Resource Significant Site management prescription. Commercial timber removal should not be allowed on significant heritage resource sites.

RESPONSE:

All significant sites may not be large enough to manage as a management area. In any case, all archaeological sites listed on the NHRP, eligible for listing and potentially eligible are protected from earth-disturbing activities, including timber removal.

234. Significant heritage-resource sites managed under Plan standard HR24 are classified as unsuitable for timber production, but the commercial or non-commercial removal of timber may be used to achieve other site-specific objectives. Timber should be managed only as needed to maintain, restore, or enhance an area’s unique features; to control non-native invasive species; or for wildlife habitat improvement.

RESPONSE:

Whether timber is removed commercially or non-commercially, the effects are the same; there is no differentiation between the two with regard to ground-disturbances.

235. The Heritage Resource Significant Site management prescription is inappropriate for wildlife openings, as they are not natural and distract from the sites.

RESPONSE:

As noted in Plan standard HR26.2 no new openings are allowed. The wildlife openings that are already in place have been there from 25 to 70 years and will not further affect any intact cultural deposits.

K. VISUAL QUALITY

236. Regarding filter-strip management, the DEIS states, “The corridor of trees left in the filter-strips would mitigate or soften visual contrasts caused by nearby timber harvesting...Along perennial streams, the filter strip would effectively divide the harvest units, thereby creating the perception of two separate openings” (III-297). This statement seems baseless since the Plan provides no standard prohibiting harvesting in filter strips. Additionally, the appearance of two separate openings can be as unsightly as a single one.

RESPONSE:

Protection of water quality is an important goal in the revised Plan (Forest Plan page 25, Goal O). The Plan also contains objectives to guide the use of programmatic direction in future site-specific decision-making.

It is important—for forest health, ecological restoration and wildlife habitat management reasons—to have vegetation management as a potential tool for the protection and management of vegetation in filter strips. It is unlikely that timber harvesting would be used in filter strips, as this land is considered unsuitable for timber management and timber removal could only be used to achieve other resource-management objectives. Vegetation management, which would be limited by the bare-soil exposure-limits in the Plan, as well as by site-specific project mitigation measures, could have beneficial ecological and wildlife benefits. Failure to take action may allow for the spread of insects, pathogens and invasive species, or exacerbate other forest-health issues. Thus, the Plan envisions limited vegetation management in filter strips at some time in some locations over the 10-15-year life of the Plan. The Plan does not propose, authorize, or mandate any site-specific action in the filter strips.

The programmatic direction for filter strips is based on the best available scientific information. We concluded that the best course of action to promote forest health was to allow for the possible use of limited, judicious vegetation-management actions in filter strips. Research has shown that such action can be undertaken without adverse water-

quality or aesthetic effects, and can benefit the environment over time. For these reasons, and based on the rationale documented in the FEIS, the Plan filter-strip guidelines provide sufficient direction for flexibility in management of vegetation and other forest-health issues adjacent to streams and lakes.

We assume that the concern about two separate openings appearing as unsightly as one refers to an observer's perception of size and scale of opening, assuming both openings could be seen at once. However, the guidelines assume that the observer would not be able to see both at once, or that at least the perception of opening would be substantially reduced because the views were visually buffered by the filter strip. See the discussion about the relationship between slope and width of filter strip as noted in the filter-strip guidelines (FEIS pages 58-60).

Although the guidelines are intended to protect soil and water resources, they will also complement the visual resource. For instance, within a landscape that is relatively flat (ten percent or less), the width needed to restrict views through the filter-strip is not as much as when the slope becomes steeper. According to these guidelines, as the slope increases the width of the filter strip increases. As the width of the filter strip increases, the more difficult it will be to see through the filter strip. One opening that is separated by a filter strip reduces the amount of seen area and creates two smaller areas. The shape, relative scale and amount of seen area of an opening will be subject to design considerations that complement the surrounding landscape character at the project level. Whether or not an opening is seen is not the issue; but, rather, how it is seen.

237. The DEIS states, “The visual effects associated with even-aged timber harvest may last more than 20 years” (III-300). It seems that they will last much longer, perhaps decades.

RESPONSE:

In on our review of scientific literature, we have found that the duration of the effects of timber harvesting on scenic beauty varies with the forest-type, and the manner of timber harvesting. In the western Douglas fir and larch type, ratings of scenic beauty reached the “Like” portion of the scenic-beauty estimation-scale about 10 years after clearcut harvesting, while lodgepole pine took 15-20 years after clearcutting to reach the same aesthetic rating (Benson and Ulrich, 1981). In a shortleaf pine-oak-type in Arkansas, Rudis *et al.* (2004) found no statistical differences in scenic beauty between clearcut, group selection, shelterwood and untreated stands four years after treatments. In Michigan, photos taken two years after clearcut harvesting were rated much higher than photos taken shortly after harvest, probably due to the regeneration in the clearcuts (Schroeder *et al.*, 1993).

Photos E, F, G in the Visual Resource section of the SNF 2002 Monitoring Report show prolific vegetation growth in the Whoopie Cat timber-sale area that has occurred in the 15 years since timber removal was performed in this area. A combination of clearcutting and shelterwood harvest was done in this area and the inventoried visual-quality objective of modification was met. It appears that, within 20 years of harvest activities, visitors to this remote location of the Forest will not be able to tell or have a concern that a clearcut was done here. However, some Forest visitors may associate vigorous growth and healthy forest conditions with clearcutting.

Although this is a complex area of emerging science, there seems to be little disagreement among scientists that the aesthetic effects of harvest are diminished with time. Based on the findings in other areas and our own monitoring of effects on the visual resource, we believe that, within 20 years of harvest activities, visitors to the Forest will not be able to tell or have a concern that even-aged harvests were carried out. However, some Forest visitors may associate vigorous growth and healthy forest conditions with an even-aged forest stand.

238. The DEIS states, “The visual contrasts by silvicultural methods are listed in descending order: clear-cutting, shelterwood, group selection and single-tree selection” (III-300). Shelterwood seems to be effectively a two-step clearcut. Once the clearcut is complete, it would appear to be a clearcut.

RESPONSE:

We disagree. The standard shelterwood and shelterwood-with-reserves methods offer flexibility to accomplish vegetation management goals as well as visual-quality objectives. The visual-quality guidelines in Plan Appendix F list mitigation measures that are needed to meet the visual-quality objectives. The shelterwood-with-reserves method will likely be used in areas of the Forest that have a higher visual sensitivity. If needed, this method provides the flexibility to leave the remaining stock indefinitely as a means of mitigating the visual concern of slow regeneration.

In a shortleaf pine-oak-type in Arkansas, Rudis *et al.* (2004) found no statistical differences in scenic beauty between clearcut, group selection, shelterwood and untreated stands four years after treatments. Schroeder *et al.* (1993) found that photos taken two years after clearcut harvesting were rated much higher than photos taken shortly after harvest, probably due to the regeneration in the clearcuts. Since the purpose of the shelterwood harvest method is to develop regeneration in the understory prior to the removal of the overstory, the shelterwood method should help reduce the visual impact when the overstory is finally removed.

Although the Plan envisions the future use of shelterwood and shelterwood with reserves, the finding of appropriateness or optimality required by NFMA Section 1604(g)(3)(F) is not to be made in this programmatic document, nor does the Plan contain any site-specific harvesting proposal. The Plan simply identifies the probable methods of harvest, as required by NFMA Section 1604(f)(2). The actual determination of harvest method will be made at the site-specific project-level using local factors and information in a project-specific analysis. The aesthetic concerns associated with particular sites would be part of the analysis of harvesting and guide the choice of harvest method during project development.

239. The DEIS states, “A negative visual condition has prevailed over several decades in un-thinned pine-stands within developed recreational areas and along visually sensitive travel corridors” (III-296). The condition would not appear negative to the many visitors who would like to see and camp in pine.

RESPONSE:

We agree that the texture and dark-green color of these conifers provides a pleasant visual contrast to the deciduous trees in the forest, especially in the leaf-off season. However,

since these pine stands have not been thinned adequately over time, they are overstocked and very dense. The concern with these stands is that they are prone to wind damage and mortality within a short time period. Since the stands that were mentioned are located in highly visible areas, the declining condition of the stands will become more visually evident to recreational visitors over time.

240. The DEIS states, “The eventual large-scale die-off (of the non-native pine stands) will bring about a dramatic visual-character change” (III-297). However, the DEIS fails to address the fact that hardwoods are coming back into the pine stands.

RESPONSE:

The result of regenerating hardwoods has no bearing on the existing visual condition of these decadent stands of pine and their scraggly appearance. The variety of tree species that are coming back or may come back after the inevitable collapse of these pine stands is not relevant to the existing visual condition or the expected visual condition of these stands as they continue to decline. The only relevant comments about the condition of these pine stands are those that address how these declining pine stands may be treated to ameliorate the safety hazards of falling limbs and the negative visual condition that exists and will continue to exist in visually sensitive areas, if nothing is done.

241. It seems that the visual-quality objective for natural areas should be preservation instead of retention.

RESPONSE:

We disagree. Since the preservation visual-quality objective allows for “ecological changes only,” the landscape management activities necessary to maintain the scenic integrity of the natural areas makes this visual-quality objective too restrictive in many cases.

L. MINERAL RESOURCES

242. Mining, mineral extraction and oil/gas leasing, exploration and development should be banned on the Forest. These activities conflict with recreation, clean water and quality wildlife habitat.

RESPONSE:

An abundance of laws directs mineral activity on national forest land, including the 1872 Mining Law, the Organic Act of 1897, the Mineral Leasing Act of 1920, the Mineral Leasing Act for Acquired Lands of 1947, the Mineral Leasing Act Revision of 1960, the Multiple-Use Sustained-Yield Act of 1960, the Mining and Minerals Policy Act of 1970, the Energy Security Act of 1980, the Federal Onshore Oil and Gas Leasing Reform Act of 1987 and the Energy Policy Act of 2005. The Energy Security Act specifically directs the Secretary of Agriculture to process applications for leases on national forest system lands, regardless of the status of forest plans. Additionally, the fact that congress has identified certain types of areas as not subject to leasing (e.g., in congressionally designated wilderness areas) implies that additional, discretionary, “off-limits” designation without congressional review or involvement should be limited and made with clear justification. Our interpretation of the intent of congress is that a federal land manager’s discretion not to lease or allow development is somewhat limited. The land manager must clearly demonstrate, based on adequate record, that oil and gas leasing is not only detrimental to the management of

national forest resources, but also is neither scientifically nor economically necessary nor justifiable.

There are no facts to support the contention that the resources on the Forest are too sensitive to allow oil and gas leasing or other mineral activity. History provides many examples that indicate the contrary (e.g., more than 100 exploratory wells for petroleum have been drilled within the boundary of the Forest over the years and most are difficult or impossible to find today). Objects and land-disturbances much larger than well locations have been restored and have disappeared into the natural landscape with no adverse effects on the environment in the long term, including water, wildlife resources and recreation.

In any case, the revised Plan makes no consent-to-lease determination. It only identifies lands that are administratively available for development and specifies surface-use/occupancy stipulations (see 36 CFR 228.102[c], [d]). The Plan does not mandate or authorize minerals development. “Administratively available” simply means that land has been identified or listed as suitable for possible future oil and gas development. Such development may never occur. Subsequent to this decision, the Forest Supervisor will consider leasing determinations for specific lands (see 36 CFR 228.102[e]). Prior to any ground-disturbance, the lessee must receive approval of an application for permit to drill from the Bureau of Land Management and the Forest Service. The approval process for surface activities under a lease includes the appropriate environmental analysis in compliance with NEPA.

243. Regarding performance bonds for mineral extraction, who has jurisdiction, the Forest Service or the Bureau of Land Management? Who will issue the bonds and who will monitor the bonds?

RESPONSE:

The Forest Service is responsible for issuing and collecting bonds associated with surface disturbance from operations involving common-variety minerals, such as gravel. The Bureau of Land Management is responsible for issuing and collecting bonds associated with hardrock, leasable minerals and oil/gas operations. Both agencies are responsible for monitoring mineral operations covered by bonds. If, at any time, the responsible officer from either agency determines that the bond is inadequate, the bond may be increased. If the industry violates the terms of the lease, the bond may be revoked and the industry held liable for additional actions. For oil/gas operations, the industry is subject to a state bond in addition to the bond held by the Bureau of Land Management.

244. The Plan standard associated with the management of outstanding or reserved mineral rights should be eliminated. Eminent domain authority should be used to acquire these private rights.

RESPONSE:

We disagree. The language in the deed or similar conveyance document associated with outstanding or reserved mineral rights varies; consequently, the mineral rights reserved are variable. Considering that there are no current cases involving the exercise of outstanding or reserved mineral rights, the value of these rights would be considered speculative. Additionally, there are no threatened, endangered or sensitive resources under current threat from the holder of outstanding or reserved mineral rights. It is entirely

inappropriate to expend public funds to acquire these speculative property rights without a known threat to sensitive resources.

245. The analysis of direct and indirect effects of minerals management was inadequate because of the focus on settling ponds. The issues of subsidence, water-use effects, spills and effects on groundwater should be addressed.

RESPONSE:

The issues identified indeed warrant analysis; however, the appropriate time to perform this analysis is during the site-specific review of specific proposals. The revised Plan makes no consent-to-lease determination; neither does it make any on-the-ground proposal for action. It simply identifies lands administratively available for development and specifies surface-use/occupancy stipulations (Appendix H). Therefore, it would be inappropriate to speculate on any specific activities that might occur and what their effects might be. The Plan does not mandate or authorize minerals development and, in any case, such development may never occur. Prior to any ground-disturbance, the lessee must receive approval of an application for permit to drill from the Bureau of Land Management and the Forest Service. The approval process for surface activities under a lease includes the appropriate environmental analysis in compliance with NEPA.

246. All mining or drilling should require analysis under NEPA and include a requirement to protect national forest land.

RESPONSE:

We agree. A site-specific environmental analysis will be performed prior to any mineral activity to identify and protect forest resources. Special stipulations and mitigation measures will be applied to all surface-disturbing mineral activities (Plan Appendix H).

247. The Plan guideline that states all land is available for non-surface-disturbing mineral exploration is a site-specific commitment of resources that should be eliminated.

RESPONSE:

We disagree. The revised Plan guideline FW28.1 states that exploration *may* be allowed, not *shall* or *must* be allowed. The Plan identifies lands that are administratively available for development and specifies surface-use/occupancy stipulations (Appendix H). It does not mandate or authorize minerals development that may never occur. Prior to any ground-disturbance, the lessee must receive approval of an application for permit to drill from the Bureau of Land Management and the Forest Service. The approval process for surface activities under a lease includes the appropriate environmental analysis in compliance with NEPA.

Non-surface-disturbing mineral exploration does not commit Forest resources to any use. Exploration provides scientific information regarding the geology and mineral potential. Each proposal for non-surface-disturbing exploration will be individually analyzed prior to implementation.

248. The mineral lease in the Camp Hutchins area is a good example of how a mining lease can hamper management. The Forest Service should request funds to buy back old leases.

RESPONSE:

The comment provides no information regarding how management of the Camp Hutchins area has been “hampered.” Since there have been no leases of federally owned minerals in the area, it appears to be based on a misapprehension. We disagree that funds should be appropriated to buy back old leases for the same reasons stated in Response 244 for not acquiring all outstanding and reserved mineral estates.

249. Plan guideline FW28.4, addressing recreational rock collecting, needs to be more specific than “most management prescription areas.”

RESPONSE:

We agree and have clarified the guideline to prohibit collection in natural areas, developed recreational sites and heritage resource significant sites.

250. The Forest Plan should make it clear that more stringent terms and conditions can be applied.

RESPONSE:

We agree. For this reason, Plan Appendix H identifies conditions of approval. It clearly states that the conditions may be used in part or in their entirety, depending on the recommendations of the site-specific analysis.

251. The EIS should disclose the effects of mining and oil/gas leasing.

RESPONSE:

As stated earlier, the revised Plan makes no consent-to-lease determination. It identifies lands that are administratively available for development and specifies surface-use/occupancy stipulations (see 36 CFR 228.102[c], [d]). The Plan does not mandate or authorize minerals development. “Administratively available” simply means that land has been identified or listed as suitable for possible future oil and gas development. Such development may never occur. Subsequent to this decision, the Forest Supervisor will consider leasing determinations for specific lands (see 36 CFR 228.102[e]). Prior to any ground-disturbance, the lessee must receive approval of an application for permit to drill from the Bureau of Land Management and the Forest Service. The approval process for any surface activities under a lease includes the appropriate environmental analysis in compliance with NEPA. The FEIS addresses programmatically the reasonable development scenario and the effects of development.

252. The EIS should address artificial openings in the forest canopy associated with oil and gas exploration. A thorough species evaluation should be implemented prior to the creation of any opening.

RESPONSE:

The effects of canopy openings associated with oil and gas exploration would be determined during site-specific analysis.

253. The DEIS failed to compare alternatives or analyze what would happen if there is a spill. The document failed to point out any standard that requires these protective measures.

RESPONSE:

FEIS pages 79-80 address brine spills and pages 80-81 address oil spills. There is no potential for brine or oil spills through the implementation of Alternative 3 because the federal mineral estate would be unavailable, or Alternative 4 because no surface occupancy would apply Forest-wide. The potential for brine and oil spills through the implementation of Alternative 1 and 2 are the same.

254. The DEIS statement on page III-38 regarding water-quality protection associated with oil and gas leasing is questionable. What was the methodology of past monitoring and does it comply with the USDA Information Quality guidelines? Did these monitoring results receive peer review?

RESPONSE:

Forest Service and BLM personnel have been monitoring well-sites on federal lands throughout the United States for many years and the methodology has varied. Based on the monitoring, BLM created best management practices and, with the Forest Service, is currently updating the *Gold Book* (Oil and Gas Surface-Operating Standards for Oil and Gas Exploration and Development). The best management practices and standards in the *Gold Book* were developed to minimize environmental effects on federal lands, including the protection of water quality. Best management practices and standards are in Appendix H.

The monitoring employed under the 1992 Plan was designed to allow the Forest to evaluate water quality. No oil and gas leasing has occurred since then; therefore, no oil and gas development-related site-disturbance has occurred on the Forest for a considerable time. The water-quality monitoring is of high quality and verified by independent, state water-quality monitoring of various watersheds on the Forest. Water-quality information is displayed on FEIS page 53. No evidence has been presented to us in this comment or elsewhere that the Forest's water-quality monitoring information is insufficient. To the contrary, there is little information available in Illinois to match the consistent and thorough monitoring done on the Forest. We have diligently gathered and compiled monitoring data, and that data shows the positive results of stewardship. More information can always be collected, but budgets, time and other priorities must also be considered. The data from past water-quality monitoring and evaluation is of high quality.

Our monitoring strategy was likewise developed based upon the best available science, and using the input and advice of state, federal and other resource experts. Information regarding the monitoring of water quality in forested environments of the state, especially that peer-reviewed and found in scientific journals, was, of course, most valuable to us. High-quality data and information were used to develop the monitoring strategy. Nothing has been presented in the comment or elsewhere that we have overlooked or ignored information in the development of this aspect of the Plan. Monitoring is an area of considerable discretion under NFMA and its regulations. We are concerned about maintaining good water quality on the Forest and have developed reasonable monitoring to ensure that we are moving towards revised Plan goals and objectives. We have taken the USDA information quality guidelines into account in the development of the monitoring.

255. The DEIS states (III-39) that Alternative 2 would allow for surface occupancy with stipulations, but notes that this would only be a guideline within the Cave Valley Area. This statement is interpreted as indicating that surface occupancy could be incorporated in Cave Valley and other sensitive areas without special stipulations.

RESPONSE:

The DEIS states, “No-surface-occupancy stipulations would apply in Cave Valley...” No reference is made to this being a “guideline.” There are Plan standards in each of the management prescriptions for the sensitive areas cited in the DEIS statement that provide no-surface-occupancy stipulations.

256. The EIS should quantify the effects on soils by alternative. Alternative 1 requires that bare-soil exposure limits be applied, but Alternative 2 and 4 do not include this requirement.

RESPONSE:

The FEIS on page 79 quantifies the effects on soils by alternative. It states that operational plans approved under Alternatives 1 and 2 would address the mitigation of soil-disturbance by limiting new road construction and requiring necessary revegetation techniques. There would be no soil-disturbance under Alternative 3 because the federal mineral estate would be unavailable for leasing, or under Alternative 4 because the no-surface-occupancy stipulation would apply Forest-wide. Bare-soil exposure limits are stipulated under all alternatives.

257. Although the reasonably foreseeable development scenario in the DEIS (page III-39) indicates that 10 to 20 acres could be affected, the effects on these acres could be significant.

RESPONSE:

We disagree. Prior to drilling, an environmental analysis of the potential effects of each site must be performed. Additionally, each operation must comply with the conditions of approval, which incorporate best management practices. As the FEIS states, the potential for adverse affects is minimal.

258. The economic analysis associated with the anticipated revenue from oil and gas leasing is questionable. Revenues from leasing under Alternatives 1, 2 and 4 were identified, but revenues lost from recreation and tourism were not identified for these alternatives.

RESPONSE:

We consulted other national forest units and units in the state park system regarding the effect of oil and gas development on recreation and tourism. None of these units have reported a sharp decline in recreation or tourism, nor could they identify a definitive cause-and-effect relationship between oil/gas leasing and a reduction in tourism and recreation. Recreation tends to decline in the seen area of the facility only. Considering that our reasonable development scenario indicates that 10 to 20 acres could be affected, the number of displaced recreational users and tourists is too low for measurement.

M. SOCIOECONOMICS

259. Please explain how the present net value of the alternatives was calculated.

RESPONSE:

The calculation of the present net values of the alternatives is described under the economic efficiency analysis in the FEIS Appendix B.

260. Please explain and clarify Table 3-52, Employment by Program Alternative, and identify the source of the data.

RESPONSE:

The impacts of the alternatives are projected based on Forest expenditures and the estimated outputs in two principal program areas of Forest management: recreation/tourism and timber. Recreation/tourism includes expenditures by local and non-local visitors who engage in a variety of activities, including those related to fish and wildlife. Combined, the recreation activities provide the most support for employment. The second major source of employment is from Forest Service expenditures on its programs. Employment based on national forest timber production is the third major source of employment. Payments to states/counties are a minor component of the overall impacts. The latter are based on policies that provide local units of government some financial support, depending on the historic level of revenues coming from the SNF to the federal treasury. The SNF provides a constant level of payments based on the high three payments between fiscal year 1986 and fiscal year 1999.

Alternative 4 provides the highest number of jobs, a 26 percent increase over the current situation (108 additional jobs). The largest source of additional jobs is from timber production. Timber provides job support only for the three alternatives (1, 2 and 4) in which there is non-firewood timber management. Alternative 1 provides a similar number of jobs as Alternative 4 (518 vs. 520 jobs). However, the timber-based jobs are higher whereas jobs based on recreation and Forest Service expenditures are lower. Alternative 2 supplies a 21 percent increase over the current employment level. The increase, in descending order of magnitude, is from timber, recreation and Forest Service expenditures.

N. LAND-OWNERSHIP ADJUSTMENT

261. The Forest should extend the proclamation boundary to include portions of the Mississippi River floodplain in order to enhance biological diversity and cooperation with other agencies, and to provide recreational benefits.

RESPONSE:

We agree. On October 7, 2004, the Undersecretary of Agriculture approved the Middle Mississippi River Purchase Unit, an area of about 60,000 acres. Its establishment provides opportunities to acquire land within the Mississippi River floodplain between Fountain Bluff and Thebes. A recommendation to congress to expand the proclamation boundary is expected to be part of the decision selecting the revised Plan.

262. The Dixon Springs Agricultural Center managed by the University of Illinois seems to be an inappropriate and incompatible use of national forest land that appears to violate the

law. The center appears to be operating without appropriate environmental consideration under NEPA. The Forest Service should require the university to return the land within five years.

RESPONSE:

The federal land occupied by the Dixon Springs Agricultural Center (DSAC) was not acquired for national forest purposes. The United States acquired title to the land occupied by DSAC, as well as adjacent land currently managed by the Forest, for use by the USDA Resettlement Administration and its successor, the USDA Farm Security Administration. The programs of these agencies were developed in response to the Great Depression, which had intensified rural poverty, forced down agricultural prices, increased over-farming and led to erosion.

The majority of federal land managed as part of the Forest was acquired under the authority of the Weeks Act of 1911, which authorizes and directs the Secretary of Agriculture “...to examine, locate and purchase forested, cutover, or denuded lands within watersheds of navigable streams as in his judgment may be necessary to the regulation of the flow of navigable streams or for the production of timber.” The land occupied by DSAC was acquired under the authority of the Bankhead-Jones Farm Tenant Act of 1937, which authorizes and directs the Secretary of Agriculture “...to develop a program of land conservation and land utilization in order thereby to correct maladjustments in land use, and thus assist in controlling soil erosion, reforestation...”

The University of Illinois was allowed to occupy the federal land managed by the Resettlement Administration (later the Farm Security Agency) under authority of the Hatch Act of 1887. Section 1 (2) of this law directs, “...it is the policy of Congress to continue the agricultural research at State agricultural experiment stations...” The DSAC was established in Pope County, Illinois to aid this poverty-stricken area in improving farmland and farming techniques.

As the role of the Farm Security Agency was diminishing around 1938, about the time that the Forest was being proclaimed, the two USDA agencies agreed that the Farm Security Agency would transfer management authority of the land to the Forest Service. However, the receiving agency made a firm commitment to the University of Illinois that it could continue to occupy and utilize land for experimental purposes. Because this commitment was part of the agreement to convey management authority, it is viewed in a manner similar to a titular right (i.e., outstanding or reserved right).

The economic condition of Pope County has improved significantly since 1933, and the mission of the DSAC has responded. Agricultural research remains the sole goal; however, DSAC is responding to research needs of the region, rather than local needs only. One of the best examples of beneficial research from the DSAC involves “no-till farming.”

We disagree that DSAC is an inappropriate or incompatible use of national forest land operating outside the law. The use by DSAC represents a firm and historic commitment of the University of Illinois and the USDA to provide agricultural research. We do, however, remain open to the consideration of land exchanges that would transfer ownership of all or part of this federal land to the University of Illinois.

263. The Forest should prohibit additional land purchase and use the funds for the proper management of the existing national forest land.

RESPONSE:

Congress appropriates funds for the Forest Service and assigns funds to specific categories. Forest officers do not have the authority to utilize funds designated for land purchase to achieve other management goals.

264. The Forest should purchase additional land for expansion, consolidation of ownership, acquisition of scenic sites and biologically sensitive areas, and the reduction of fragmentation.

RESPONSE:

We agree. The Forest annually submits a proposal to compete for funds from the Land and Water Conservation Fund. This proposal identifies privately owned land parcels available for acquisition that provide sensitive species habitat, consolidation benefits, outstanding scenery, recreational attraction, or other benefits. In some years, the proposal is successful; in others it is not.

265. The Forest should acquire all available property rights when land is acquired to consolidate holdings.

RESPONSE:

We agree. The acquisition of all available property rights simplifies future management and is preferable. In many cases, the Forest has refused land because the title included encumbrances that were incompatible with national forest management.

We recognize that southern Illinois has a history of mineral extraction and that long ago mineral estates were separated from surface estates of many land parcels now available for acquisition. However, we likely would acquire land parcels with outstanding mineral estates if they offer surface resources desirable for national forest acquisition and management.

266. The Forest should acquire land to consolidate ownership and so limit the influence of “exurban development.” Forest management activities from prescribed burning to hunting are adversely affected by exurban development.

RESPONSE:

Exurban development refers to the out-migration of people from urban and suburban areas to sites previously considered rural. We agree that consolidation of national forest ownership reduces the impacts of exurban development, along with reducing the potential for conflict between users of the Forest and adjacent landowners. (Hunting and other recreational uses of the Forest have led to unintended trespass on private land.)

267. The EIS should disclose the effects of “cut and swap” land exchanges unless they are prohibited by the Plan.

RESPONSE:

The Forest Service does not identify any land-for-land exchange as a “cut and swap.” Each land exchange must be evaluated based on the ecological, economic and social values associated with the federal and private land being considered. Some parcels of private land that have been subject to past timber harvest provide outstanding values and should receive site-specific evaluation for acquisition through land exchange.

268. The Plan should prohibit all land exchanges because some isolated parcels involve high-quality habitat that supported migrant songbirds, endangered species and the rural neighborhoods of southern Illinois. These isolated parcels should be expanded through land purchase.

RESPONSE:

We disagree that all land exchanges should be prohibited. Land exchange can be an effective tool to consolidate ownership and protect sensitive habitat. As stated above, each land exchange must be evaluated based on the ecological, economic and social values associated with the federal and private land being considered. During past evaluations, we have discovered that some small parcels considered isolated contained resources that warranted retention in federal ownership, including karst topography, archeological sites, sensitive species habitat and similar resources. We sometimes have discovered that the private parcels being offered were far superior to the national forest land, based on the resources considered. When it is discovered that isolated land parcels contain important resources, consolidation activities are considered.

269. The Plan should allow no additional land-adjustment activities because of potential limitation on recreational activities, especially horseback riding.

RESPONSE:

We disagree. It is important to protect the sensitive resources of the Forest. Land-adjustment actions, especially those that improve consolidation of the Forest, provide greater opportunities for public recreation in a manner that avoids adverse effects on sensitive sites.

270. The Plan should specify that priorities for land acquisition are wilderness inholdings and land adjacent to wilderness, Camp Hutchins, Ripple Hollow, Burke Branch, natural areas, candidate wild and scenic rivers and habitat for threatened and endangered species. Inholdings in large blocks of forest and other ecologically important land should be the next priority.

RESPONSE:

The priorities listed in the Plan (page 51) are similar to those in the comment: The first is land needed to carry out programs specified, prescribed or endorsed by acts of congress or department policy (e.g., wilderness); the second is land needed to block-in or consolidate existing national forest land that is valuable primarily for watershed protection, access, special feature or sensitive-species management or recreation; the third is other land

parcels desirable and suitable for Forest purposes that would also enhance management efficiency.

271. Land may be more protected under private ownership; consequently, acquisition by the Forest does not necessarily improve protection.

RESPONSE:

We agree. Some owners of private land provide the maximum protection by prohibiting access by all parties. Forest land is open to public use, with restrictions prescribed to protect resources.

272. A consolidated land base does not lead to more efficient management because the public cannot use land that is traded away.

RESPONSE:

We disagree. In many cases, the public does not have access to isolated land parcels conveyed in land-for-land exchanges and, consequently, could not use the land prior to the exchange. A consolidated land-base reduces the cost of landline location, special-use management and boundary adjustments. Additionally, public recreation within a consolidated land-base reduces the potential of unintended trespass on private land.

273. The Plan lists the number of acres in the Mississippi and Ohio Rivers Floodplains management prescription. This seems to indicate that additional land may be acquired within this prescription.

RESPONSE:

The Plan provides the number of acres currently managed under each management area prescription. However, based on the establishment of the Middle Mississippi Purchase Unit, we hope to acquire additional land to be managed under this prescription.

O. PROCESS

ANALYSIS

274. The Plan states, “Within its natural-resource capabilities and long-term sustainability, the Forest will provide a balance of multiple uses and public benefits that best meet desires and expectations” (IV-1). It is unclear whose desires and expectations are being best met.

RESPONSE:

As we stated in the Forest Plan goal of multiple-use management, the Forest will be managed to provide a *balance* of multiple uses and public benefits. This means that a balance of the desires and expectations of a variety of citizens and interest groups would be met. Obviously, it is not possible for us to satisfy all of the desires and expectations of all the various interests in how the Forest should be managed.

275. The Forest has been provided a copy of the “Citizens’ Call for Ecological Forest Restoration.” The EIS should disclose how the Plan’s restoration strategy responds to the principles in the Citizens’ Call.

RESPONSE:

We reviewed the paper, “Citizens’ Call for Ecological Forest Restoration: Forest Restoration Principles and Criteria” (planning record). It states that the primary goal of forest restoration is to enhance ecological integrity by restoring natural processes and resiliency. The Forest Plan goals for ecosystem management, forest ecosystem health and sustainability, wildlife and fish management, and threatened, endangered and sensitive species incorporate many of the principles and criteria put forth in the paper. The Plan will incorporate various forms of protection and passive and active restoration. We have conducted a broad-scale ecological assessment as proposed in the paper and believe that the Plan is an important intermediate-scale assessment.

We used the best available scientific information, as well as our experience, monitoring information and public participation to develop the alternatives. The Forest was particularly sensitive to the quality of information used in the development of the alternatives. The 2002 Citizens’ Call document appears not to have received any peer review, nor has it been published (to our knowledge) by any scientific journal. The Forest did, however, consider the broad views espoused by the document in review of the EIS alternatives. The Citizens’ Call was not written specifically for the unique ecological conditions found on the Forest. New information, as well as science that is particularly focused on the central hardwoods ecosystem involved here, was available to the Forest for use in the development of alternatives. Although Citizens’ Call was considered, the Forest also used and relied more heavily upon published, peer-reviewed, scientific information. The scientific basis for the FEIS is documented in the planning record.

276. The DEIS states, “The proposed action is the revision of the programmatic Forest Plan.” The DEIS should disclose which current management directions do not require revision. The entire Plan is being replaced. The Forest should prepare a supplemental DEIS to address this.

RESPONSE:

The 1992 Forest Plan was the basis and starting point for the Plan revision. As described in the DEIS, a “need for change” analysis was conducted to determine what change was required in the 1992 Plan. Our proposed changes were disclosed in the notice of intent to revise the Forest Plan. We identified some additional changes during the analysis process and incorporated them in the proposed Plan. The revised Plan will have many of the same management goals and desired conditions as were included in the 1992 Plan.

The Need for Change analysis documents the review of existing Plan direction. The public input received during scoping for the DEIS also shaped development of the preferred alternative. The disclosure of proposed changes to the 1992 Plan (and thus those matters that would remain unchanged) is clearly documented in the record. The public was engaged in this process and public input influenced the content of what was proposed in the DEIS and preferred alternative.

It is important to note that NFMA and its regulations do not require that particular topics be re-visited during forest plan revision. Instead, NFMA and its regulations provide Forests with the discretion to determine how best to revise the forest plan. As is described in the revised Plan, an in-depth analysis and comprehensive public participation process was used to determine the initial path for the revision of the 1992 Plan. Based on information

received at this stage, alternatives were developed. Again, public participation was key, and we consulted with agency planning and resource experts to ensure that the revision process for the revised Plan was appropriate, given the forest-planning efforts ongoing nationwide. After more than two year's work, the DEIS was made available for 90 days of public review. Thus, the public had the opportunity to participate in shaping the revised Plan from the beginning of the process. We solicited input on what should be changed, and listened to the public throughout the planning process. The key issues addressed in the EIS are the product of this comprehensive analysis and public participation process.

A supplemental DEIS is required only under certain conditions (see 40 CFR 1502.9[c]). We see no evidence in this comment or elsewhere that the DEIS was so seriously flawed as to preclude meaningful public comment on the alternatives proposed to the public. There is no indication that the public was confused about what was proposed to be changed in the DEIS. Many people proposed other changes, and these comments were considered in the development of the FEIS. The record demonstrates that the public, as well as the decision-maker, were aware of the portions of the Plan that were proposed for revision. There is no evidence that a supplemental DEIS is required, would benefit the public, or change the selected alternative in any way.

277. In the DEIS, the discussion of cumulative effects is inadequate.

RESPONSE:

The comment does not explain how or why the cumulative effects analysis is flawed. In light of the 1995 court decision, NEPA regulations and recent CEQ guidance, we have examined the cumulative effects of the revised Plan and disclosed them in the FEIS. The level of disclosure and analysis is commensurate with the nature of the programmatic decision being made. No specific proposals for ground-disturbing action are before the agency at this time and, so, none are analyzed in this programmatic EIS. It is impossible to predict at this time where, when, or how site-specific actions will be executed during the 10-15 year life of the Plan. Moreover, third-party proposals for mineral development or special uses of the Forest may be proposed during the life of the Plan that are, at this time, unforeseen.

The actual level of activities, e.g., of trails construction or timber harvest, will be determined through future site-specific analysis and decision-making. Further cumulative effects analysis will be undertaken at the project level of decision-making, when actual, concrete information is available to the agency. The revised Plan is not self-executing, but relies upon staged-decisionmaking (i.e., site-specific survey, analysis and decision-making) to accomplish its broad programmatic goals and objectives. Thus, the cumulative effects analysis at the programmatic level cannot possibly disclose effects from all specific future projects that may occur over the next 15 years, as the Forest does not have (nor will it ever have) information on where, when, and how 10-15 years of prospective projects will be implemented. NEPA does not require us to engage in unreasonable, speculative analysis. Further cumulative effects analysis will be accomplished at the project level of decision-making.

In addition, it is important to note that the *Hoosier-Shawnee Ecological Assessment* was used in development of the EIS for the revised Plan. This broad-scale, scientific assessment provides another important part of the overall picture. The assessment sets forth

information on vegetation, animals, soil, water and other resources that was used in consideration of the potential environmental effects.

BIOLOGICAL ASSESSMENT AND BIOLOGICAL OPINION

278. The Forest Service published the biological evaluation for the Regional Forester sensitive species, but not the biological assessment of effects on federally listed threatened and endangered species. The public should have been able to comment on both the biological assessment and the biological opinion issued by the US Fish and Wildlife Service before the end of the comment period on the DEIS and proposed Plan. The Forest should make the documents available for review in a supplemental DEIS.

RESPONSE:

We have completed formal consultation with the US Fish and Wildlife Service and have received a biological opinion and incidental-take statement. Consultation is required by the Endangered Species Act and its regulations; there is no requirement for formal public comment. Through the NEPA process, the public has had ample opportunity to comment on the Forest's disclosure of the potential effects of the programmatic revised Forest Plan on federally listed species. The comment provides no explanation or evidence of how this process was flawed, nor is there any indication that the selected alternative would have been different had there been an additional public-comment opportunity. We have incorporated the information received during consultation into the FEIS, Plan and Record of Decision.

Because the Forest and the Fish and Wildlife Service were engaged in discussions during Plan development, it is not surprising that the changes in the FEIS and Plan resulting from consultation do not present a different picture from the effects disclosed in the DEIS. The public was not deprived of an opportunity to comment, given the extensive opportunity to participate in the development of the DEIS and then comment upon it. The extensive comments received on the DEIS are an indication that the public was fully informed of the choices and trade-offs identified for the preferred alternative.

DATA QUALITY

279. The DEIS does not comply with USDA Data Quality Guidelines.

RESPONSE:

To our knowledge, all Forest-published documentation related to the revision of the Plan, including the DEIS and FEIS, meet USDA Data Quality Guidelines. The comment does not indicate how the DEIS fails to comply with the Data Quality guidelines. The EIS was developed by an interdisciplinary team of agency resource specialists using the best available scientific data. Data quality was a key concern in the development of the analysis, with the team careful to consider the quality and integrity of all information used, especially with regard to resources, the range of alternatives, and disclosure of potential environmental effects. Scientific information was solicited from other federal agencies, state resource agencies, and other recognized experts and scientists. The context and geographic scope of scientific information was of particular importance in this analysis. The team gave greatest attention to peer-reviewed scientific information in published scientific journals and texts.

The interdisciplinary team was aware of the Data Quality Act's provisions and recognized that the broad terms of the Act provide considerable discretion to federal agencies to address information quality. By its terms, the statute creates no legal rights in third parties (i.e., no legal right to information access or correctness). The Act simply provides that the Office of Management and Budget draft guidelines concerning information quality and specifies what those guidelines should contain. (The Forest's understanding of the Act is informed by the 2005 court decision in the context of grazing on the Lewis and Clark National Forest, Goodrich v. Forest Service, where the court found that the statute did not include a private cause of action.) Although the USDA information quality guidelines are not intended to be legally binding, the interdisciplinary team gave careful attention to this guidance during development of the EIS.

EDITORIAL

280. The Forest should make certain editorial and/or format changes and/or corrections to the texts of either the EIS or the Forest Plan.

RESPONSE:

Our response to these requests is reflected in changes, if any, to the respective texts.

HOOSIER-SHAWNEE ECOLOGICAL ASSESSMENT

281. The ecological assessment violates USDA Information Quality Guidelines. The Forest Service directed the scientists to say what is in the assessment. The document is currently the subject of a lawsuit and should not be used.

RESPONSE:

Early in our Plan-revision process, the Shawnee and Hoosier National Forests determined that additional information was necessary to support the analyses of our Forest Plans. The *Hoosier-Shawnee Ecological Assessment* was developed by local scientists and resource specialists in response to this determination. The assessment was assembled and edited by Dr. Frank Thompson, a respected scientist with the North Central Research Station, part of the research and development branch of the Forest Service. The North Central Research Station published the assessment under the protocols for a general technical report. The assessment meets USDA Data Quality Guidelines. It is preposterous to suggest that the Forest Service directed scientists to reach predetermined conclusions, or that scientists would accommodate such direction. The referenced lawsuit challenges the unavailability of the draft assessment under the Freedom of Information Act, not the assessment itself.

The comment fails to indicate how the assessment violates the Data Quality Act. As noted in Response 279, the Forest carefully considered the quality of data and scientific information used in Plan development. Many resource experts and scientists, as well as a large volume of published scientific information, were consulted to develop the alternatives and assess environmental effects. The assessment was prepared by researchers, not forest managers. State and other resource experts have requested the document and expressed their gratitude at having it as a reference resource. Aside from this comment, the document has received wide acclaim in southern Illinois and Indiana as useful, scientific information. There is no evidence that the integrity of the data is less than acceptable. The unsupported claims in the comment do not provide any evidence or basis on which to question its worth or scientific

importance; neither does the comment provide any peer-reviewed, published scientific information to refute or challenge the assessment.

MODELING

282. The DEIS states, “A model created by the Missouri Department of Natural Resources was used to predict the effects of various management activities on the MIS habitat and populations.” What, if any, adjustments were made to the model to take into account the difference between Missouri and Illinois? What are the assumptions of the model? Do they address species numbers or successful reproduction? Has the Forest Service verified the accuracy of the model? How does the model comply with the USDA Data Quality Guidelines?

RESPONSE:

The Habitat Suitability Index (HSI) model was described on DEIS pages III-109 and III-112 and in Appendix F. Additional information can be found in the 1992 Plan Appendix H-7 and in the planning record.

The assumptions used in the model are disclosed on FEIS pages 142-143 and 145, in FEIS Appendix F, page 118, and in the planning record. The model and its assumptions are accurate and acceptable for use in southern Illinois, as well as Missouri. The HSI model was used as intended, within the limits of model assumptions and limitations. Species numbers and reproduction are not specifically addressed in the model, but are implied in habitat suitability and capability estimates, in that the most suitable and capable habitats should support the largest numbers of individuals, including breeding individuals. This was discussed in the 1992 FEIS Appendix H.

The wildlife biologists responsible for running and analyzing the model and its results constantly compared the model results with their on-the-ground knowledge of Forest habitats and MIS populations in the subject locations. The reliability of the model for game species such as the northern bobwhite is supported by monitoring data from the Missouri Department of Conservation (MDC) for similar habitats on MDC conservation areas (from the *Wildlife Habitat Appraisal Guide* for the model). The models for MIS songbirds were reviewed by Dr. Scott Robinson of the University of Illinois and the Illinois Natural History Service and Mr. Todd Fink (deceased) of the IDNR in the early 1990's and adjusted based upon their local knowledge of songbird habitats and populations on the Forest.

The Forest was scrupulous with regard to the scientific integrity of the modeling used during Plan revision and documented the assumptions, limitations and proper use of models in the planning record. Model results were reviewed by state and Forest Service wildlife experts as part of the proposed Plan and DEIS review process. This included sending the proposed Plan and DEIS to species viability evaluation panel members, which included species experts from Illinois universities and from the IDNR. The model results and other parameters associated with the use of the modeling were also disclosed to the public in the DEIS.

The record demonstrates that we employed a reasonable methodology and disclosed the limits of that methodology, properly applying the HSI model to the Forest. In summary, the record assures the scientific integrity of HSI modeling by documenting the specific scientific

methodology used in reaching wildlife conclusions, the supporting data for those conclusions and the connections or relationship among conclusions, data and modeling.

The model, also known as a habitat evaluation procedure, or HEP model, was revised and verified by the Missouri Department of Conservation to provide the Forest Service with a habitat-analysis tool in response to the requirements of NFMA. The model meets the general requirements and the objectivity, utility and integrity criteria found in the USDA Information Quality Guidelines. HSI models are used by the US Fish and Wildlife Service and other federal agencies in evaluating the effects on wildlife of large federal actions.

283. The DEIS indicates that Alternative 3 has the highest present net value. Where did the numbers in the table (page III-317) come from and how were they calculated? How do the calculations account for the adverse effect timber removal has on recreation?

RESPONSE:

As explained in the DEIS Appendix B, the figures in Table 3-56 were generated from the IMPLAN economic-impact model. The model utilized Forest-related recreation-use figures from the National Recreation Use Survey.

NATIONAL FOREST MANAGEMENT ACT

284. The proposed revised Plan standards and guidelines do not appear to be in compliance with NFMA. They are vague, do not contain measurable and quantifiable standards and do not contain sufficient timeframes for implementation.

RESPONSE:

We disagree. The federal regulations at 36CFR219.11(c) require only that “multiple-use prescriptions and associated standards and guidelines for each management area” be included in the forest plan content. The regulations do not require that the standards and guidelines be measurable and quantifiable.

Each management prescription is defined by goals and a desired future condition clearly distinguishable from other prescriptions. Standards and guidelines for each management prescription establish clear direction, as well as boundaries, or limits, for actions that may be taken at some future time in those areas. We disagree with the view that the standards and guidelines are vague. NFMA and its regulations allow considerable discretion for field managers to draft appropriate standards and guidelines to meet local conditions. The comment offers no explanation or evidence indicating what particular standards are “vague.”

We have taken great care to draft direction for the revised Plan that allows for management flexibility to address the dynamic conditions of complex ecosystems. The interdisciplinary planning team, drawing on its collective expertise and the experience gained implementing the 1992 Plan, and in consultation with field managers, staff and other agency planning and resource experts, developed appropriate standards after considering physical, biological and social information. The combination of standards and guidelines, as written, provides managers with the flexibility to accomplish the goals and objectives of the Plan, while protecting sensitive resources and ensuring long-term sustainability.

285. Plan guideline EH24.1 appears to violate NFMA. NFMA restricts the use of even-aged management, not uneven-aged management as does the Plan.

RESPONSE:

Our analysis for the revised Plan led us to the conclusion that even-aged management should be the predominant silvicultural system and that shelterwood and shelterwood with reserves should be the predominant methods of harvest, *if even-aged management is determined to be appropriate*. This is as required by NFMA: even-aged management must be determined to be the appropriate silvicultural system. Plan guideline FW24.1 provides criteria for determining the appropriateness of even-aged management on a project-specific basis.

286. Plan guideline EH24.2 appears to violate NFMA. The Forest Service cannot prohibit the use of single-tree selection. The DEIS does not disclose the effects of this prohibition.

RESPONSE:

We agree that single-tree selection should not be ruled out for the management of shade-tolerant species such as sugar maple and American beech, as is discussed in Plan Appendix D. We have revised Plan guideline EH24.2 to reflect this. It is important to note that the Forest Plan does not authorize or prohibit site-specific timber-harvest methods. NFMA, 16 U.S.C. Sec. 1604(f)(2), simply requires that plans identify the proportion of probable harvest methods. The determination of when, where, and how timber will be harvested is a project-level determination based on site-specific conditions and analysis.

RANGE OF ALTERNATIVES

287. Federal regulations, specifically at 36 CFR 219.12f, provide several requirements for the range of alternatives. It does not appear that many of these requirements have been met. Please disclose how each of the requirements has been met and identify which alternative complies with which requirement. For example, please identify which alternative responds to the RPA.

RESPONSE:

The cited regulation (from the 1982 planning rule) requires that alternatives “be distributed between the minimum resource potential and the maximum resource potential to reflect to the extent practicable the full range of major commodity and environmental resource uses and values that could be produced from the forest...,” “...reflect a range of resource outputs and expenditure levels...,” “...be formulated to facilitate evaluation of the effects...,” “...provide different ways to address and respond to the major public issues, management concerns, and resource opportunities identified during the planning process...” The range of alternatives we developed in collaboration with the public during the planning process and analyzed in the EIS satisfies the regulatory requirements.

Section 219.12(f) lists nine factors—discussed below—to be included in developing the range of alternatives for a forest plan. As is documented in the planning record, we have met these requirements. The summary below shows that we carefully considered and complied with each aspect of 36 CFR 219.12(f) in the development of the programmatic FEIS.

1. *Alternatives shall be distributed between the minimum and maximum potential* (36 CFR 219.12[f][1]). We conducted benchmark analysis to define the range within which the alternatives can be constructed (Section 219.12[e][1]). Benchmarks estimate the Forest's physical, biological and technical capabilities. The alternatives for the revised Plan were developed to be within this range. See benchmark analysis in FEIS Appendix B.

2. *Alternatives shall be formulated to facilitate analysis of opportunity costs and of resource use and environmental trade-offs* (219.12[f][2]). The alternatives in the FEIS were formulated to emphasize different environmental effects and resource uses in a multiple-use context. A computer program was used to analyze the trade-offs among many goals, constraints, management activities, timing options and land-types. This analysis is documented in Chapter 3 and FEIS Appendix B.

3. *Alternatives shall be formulated to facilitate evaluation of effects on present net value, benefits and costs* (219.12[f][3]). FEIS Appendix B contains an economic analysis commensurate with the level and nature of the programmatic decision.

4. *Alternatives shall provide different ways to address and respond to the major public issues, management concerns, and resource opportunities identified in the planning process* (219.12[f][4]). The analysis in this revision of the Forest Plan focused on the issues identified by the public and the agency in the need-for-change analysis. Major public issues, management concerns and resource opportunities were further identified through analysis of the comments received after publication of the notice of intent to publish the DEIS. The EIS discloses the major public issues and how they were identified, as well as how the alternatives respond to these issues (FEIS Chapters 1 and 2).

5. *Reasonable alternatives that may require changes in law or policy to be implemented shall be formulated if necessary to address a major public issue, management concern, resource opportunity* (219.12[f][5]). We have been provided no evidence in this comment or elsewhere that would lead us to conclude it was necessary to develop an alternative that would require changes in existing laws or policies.

6. *At least one alternative shall be developed which responds to and incorporates the RPA Program tentative resource objectives for each forest as displayed in the regional guide* (219.12[f][6]). The NFMA of 2000 required the withdrawal of regional planning guides, superseding the requirements of the 1982 planning rule regarding an alternative that responds to the RPA “as displayed in the regional guide.” The Regional Forester, on November 7, 2001, directed, “Forest Plan revisions (under the 1982 planning rule) should develop and evaluate alternatives that respond to these goals and objectives (of the USDA Forest Service Strategic Plan) in order to meet the requirements of 36 CFR 219.12(f)(6).”

The goals of the strategic plan are: 1) Reduce the risk from catastrophic wildland fire, 2) Reduce the impacts from invasive species, 3) Provide outdoor recreational opportunities, 4) Help meet energy resource needs, 5) Improve watershed condition, and 6) Conduct mission-related work in addition to that which supports the agency goals. Alternatives 1, 2 and 4 meet to some extent all the goals and objectives of the USDA Forest Service Strategic Plan. Alternative 3 fails to “help meet energy resource needs” (goal 4) and, with its prohibition on the use of pesticides, fails to provide all the tools necessary to “reduce the impacts of invasive species” (goal 2).

7. *At least one alternative shall reflect the current level of goods and services provided by the unit and the most likely amount of goods and services expected to be provided in the future if current management direction continues (219.12[f][7]).* Alternative 3 reflects the current level of goods and services and the likely future scenario if the existing court-enjoined management were to continue. As noted elsewhere, the projections of commodity production are simply that, projections. They are not binding commitments to produce particular levels of goods and services. The actual amount of goods and services produced during the planning period is influenced by budgets, staffing, weather events (tornadoes, windstorms, e.g.), natural events (such as fire) and many other factors.

8. *Each alternative shall represent to the extent practicable the most cost-efficient combination of management prescriptions examined that can meet the objectives established in the alternative (219.12[f][8]).* Each of the alternatives developed for the programmatic EIS represents, to the extent practicable, the most cost-efficient combination of management prescriptions to meet the objectives of each alternative and move the Forest towards the desired future condition described for that alternative. Given our budget situation, we took great care to consider the cost-efficiency of implementing various management actions. Economic concerns (especially our ability to fund future management actions, such as trail maintenance) were an important part of the development of management prescriptions and alternatives.

9. *Each alternative shall state at least (i) the condition and uses that will result from long-term application; (ii) the goods and services to be produced, the timing, together with associated costs, benefits; (iii) resource management standards and guidelines; and (iv) the purposes of the management direction proposed (219.12[f][9]).* Each alternative analyzed in the EIS describes the results of long-term application of the management prescriptions. The timing, flow and other aspects of potential commodity production are described as projections in the FEIS. The alternatives describe the resource management direction and purposes of that direction.

288. The DEIS refers to Alternative 1 as “No Action” and states, “Adoption of Alternative 1 would continue management under the 1992 Plan...” Even though it may be a reasonable alternative, this does not appear to be the no-action alternative. The no-action alternative should be management under the federal court injunction.

RESPONSE:

We have correctly identified Alternative 1 as the no-action alternative. The activities enjoined by the court ruling on the 1992 Plan are not implemented under Alternative 3. Thus, continuation of the situation imposed by court injunction was analyzed in detail. The tradeoffs between this restricted-management alternative and other management direction are detailed in FEIS Chapter 3. The record clearly demonstrates that the lack or absence of certain management actions may have future, adverse environmental consequences.

289. The DEIS does not offer an adequate range of alternatives. The Forest Service should consider alternatives that:

- Provide more protection to threatened and endangered species.
- Include more management indicator species.
- Modify Alternative 3 by removing avenues for timber removal, providing enforceable guidelines, maintaining large openlands, calling for the removal of Dixon Springs Agricultural Center from national forest lands, addressing oak-hickory with prescribed fire only (no timber removal), recommending several areas for wilderness study and/or inclusion, and ending the disabled access ATV permit program.
- Prohibit all prescribed burning and allow fire to take its natural course.
- Prohibit timber removal in areas unsuitable for timber production.
- Prohibit commercial timber removal.
- Eliminate all effects of equestrian use.

RESPONSE:

We gave considerable thought to the view expressed in this comment, but concluded that the range of alternatives considered in the FEIS (including those analyzed in detail and those that were not) was reasonable. FEIS Appendix B describes the public-involvement process we used to guide the identification of issues and development of alternatives. Many of the suggested alternatives were analyzed or considered in the EIS, and many of the suggestions for changes in alternatives are encompassed in one or more of the existing alternatives analyzed in the EIS.

NEPA requires analysis of a broad range of reasonable alternatives, but does not mandate that any particular alternative be selected. An agency's discussion of alternatives in a programmatic EIS must be bounded by some notion of feasibility. There is no requirement to consider alternatives that are impractical or infeasible. CEQ guidance (46 Fed. Reg. 18026) [1981]), as well as many federal courts, have stated that the range of alternatives is bounded by the purpose of the proposed action. As one judge noted, when the purpose of a proposed action is to accomplish one thing, it makes no sense to consider alternative ways by which another thing may be accomplished. NEPA does not require agencies to consider alternatives that are inconsistent with the basic policy objectives for the management of the area. Nor is there any requirement in NEPA that an EIS discuss a minimum number of alternatives. In this EIS, we are required to set forth only those alternatives necessary to make a reasoned choice.

1) *Provide more protection for threatened and endangered species.* We fully incorporated this suggestion into the alternatives considered in the programmatic EIS. Each of the alternatives analyzed in detail was crafted with the protection of threatened and endangered species foremost in mind. Each places a strong emphasis on the conservation and recovery of federally listed species; the selected alternative doing this through Forest-wide standards and guidelines and management direction in Plan Appendix H.

2) *Include more management indicator species.* The rationale for the choice or selection of MIS was influenced by the discretion left to local land managers in 36 CFR 219.19(a)(1). The record fully discloses why certain species were selected as MIS, and why others were not.

Since MIS are simply an indicator, and the choice or number of MIS by itself has no environmental effects, there is no reason to consider alternatives with greater numbers of MIS. The MIS identified in the revised Plan provide the basis for full compliance with 36 CFR 219.19(a)(6).

3) *Modify Alternative 3 . . .* We considered the specific modifications suggested in the comment, but found them to be impractical, infeasible, or not meeting purpose and need.

4) *Prohibit all prescribed fire . . .* This suggestion is very similar (including environmental effects) to Alternative 3, which envisions the limitation of prescribed burns to the maintenance of rare ecosystems. This alternative captures and discloses the environmental trade-offs from a very low use of prescribed burns as suggested in this comment.

5) *Prohibit timber removal in unsuitable areas . . .* This suggestion is very similar (including environmental effects) to Alternative 3, which envisions no removal of trees for any reasons other than public health or safety, firewood cutting, natural area management outside of wilderness, and administrative needs. This alternative addresses the suggestion of little or no timber removal in unsuitable areas.

6) *Eliminate all effects of equestrian use.* This comment suggests that we analyze in detail a proposal that would not meet the purpose and need for Plan revision. Through public involvement and in recognition of the long-standing recreational use of horses on the Forest, the purpose and need states that recreation management was a major topic for plan revision. In accordance with information we received during NEPA scoping and the need-for-change analysis, the management of equestrian use—not the prohibition of this recreation entirely—was clearly identified as a pressing need. Equestrian management was addressed in the alternatives examined in the FEIS and will be addressed in the future in site-specific environmental analyses related to project proposals. We considered this suggestion appropriately in the development of the alternatives.

RELATIVE-VALUE ANALYSIS

290. Management that prescribes timber removal, oil and gas development, road building, extensive and repetitive burning and pesticide use cannot be the result of an honest and unbiased relative-value analysis. Such management would harm values that are rare or unavailable on other lands in the region and that are necessary in order for the Forest Service to meet certain legal requirements. It is an abuse of agency discretion to base a relative-value analysis on incomplete or inaccurate information.

RESPONSE:

The term “relative-value analysis” is not found in NEPA, NFMA, or their regulations. Rather, the phrase appears in the Multiple-Use Sustained-Yield Act (MUSYA) definition of the term “multiple use.” MUSYA, 16 U.S.C. Sec. 531(a), states that multiple use includes “consideration being given to the relative values of the various resources . . .” The Act, in the broadest terms, states that the Secretary of Agriculture is to administer the renewable resources of the national forests for “multiple use.” MUSYA does not prescribe a “relative values analysis,” neither does it give any indication of the content, nature, or limits of such analysis. Other than the unpublished district court opinion on the 1992 Plan, we are not aware of any court ever considering a relative-value analysis in the nearly 50 years since

MUSYA was enacted. There are no regulations or policies that prescribe a written relative values analysis or its content.

While acknowledging that a relative-values analysis was completed, this comment suggests that the revised Plan and its EIS are flawed because the analysis is inadequate. Given that there is no specific requirement in MUSYA to document “consideration” of “relative values,” nor any law, regulation, or policy by which to judge the adequacy of such an analysis, we are uncertain as to why the commentator indicates the revised Plan is flawed.

Regardless, the record documents that the interdisciplinary planning team and the decision-maker gave “consideration to the relative values of the various resources” and documented the essence of this balancing of resource trade-offs. This is all the law requires. As one federal district court judge noted, MUSYA bleeds discretion at every pore. It is hard to imagine statutory language that could be more discretionary than 16 U.S.C. Section 531(a): “Consider the relative values of the various resources.” The detailed disclosure in the programmatic EIS and revised Plan comply with this requirement and are fully within the discretion contained in MUSYA.

The comment embodies a particular (relative) viewpoint, specifically, that the result of management—the managed forest—is always of lesser value than an unmanaged forest. This is simply not the case. A good example is the lack of fire and the decline of oak-hickory forest and the resulting reduction in the diversity of plant and animal communities. A decline in early-successional habitat (large openlands) is another example of the deleterious consequences of passive or no action. Some invasive species will not be eliminated from the Forest without the careful use of herbicides. The lack of action allows these invasive plants to thrive and spread (including to adjacent private lands). Congress mandated in NFMA and other applicable law that national forests would be available for timber harvest and the development of mineral resources. The record shows that congress has sharply defined the limits or bounds of the Forest’s “relative-value” analysis by mandating in federal laws enacted since the passage of MUSYA in 1960 that such actions are allowable on the Forests. The comment reflects a viewpoint, but contains no concrete, credible information that we have ignored.

We have sought diligently to use the best available and most accurate information in the environmental analysis for the revised Plan (including the balancing of relative values). We are aware that there is always the prospect of gathering more and better information. However, congress does not require in NEPA or NFMA that the agency gather new information; but, rather, that the Forest Service use the best *available* information. The information used in the balancing of relative values is accurate, complete and reasonable. We have been provided no evidence in this comment or elsewhere to suggest otherwise. As noted above, MUSYA puts no limit on the agency’s discretion in balancing or “considering” the “relative values” of “various resources,” nor any direction as to what type or quality of information should be used in this “consideration” or balancing of uses.

STANDARDS VS. GUIDELINES

291. The Plan’s guidelines appear to be unenforceable, meaningless as mitigation measures, and should be changed to standards. No need has been identified for this major change in the enforceability of guidelines. Only the standards and guidelines of the 1992 Plan are enforceable, so the Forest should prepare a supplementary DEIS to address the effects of implementing the revised Plan without the ability to enforce the guidelines. For this reason, certain guidelines should be made standards.

RESPONSE:

The Plan states in the introduction to the standards and guidelines: “A standard is...a course of action that must be followed or level of attainment that must be reached, to achieve Forest goals. In general, standards limit project-related activities rather than compel or require them. Adherence to standards is mandatory. Deviations from standards require a Forest Plan amendment and must be analyzed and documented in an environmental analysis...A guideline is a course of action that should be followed in most circumstances, but which could require flexibility related to site-specific factors. Deviations from a guideline must be analyzed and documented in a project-level environmental analysis, but do not require a Plan amendment...”

Most guidelines were written as they were because the protection they provide is important; but we also recognized that there could be circumstances under which implementation of such mitigation measures might not be feasible or practical. In these instances, discretion is provided the decision-maker to consider on-the-ground conditions and adjust management action, as necessary. However, the decision-maker must explain and fully examine the effects of not following the guidelines contained in the Plan.

We disagree with the speculation in this comment that the guidelines in the revised Plan are somehow “unenforceable.” To the contrary, the guidelines were drafted in concise, clear terms that are easily enforceable in the context of site-specific resource conditions. The comment provides no specific information to indicate how the guidelines in the revised Plan are legally insufficient (i.e., violate NFMA) or will not provide adequate resource protection. The comment intimates or presumes that guidelines will not be followed—a speculation or opinion unsubstantiated by any credible evidence. In the majority of situations, Forest line officers will observe and fully implement the guidelines at the project-level of analysis and decision-making. The guidelines provide efficacious and efficient resource-protection, allowing for adjustment to meet local, on-the-ground conditions. They are an important part of the revised Plan, and we are confident that their implementation, together with Plan standards and other direction, will provide an excellent programmatic framework on which to base future, site-specific decisions.

IV. COMMENTS AND RESPONSES OUTSIDE THE SCOPE OF THE PLAN REVISION OR DEIS

A. ATV PERMITS FOR DISABLED ACCESS

292. The Plan is unclear as to whether or not the ATV permit program for disabled access will be continued. The DEIS does not disclose current numbers of permits. The Forest Service should address the effects of the program in a supplemental DEIS with alternatives to the program.

RESPONSE:

We are re-evaluating the permit program in light of new regulations. The design and regulation of the program is outside the scope of the programmatic nature of the Plan and the EIS. The effects of the program are described throughout FEIS Chapter 3.

B. EXPRESSIONS OF OPINION AND INTEREST

293. We received statements of opinion related to the quality of the DEIS and/or the revised Plan, as well as to specific issues with the on-the-ground management of the Forest, ranging from praise to criticism.

RESPONSE:

We appreciate all expressions of interest in our programs.

294. We received critical comments—positive and negative—regarding the planning and NEPA analysis processes and the use of comments in the decision-making process, as well as expressions of support for one or another of the alternatives analyzed in the DEIS. We were asked to document our public notice of all plan-related public meetings since we had received complaints that adequate notice had not been given.

RESPONSE:

We appreciate all expressions of interest in the Plan-revision process and the environmental analysis of the proposed Plan, including the many well-attended public meetings during the development of the revision, as well as the letters we received on the Plan from all over the country. The planning record contains documentation of our public notice for all meetings. It shows that we have complied with applicable regulations in the announcement of our public meetings.

295. We received requests to address on-the-ground issues related to equestrian use and the trails-designation project, to delay the decision on the revised Plan until the trails-designation process is completed, or to examine and reconsider ATV/OHM use.

RESPONSE:

We appreciate these expressions of interest in the trails-designation project and the issue of ATV use on the Forest. We have published a trails-designation Record of Decision and FEIS, which addresses comments received on the DEIS related to that project. The Forest Supervisor has made his decision on the trails-designation proposal. Each decision-making process is proceeding appropriately. ATV/OHM use was adequately discussed in the DEIS.

C. LAW ENFORCEMENT

296. The DEIS should consider an increase in law-enforcement officers as a mitigation measure. The Forest Service should invest more money to put more law-enforcement officers on the Forest to enforce the law and regulations, especially related to off-road vehicle use.

RESPONSE:

Neither the Regional Forester nor the Forest Supervisor control law enforcement on the Forest; thus, it is outside the scope of the Forest Plan and the EIS. The EIS discusses law enforcement as an element of the affected environment.